22nd European Congress on Obesity (ECO2015)

Prague, Czech Republic, May 6–9, 2015

ABSTRACTS
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Contents

Obesity Facts 2015;8(suppl 1):V

PLENARY SESSIONS
Thursday, 7 May, 2015
T1:PL - Track 1 Plenary Lecture 1
T3:PL - Track 3 Plenary Lecture 1

Friday, 8 May, 2015
T2:PL - Track 2 Plenary Lecture 1
T5/T6:PL - Track 5 Plenary Debate 1

Saturday, 9 May, 2015
T6/T7:PL – Track T6/T7 Plenary Lecture 2
T8:PL – Track T8 Plenary Debate 2

REVIEW SESSIONS/WORKSHOP
Wednesday, 6 May, 2015
T1:RS1 – Secretory Factors in Non-Adipose Tissues 3
T3:RS1 – Changing Behaviors 3
T5:RS1 – Screening and Intervening Early for Healthy Growth 4
T8:RS1 – Ethics of Medico-Surgical Management 6

Thursday, 7 May, 2015
T2:RS1 – Remodelling, Fibrosis and Inflammation 7
T3:RS2 – Physical Fitness 8
T7:RS2 – Lifecourse Perspective 8
T4:RS1 – Addiction 10

Friday, 8 May, 2015
T1:RS2 – Lipid Metabolism 10
T3:RS3 – Nutrients and Diet Patterns 11
T4:RS2 – Extreme Weight Loss and Psychological Support 12
T5:RS2 – Genetics, Epigenetics and Early Feeding Practices 12
T2:RS2 – Adipose Tissue Oxygen Tension and Angiogenesis 13
T8:RS2 – Multidisciplinary Clinical Management 14

Saturday, 9 May, 2015
T6:RS1 – Societal and health economics (taxation) 15
T8:WS1 – Multidisciplinary Treatment in Children and Adults 16

SPECIAL SESSIONS
Wednesday, 6 May, 2015
EASO OMTF Teaching Course: Multidisciplinary Treatment in Adults 17
EASO PPHTF and WHO Europe Join Workshop: Primary Prevention of Overweight and Obesity 17
WHO Session: Population Trends 17

Thursday, 7 May, 2015
T8: CS1 – Should Children, Elderly and Adults who are Moderately Obese be Offered Surgery? 18
T1/T2:CS1 – Central or Peripheral Regulation in Obesity and Insulin Sensitivity? 19
Controversy Session: Should Weight/Adipose Tissue Loss or General Health be the Treatment Goal? 19
EASO/IFSO-EC Young Investigators United (YIU) Scientific and Awards Session 20
## Contents

**Obesity Facts 2015;8(suppl 1):VI**

### ORAL SESSIONS

**Wednesday, 6 May, 2015**
- T1/T2:OS1 – Organ Cross Talk
- T3:OS1 – Eating Behaviour and Patterns
- T6/T7:OS1 – Working with Perception and Stigma

**Thursday, 7 May, 2015**
- T1/T2:OS2 – Adipose Tissue Plasticity and Oxidative Phenotype
- T3:OS2 – Macro and Micro Nutrients
- T5:OS1 – Childhood Growth

**Friday, 8 May, 2015**
- T6/T7:OS2 – Drivers of Difference
- T3:OS2 – Macro Nutrients and Food Reformulation
- T5:OS1 – Childhood Obesity
- T8:OS2 – Multidisciplinary Treatment

**Saturday, 9 May, 2015**
- T1/T2:OS3 – Adipose Tissue Mass and Function
- T6/T7:OS3 – Actions for Change
- T3:OS3 – Genes and Metabolic Function
- T8:OS3 – Bariatric and Metabolic Surgery

### POSTER SESSIONS

**Thursday, 7 May, 2015**
- T1 – Organ cross-talk
- T1 – Genetics, epigenetics and omics
- T1 – Lipid Metabolism
- T1 – Myokines
- T1 – Gut microbiota
- T1 – Gut hormones/incretins
- T1 – Bone & Muscle
- T1 – Imaging
- T1 – Immunometabolism
- T3 – Nutrients and diet patterns
- T3 – Changing behaviors
- T3 – Physical fitness
- T3 – Food reformulation
- T3 – Genetic susceptibility
- T3 – Taste, hedonics and appetite
- T3 – Protective foods
- T3 – Energy balance
- T3 – Popular diets
- T3 – Physical (in)/activity
### Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>T3 – Sleep</td>
<td>112</td>
</tr>
<tr>
<td>T3 – Sugar and artificial sweeteners</td>
<td>114</td>
</tr>
<tr>
<td>T6 – Environmental/ecological drivers</td>
<td>115</td>
</tr>
<tr>
<td>T6 – The role of industry (inc reformulation)</td>
<td>116</td>
</tr>
<tr>
<td>T6 – Stigma, bias and discrimination</td>
<td>116</td>
</tr>
<tr>
<td>T6 – Inequalities/Cultural variation</td>
<td>119</td>
</tr>
<tr>
<td>T6 – Consumer perspectives</td>
<td>120</td>
</tr>
<tr>
<td>T6 – Media</td>
<td>120</td>
</tr>
<tr>
<td>T7 – Lifecourse perspective</td>
<td>120</td>
</tr>
<tr>
<td>T7 – Population trends (European comparison)</td>
<td>122</td>
</tr>
<tr>
<td>T7 – Health promotion policies</td>
<td>125</td>
</tr>
<tr>
<td>T7 – Community based interventions</td>
<td>125</td>
</tr>
<tr>
<td>T7 – Success and failure of interventions</td>
<td>128</td>
</tr>
<tr>
<td>T7 – Obesity and disease in populations</td>
<td>133</td>
</tr>
<tr>
<td>T7 – Primary/secondary prevention</td>
<td>145</td>
</tr>
<tr>
<td>T7 – Policy</td>
<td>149</td>
</tr>
<tr>
<td>T7 – New analytical approaches in epidemiology</td>
<td>149</td>
</tr>
<tr>
<td>T7 – Optimising monitoring and technology with technology</td>
<td>150</td>
</tr>
</tbody>
</table>

**Friday, 8 May, 2015**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2 – De novo lipogenesis</td>
<td>151</td>
</tr>
<tr>
<td>T2 – Mitochondrial functions</td>
<td>151</td>
</tr>
<tr>
<td>T2 – Remodeling, fibrosis and inflammation</td>
<td>152</td>
</tr>
<tr>
<td>T2 – Oxygen tension</td>
<td>157</td>
</tr>
<tr>
<td>T2 – Ectopic fat</td>
<td>157</td>
</tr>
<tr>
<td>T2 – Lipotoxicity</td>
<td>159</td>
</tr>
<tr>
<td>T2 – Lipid Metabolism</td>
<td>160</td>
</tr>
<tr>
<td>T2 – Adipokines</td>
<td>163</td>
</tr>
<tr>
<td>T2 – Recruitment of adipocytes</td>
<td>168</td>
</tr>
<tr>
<td>T2 – White, beige and brown Adipocytes</td>
<td>168</td>
</tr>
<tr>
<td>T2 – Angiogenesis</td>
<td>173</td>
</tr>
<tr>
<td>T2 – Systemic consequences of adipose tissue metabolism</td>
<td>173</td>
</tr>
<tr>
<td>T4 – Addiction/Addiction after Bariatric Surgery</td>
<td>178</td>
</tr>
<tr>
<td>T4 – Brain imaging and phenotyping</td>
<td>180</td>
</tr>
<tr>
<td>T4 – Eating Disorders</td>
<td>181</td>
</tr>
<tr>
<td>T4 – Psychological support and Patient Support</td>
<td>182</td>
</tr>
<tr>
<td>T4 – Quality of life</td>
<td>185</td>
</tr>
<tr>
<td>T4 – Anxiety and depression</td>
<td>188</td>
</tr>
<tr>
<td>T4 – Disability/intellectual deficiency</td>
<td>189</td>
</tr>
<tr>
<td>T5 – Pregnancy</td>
<td>190</td>
</tr>
<tr>
<td>T5 – Fetal programming/epigenetics</td>
<td>193</td>
</tr>
<tr>
<td>T5 – Early feeding practices and nutrition</td>
<td>195</td>
</tr>
<tr>
<td>T5 – Healthy development</td>
<td>197</td>
</tr>
<tr>
<td>T5 – Education/Schools</td>
<td>198</td>
</tr>
<tr>
<td>T5 – Childhood and adolescence</td>
<td>199</td>
</tr>
<tr>
<td>T5 – Screening and early interventions</td>
<td>202</td>
</tr>
<tr>
<td>T5 – Child protection and welfare</td>
<td>203</td>
</tr>
<tr>
<td>T8 – Comorbidities (inc diabetes, hypertension, lipids, sleep apnea, sexual dysfunction)</td>
<td>203</td>
</tr>
<tr>
<td>T8 – Metabolic outcomes (diabetes, lipids, hypertension)</td>
<td>208</td>
</tr>
<tr>
<td>T8 – Long term outcomes</td>
<td>214</td>
</tr>
<tr>
<td>T8 – Bariatric and metabolic surgery</td>
<td>218</td>
</tr>
<tr>
<td>T8 – Multidisciplinary treatment</td>
<td>229</td>
</tr>
</tbody>
</table>
## Contents

Obesity Facts 2015;8(suppl1):VIII

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>T8 – Drugs (approval, regulation)</td>
<td>235</td>
</tr>
<tr>
<td>T8 – Medico-Surgical approaches</td>
<td>237</td>
</tr>
<tr>
<td>T8 – Ethics and guidelines</td>
<td>238</td>
</tr>
<tr>
<td>T8 – Emerging treatments</td>
<td>238</td>
</tr>
<tr>
<td>T8 – Diagnostics</td>
<td>242</td>
</tr>
<tr>
<td>T8 – Geriatric obesity, treatment</td>
<td>245</td>
</tr>
<tr>
<td>T8 – Complications</td>
<td>245</td>
</tr>
<tr>
<td>T8 – Alternative treatments</td>
<td>245</td>
</tr>
<tr>
<td>Author Index</td>
<td>249</td>
</tr>
<tr>
<td>Imprint</td>
<td>ll</td>
</tr>
</tbody>
</table>
PLENARY SESSIONS

Thursday, 7 May, 2015

T1:PL
Mammalian circadian clock and metabolism: The epigenetic link
Sassone-Corsi P.1
1Center for Epigenetics and Metabolism, University of California, Irvine

Circadian rhythms govern a number of fundamental physiological functions in almost all organisms, from prokaryotes to humans. The circadian clocks are intrinsic time-tracking systems with which organisms can anticipate environmental changes and adapt to the appropriate time of day. Disruption of these rhythms can have a profound influence on human health and has been linked to depression, insomnia, coronary heart disease, metabolic disorders and cancer. At the heart of circadian regulatory pathways is the clock machinery, a remarkably coordinated transcription-translation system that utilizes dynamic changes in chromatin transitions and epigenetic control. Recent findings show that regulation goes also the other way: specific elements of the clock are able to sense changes in cellular metabolism. Importantly, dynamic transitions in the epigenome have been associated with regulated patterns of nuclear organization. The accumulating evidence that chromatin remodeling is implicated in circadian function prompted us to explore whether the clock may control nuclear architecture. We applied the 3C-derived 4C technology (Chromosome Conformation Capture on Chip) to demonstrate the presence of circadian long-range interactions using the clock-controlled dbp gene as bait. The circadian genomic interactions with dbp are highly specific and are absent in cells whose clock is disrupted by ablation of the Bmal1 gene. We establish that the dbp circadian interactome contains a wide variety of genes and clock-related DNA elements. While revealing a previously unappreciated role of the circadian clock, these findings pave the way towards the elucidation of how nutrition may impact the shaping of the nuclear landscape.

T3:PL
Modulation of inflammation and metabolism by dietary fatty acids
Calder P.C.1
1Faculty of Medicine, University of Southampton, Southampton SO16 6YD, United Kingdom and NIHR Southampton Biomedical Research Centre, University Hospital Southampton NHS Foundation Trust and University of Southampton, Southampton General Hospital, Southampton SO16 6YD, United Kingdom

Both inflammation and dysmetabolism contribute to a range of human diseases. These two processes are linked since inflammation alters metabolism, while metabolism can produce compounds that induce or modulate inflammatory processes. Lipids and their fatty acid components play key roles in regulation of inflammatory and metabolic processes. Different fatty acid classes, and within the classes, different individual fatty acids have different effects. This is because they act through both general and specific molecular and cellular mechanisms. Consequently one fatty acid, or class of fatty acids, may oppose the action(s) of another. Within metabolism, saturated and polyunsaturated fatty acids often oppose one another’s actions, while within inflammation omega-3 fatty acids (n-3FA) often oppose different actions of saturated and omega-6 polyunsaturated fatty acids. Among the n-3FAs, the most biologically active are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). EPA and DHA are found in oily fish, fish oil supplements and a small number of pharmaceutical grade preparations. They are able to reduce inflammatory responses and modify metabolism. Key effects of EPA and DHA include reduced production of eicosanoids from the omega-3 fatty acid arachidonic acid; increased production of anti-inflammatory and inflammation resolving mediators (resolvins, protectins and maresins); altered activity of several transcription factors (NFκB, AP-1, PPARα, PPARγ) so acting to reduce production of pro-inflammatory chemicals and to promote fatty acid β-oxidation, insulin sensitivity and reduction in circulating and hepatic triglycerides; and signalling through GPR120 in inflammatory cells and adipocytes. Through these molecular and cellular actions, n-3FAs counter several effects of saturated and omega-6 polyunsaturated fatty acids. The resulting improvements in cell and tissue function are associated with improved health and well-being.

Friday, 8 May, 2015

T2:PL
Molecular mechanisms linking inflammation and adipocyte de novo lipogenesis to insulin resistance in obesity
Czech M.P.1, Aouadi M.1, Tencerova M.1, Cohen J.L.1, Shen Y.1, Pedersen D.J.1, Danai L.V., Guilherme A.1
1Program in Molecular Medicine, University of Massachusetts Medical School, Worcester, MA, USA

Regulatory mechanisms that control fatty acid synthesis and oxidation under various physiological conditions contribute to overall body weight changes during nutrient overload. Insulin stimulates synthesis of fatty acids (de novo lipogenesis) and their esterification into triglycerides in liver and white adipocytes, which can secondarily modulate systemic glucose tolerance. Paradoxically, hepatic de novo lipogenesis is greatly increased in obesity while in white adipocytes it is markedly decreased, even though both tissues exhibit insulin resistance. Parallel to these effects of obesity on lipogenesis and insulin resistance, expansion of immune cells and inflammation of these tissues occurs. Although it is clear that inflammation contributes to insulin resistance, it has not however been technically possible to determine whether immune cells within a given tissue cause insulin resistance within that specific tissue. Using newly developed siRNA gene silencing technology selectively directed to either resident liver macrophages, denoted as Kupffer cells, or selectively to adipose tissue macrophages, we show these tissue immune cells do directly and locally contribute to the insulin resistance in both hepatocytes and adipocytes, respectively, in obese mice. The downregulation of lipogenic genes in adipocytes caused by obesity is also mediated in part by adipose macrophage cytokines. New data on questions that remain open will be presented: Do the cytokines that adipocytes release contribute to metabolic regulation in vivo, as do macrophage-derived cytokines? How do rates of adipocyte lipogenesis aparently module whole body glucose tolerance?

Acknowledgement: We gratefully acknowledge funding for our studies from NIH grant DK030898 and from the International Research Alliance at Novo Nordisk Foundation Center for Metabolic Research.

T5:PL
It is a Parental Responsibility
Marcus C.1
1Karolinska Institutet, Division of Pediatrics, Department of Clinical Science, Intervention and Technology, Stockholm, Sweden

Although changes in society are important for the obesity epidemic, parental factors are of major importance for childhood obesity development
– especially for younger children. Before 10 years of age parents decide almost everything regarding their children’s type of food, meal patterns, physical activity and snacking. Already during pregnancy parental behavior is of importance. Maternal weight gain is associated with children’s long-term weight development at least until 6–12 years of age. Genetic factors are of importance for obesity development but obesity genes do not make anyone obese without overeating. The temporal pattern for how and when parental obesity affects childhood obesity is not the same as that for the obesity genes. Parental education is associated with children’s weight already at one year of age. Taken together, all these facts clearly indicate that the mechanisms behind the strong association between parental and offspring obesity primarily is of social and/or epigenetic origin, i.e., factors parents should have the capacity to modify in an obesity-preventive direction. Thus, the most important measures to be taken are to increase the awareness of the parents regarding their importance and support the parents as role-models and decision-makers for their children. If the parents shoulder these responsibilities, their children will have optimal chances to handle both a potential genetic vulnerability and the obesogenic society!

Acknowledgement: Swedish Research Council

T6:PL
Obesity: A societal responsibility
Perry Ivan J, 1
1Department of Epidemiology & Public Health, University College Cork, Ireland, 2HRB Centre for Health & Diet Research

The debate on the relative importance of genes and environment in obesity is now largely redundant. It is accepted that obesity like all conditions reflects a complex interplay of both genetic and environmental factors and that efforts to partition the origins of this condition between genes and environment are futile. This issue will be briefly reviewed. The relative contributions of personal agency versus societal conditioning will also be addressed. It will be argued that although efforts to empower individuals and families are not futile they are likely to play a relatively small part in tackling the epidemic of overweight and obesity in children and adults. Rudolf Virchow in his Report on the 1848 typhus epidemic in Upper Silesia stated “If disease is an expression of individual life under favorable conditions, then epidemics must be indicative of mass disturbances of mass life.” The global epidemic of overweight and obesity is undoubtedly “indicative of mass disturbances of mass life” – a societal issue that requires a societal level response. All of us who work in the area of overweight and obesity face difficult challenges in addressing societal level issues, in particular the need to confront powerful commercial interests on the over-supply of cheap calories and inappropriate/unethical marketing of processed, calorie dense foods.


Saturday, 9 May, 2015

T6:PL
Ecological Public Health: A new approach to 21st century public health dilemmas
Rayner G.C, 1
1City University London

The main lines of the modern public health approach were established in Europe’s major cities from the mid-19th century. Sanitary measures focused on unhealthy urban environments, health education applied new behavioural rules to personal hygiene, and mass immunisation spread the first of many bio-medical measures, with bio-medicine later coming to dominate the public health field. Only from the mid-20th century was attention given to the importance of economic factors in driving health improvement. In the 1960s, the epidemiologist Thomas McKeown controversially claimed that rising living standards and nutritional improvement mattered far more than medicine as an explanation for rising health trends, an assessment extended by Nobel Laureate Robert Fogel in his proposition of ‘techno-physis’ evolution. Rather than improving health, aspects of technological and economic advance in the 21st century – the revolution in farming production and food systems, private motor transport and a burgeoning culture industry – seem only to have confounded it, contributing to population weight gain and also, via links to climate change and biodiversity loss, threatening the ecological platform of human existence.

In an age of complex and increasingly conjoint public health and environmental dilemmas once successful models of public health no appear either adequate or able to command public support. Our proposition of Ecological Public Health is hardly new. Its past supporters ranged from French biologist Rene Dubos to US public health official John Hanlon. In my presentation I will argue that in the 21st century public health advocates must embrace the Ecological Public Health perspective. I further demonstrate how such thinking might contribute to the establishment of a ‘healthy weight’ society.

Obesity Facts 2015;8(suppl 1):1–247

Abstracts

Wednesday, 6 May, 2015

T1:RS1 – Secretory Factors in Non-Adipose Tissues

T1:RS1.1
Ectopic fat and organ steatosis

Perseghin G.¹
¹Department of Biomedical Sciences for Health, Università degli Studi di Milano & Metabolic, Medicine, Policlinico di Monza, Monza, Italy

Insulin resistance may be detected up to 20 years before the development of actual hyperglycemia and it represents a pivotal event into the pathogenesis of type 2 diabetes. Insulin resistance is also widely present into the population and mechanistically it may represent a defensive mechanism against the sedentary life style and overfeeding. In fact, insulin resistance is also largely prevalent in overweight and obese individuals. In this context, there is the hypothesis that insulin resistance at the level of the skeletal muscle, liver and the heart may be secondary to the excessive amount of fatty acids released by the adipocytes because of a dysfunction of adipose tissue or simply because of an excessive amount of calories in the diet which may push the re-esterification of these fatty acids also in ectopic sites and not only in the subcutaneous and visceral adipose tissue with metabolic and functional deleterious effects on this sites of ectopic accumulation. On the opposite view accumulation of fat in ectopic sites may mediate deleterious effects in remote organs and tissue. For example NAFLD/NASH has been consistently associated with increased risk of future development of diabetes and cardiovascular disease. Whether this association is simply a simultaneous manifestation of the features of the metabolic syndrome or whether ectopic fat accumulation is truly causative of metabolic and cardiovascular diseases potentially mediated through the release of mediators acting on distant organs is still to be firmly established.

T1:RS1.2
Novel myokines

Villarroya F.¹,²
¹Department of Biochemistry and Molecular Biology, University of Barcelona, ²EBER, Fisioterapia de la Obesidad y Nutrición

The capacity of skeletal muscle to release regulatory factors with endocrine and autocrine action in response to physio-pathological stimuli has been recognized for long, and has led to the “myokine” concept. Possibly interleukin-6 (IL-6) is a paradigmatic example of myokine, highlighting the complexities of myokines action. IL-6 is released by muscle in response to exercise and contributes to the insulin-sensitizing effects of exercise, whereas IL-6 is also considered a pro-inflammatory cytokine increased as consequence of obesity. Recently, multiple novel regulatory factors acting as myokines have been identified. Irisin, a cleaved product of the FNDCS protein, is produced by muscle under exercise and has a major biological action by promoting the browning of fat. Fibroblast growth factor-21 (FGF21), another endocrine factor capable of inducing brown fat activity, white adipose tissue browning and a metabolic health profile, has been also recognized as a myokine. FGF21 is released in response to muscle mitochondrial activity and, in fact, it is considered a circulating biomarker of muscle mitochondrial disease. Molecules acting as myokines are also often adipokines, and it is specially remarkable that many of them (i.e. IL-6, FGF21) are released by muscle in conditions of enhanced muscular activity (i.e. exercise) and also by brown adipose tissue in conditions of brown fat activation (i.e. cold), which raises the point about similarities between the muscle and brown fat signalling secretome. Identification of myokines and their biological action provide tools to be influenced by nutritional or pharmacological means in order to promote healthy metabolism.

Acknowledgement: Support by MINECO, Spain and Generalitat de Catalunya is acknowledged

T1:RS1.3
Beyond intestinal soap – role of bile acids in control of adipose tissue function and development of obesity

Kuipers F.¹
¹Departments of Pediatrics and Laboratory Medicine, University Medical Center Groningen, Groningen, The Netherlands

Over the past decade, it has become apparent that bile acids are involved in a host of activities beyond their classic functions in bile formation and fat absorption. The identification of the farnesoid X receptor (FXR, encoded by Nr1h4) as a nuclear receptor directly activated by bile acids and the discovery that bile acids are also ligands for the membrane-bound, G-protein coupled bile acid receptor 1 (also known as TGR5) have opened new avenues of research. Both FXR and TGR5 are expressed in various tissues and organs and have been found to regulate various elements of glucose, lipid and energy metabolism. Consequently, a picture has emerged of bile acids acting as modulators of (postprandial) metabolism. Therefore, strategies that interfere with either bile acid metabolism or signaling cascades mediated by bile acids may represent novel therapeutic approaches for metabolic diseases. Synthetic modulators of FXR have been designed and tested, primarily in animal models, and have revealed that organ-selective FXR agonism may provide new approaches in the treatment of obesity and certain components of the metabolic syndrome. Furthermore, the use of bile acid sequestrants to reduce plasma cholesterol levels has unexpected benefits. For example, treatment of patients with type 2 diabetes melitus (T2DM) with sequestrants causes substantial reductions in plasma levels of glucose and HbA1c. An overview of the molecular mechanisms by which bile acids through FXR and/or TGR5 modulate glucose and energy metabolism, particularly focusing on adipose tissue biology and development of obesity.

T3:RS1 – Changing Behaviors

T3:RS1.1
Developing theory- and evidence-based interventions. Logic modelling for behaviour modification

Kahlert D.¹
¹University of Stuttgart, Chair Exercise and Health Science, Stuttgart, Germany

Health behaviours, such as physical activity or dieting, are associated with body weight. Being physically active and following a healthy diet have been shown to reduce the risk of premature death or morbidity. Despite those positive outcomes, prevalence studies report that only a small number of people follow a healthy lifestyle. People’s behaviour is multi-determined, often guided by routines and habits and is therefore difficult to change. Theory-driven and evidence-based interventions aim to support people in their lifestyle changes. The development of a theory-driven and evidence-based intervention contains several steps that relate tailored (or targeted) intervention inputs with intended outputs: the intervention goal(s). Theory-driven interventions postulate assumptions why the
Interventions to change nutrition and physical activity have had modest and variable success. To some extent, this reflects limitations in the scientific methods we use to study and change behaviour. Interventions are complex in that they are usually made up of several interacting components: behaviour change technologies (BCTs). In order to improve interventions, we need to be able to identify the effective BCTs within complex interventions and understand their mechanisms of action. This talk will present BCT Taxonomy v1, a method for specifying interventions in terms of their BCTs using standardised terms and definitions developed by cross-disciplinary and international consensus. The talk will also report results of applying this to identifying effective BCTs within interventions aimed at increasing physical activity and healthy eating and illustrate the power of using theory to guide such analyses. It will also present a method for designing effective interventions, starting with a model of behaviour (COM-B) which allows an analysis of the target behaviour in context. This model forms the “hub” of the Behaviour Change Wheel, which integrates 19 frameworks of behaviour change into 9 intervention functions and 7 policy categories. The talk will show how this can be used to develop population-based interventions, selecting intervention functions, relevant BCTs and policies to support their implementation.

**T3:RS1.2**

**What behaviour changetechniques and theory work best for population-based nutrition & physicalactivity interventions?**

Michie S.¹

¹Centre for Behaviour Change, University College London, UK

Interventions to change nutrition and physical activity have had modest and variable success. To some extent, this reflects limitations in the scientific methods we use to study and change behaviour. Interventions are complex in that they are usually made up of several interacting components: behaviour change technologies (BCTs). In order to improve interventions, we need to be able to identify the effective BCTs within complex interventions and understand their mechanisms of action. This talk will present BCT Taxonomy v1, a method for specifying interventions in terms of their BCTs using standardised terms and definitions developed by cross-disciplinary and international consensus. The talk will also report results of applying this to identifying effective BCTs within interventions aimed at increasing physical activity and healthy eating and illustrate the power of using theory to guide such analyses. It will also present a method for designing effective interventions, starting with a model of behaviour (COM-B) which allows an analysis of the target behaviour in context. This model forms the “hub” of the Behaviour Change Wheel, which integrates 19 frameworks of behaviour change into 9 intervention functions and 7 policy categories. The talk will show how this can be used to develop population-based interventions, selecting intervention functions, relevant BCTs and policies to support their implementation.

**T3:RS1.3**

**Public acceptability in the UK and USA of nudging to reduce obesity: The example of reducing sugar-sweetened beverages consumption**

Petrescu D.C.¹, Hollands G.J.¹, Ng Y.¹, Marteau T.M.¹

¹Behaviour and Health Research Unit, University of Cambridge

**Introduction:** The consumption of sugar-sweetened beverages is a major contributor to obesity particularly in children. Recent systematic reviews provide good evidence that reducing portion size reduces consumption. The public acceptability of such an intervention is unknown. Here we compare the acceptability in UK and USA samples of government interventions to reduce consumption of sugar-sweetened beverages: three nudge interventions (limiting portion size, changing container shape, and changing shelf location) and two traditional interventions (increased taxation and an education campaign). We also tested the hypothesis that informing participants that interventions affect behaviour via non-conscious processes decreases acceptability.

**Methods:** 1093 UK and 1082 USA participants rated their support for all experimental conditions. Each intervention was said to affect behaviour: (a) via conscious processes; (b) via non-conscious processes; (c) no process stated.

**Results:** For the majority of both samples, the education campaign and the three nudge interventions were acceptable, with education attracting most support. By contrast, only a minority of participants supported taxation. There was no support for the study hypothesis: stating that the interventions worked via non-conscious processes did not decrease acceptability for nudge interventions.

**Conclusion:** Nudge interventions to reduce consumption of sugary drinks appear to be acceptable to the public. Contrary to expectation, highlighting the non-conscious mechanisms via which nudge interventions work does not decrease their acceptability.

**T3:RS1.4**

**TV Junkie or PC Freak? – Associations of screen-time with eating and drinking habits**

Milder LE¹, Geurts M.¹, Dekkers AL¹, Temme E.H.¹, Proper K.J.¹, Wendel-Vos G.C.¹, van den Berg M.¹

¹Centre for Nutrition, Prevention and Health Services, National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands

**Background:** Screen-time is associated with higher weight and adverse health outcomes. This might be due to an influence of TV/PC use on physical activity and dietary habits, e.g. due to (mindless) snacking and exposure to food advertisements. Indeed some studies (mainly in children) have found associations between screen-time, particularly TV, and higher consumption of snacks and drinks and energy intake. **Aim:** To assess the associations between TV and PC screen-time and diet in adults

**Methods:** Dietary data of 2100 adults were collected in the Dutch National Food Consumption Survey 2007–2010 with a repeated 24-h recall. Data on leisure screen-time were self-reported. Habitual intakes of several food groups and nutrients were estimated and compared between people with low, intermediate and high screen-time using confidence intervals obtained by bootstrapping. All analyses were carried out with the SPADE statistical program (www.spade.nl); adjusting for potential confounders.

**Results:** Both PC and TV use tended to be associated with lower intake of fruit, vegetables and vitamin C. For PC differences were larger than for TV; but still small. Median intakes in the highest (≥ 3 hours/day) vs the lowest (<1 h/d) category of PC time were 66 vs 102 g/day for fruit, 110 vs 124 g/d for vegetables, and 84 vs 94 mg/d for vitamin C. With high PC use, intake of sugar-sweetened beverages was higher (233 vs 145 g/d). On the contrary, in the highest category of TV viewing (≥3h/d) intakes of sugar-sweetened beverages (151 vs 216 g/d) and mono- and disaccharides (90 vs 100 g/d) were lower than for people viewing less than 3 h/d.

**Conclusion:** Both TV and PC time were associated with some elements of an unhealthy dietary pattern. However, overall our study does not support the link between screen-time and diet.

**T5:RS1 – Screening and Intervening Early for Healthy Growth**

**T5:RS1.1**

**Screening and intervening early for healthy growth: Interventions in high risk children**

Heitmann B.L.¹

¹Research Unit for Dietary Studies at Institute of Preventive Medicine, Bispebjerg and Frederiksborg Hospital, The Capital Region, Denmark

Previous interventions have generally not been effective in preventing development of overweight, and at the same time studies suggest that some subgroups are more predisposed to future obesity. Obesity runs in families and the subgroup of children with obese parents is at a much higher risk of becoming obese than children of normal weight parents. Likewise, there is a several fold higher risk of obesity among children from lower than higher socioeconomic status families, and among those children born with a higher birth weight, those born to mothers who smoked during pregnancy, or those of Hispanic or African American origin. Generally, the studies targeting predisposed individuals seems more effective in
preventing obesity than the studies targeting general populations. However, most previous studies on high risk groups focused on ethnicity or socioeconomic status, only, and hence, there is a need for more studies. The Danish Healthy Start Primary Intervention Study included a total of 963 2–6 year old high risk children, all normal weight at baseline. The intervention, which focused on healthy diet, activity, sleep and stress management, included individual as well as group counselling and teaching in practical skills. The study was recently completed and the preliminary results, which suggest that the intervention was effective in preventing excessive weight development over the 18 months intervention period, will be presented.

T5:RS1.2
The World Health Organization’s global target for ending the increase in childhood overweight by 2025
de Onis M.1
1Department of Nutrition, World Health Organization, Geneva, Switzerland

Introduction: In 2012, the World Health Organization adopted a comprehensive plan for maternal, infant and young child nutrition which specified six global nutrition targets (1). One of the targets aims to achieve no increase in childhood overweight by 2025. This target implies that the global prevalence of 7% in 2012 should not rise to 11% in 2025 as current trends would predict (2). In addition, the number of overweight children under 5 years of age should not increase from the estimated 44 million in 2012 to 70 million in 2025 as forecasted. Achievement of the target to halt the increase in overweight in children under 5 years of age would be possible through the right mix of policies and actions. This presentation will review examples of evidence-based actions that have a strong potential for preventing childhood overweight. The policies and actions will require considerable political commitment, along with investment of resources and participation of a wide variety of sectors and stakeholders. In addition, childhood overweight is interlinked with the five other global nutrition targets of increasing the rate of exclusive breastfeeding and reducing stunting, anaemia in women of reproductive age, wasting and low birth weight. This presents opportunities for synergistic policy and programmatic approaches to address multiple targets simultaneously, using multisectoral platforms that are being established in a growing number of countries to improve maternal, infant and young child nutrition.

References

T5:RS1.3
The Early Prevention of Obesity in Children (EPOCH) Collaboration – results of an Individual Participant Data Prospective Meta-Analysis
Baur L A1, Askie L M1, Rissel C1, Espinoza D1, Martin A1, Wen L1, Magarey A1, Daniels L A1, Campbell K1, Hesketh K1, Taylor R2, Taylor B2
1University of Sydney, Sydney, Australia,
2Flinders University, Adelaide, Australia

Introduction: Obesity prevention efforts have increasingly focused early in life. RCTs of interventions are more powerful when they are synthesised into an individual participant data (IPD) prospective meta-analysis.

Methods: EPOCH comprises 4 RCTs of obesity prevention strategies commencing before age 6 mths. Its main objective was to determine if early intervention to prevent childhood obesity influences BMI z-scores at age 18–24 mths. There are a range of secondary endpoints. Data from the studies were prospectively planned to be combined. Data across the trials were aggregated using a one-step linear modelling approach that included treatment effect as a fixed effect and accommodated clustering in one trial. Multiple-imputation was used to evaluate the impact of missing data.

Results: The 4 trials comprised 2196 women/infants. Primary outcome data were available for 78% of infants. Mean BMI-z score at 18–24 mths was 0.67 (95% CI: 0.60 to 0.74) for intervention group, 0.80 (95% CI: 0.73 to 0.87) for control group (estimated diff = 0.13 [95% CI: −0.23 to −0.03]; p = 0.012). Multiple-imputation analysis estimated the difference at −0.10 (95% CI: −0.20 to 0.00; p = 0.04). Median breastfeeding duration was significantly longer in intervention arm (35 wks [95% CI: 30 to 37] vs 28 wks [95% CI: 26 to 30]; HR=0.89 [95% CI: 0.8 to 0.98]; p = 0.022). Children viewing TV for >1 hr/day was significantly lower in intervention arm (24% vs 35%; OR=0.63 [95% CI: 0.49 to 0.81; p < 0.001]). There were no significant differences in overweight/obesity, sleeping patterns or physical activity.

Conclusion: Early interventions for preventing childhood obesity appear effective in reducing BMI z-scores at 18–24 mths to a moderate degree, as well as prolonging breast feeding and reducing TV viewing time.

Acknowledgement: Australian National Health & Medical Research Council

T5:RS1.4
The role of early nutrition in programming of the adult body composition – The Helsinki Study of Very Low Birth Weight Adults
Matonlini H M1, Hovi P1,2, Männistö S1,2, Hippsle-Leppänen M1,3,4, Eriksson J G1,5,6, Mäkkie O1,2,3, Järvenpää A L1,2, Andersson S1,2, Kajantie E1,2,3,4
1National Institute for Health and Welfare, Helsinki and Oulu, Finland,
2Children’s Hospital, University of Helsinki and Helsinki University Central Hospital, Helsinki, Finland,
3Institute of Health Sciences, University of Oulu, Finland,
4Department of Pediatrics and Adolescence, Oulu University Hospital, Finland,
5Department of General Practice and Primary Health Care, Institute of Clinical Medicine, University of Helsinki, Helsinki, Finland,
6Unit of General Practice, Helsinki University Central Hospital, Helsinki, Finland,
7Folkhälsan Research Centre, Helsinki, Finland,
8Department of Obstetrics and Gynaecology, Oulu University Central Hospital and University of Oulu, Oulu, Finland

Introduction: Animal studies have shown that early nutrition plays an important role in programming long-term health. Direct human evidence is however scarce. We tested the hypothesis that higher early intake of protein and other macronutrients predicts adult adiposity in our natural experiment of adults born preterm with very low birth weight (VLBW, <1500g).

Methods: Mean gestational age (GA) of the 127 VLBW participants was 29.0 (SD 2.1) weeks and mean birth weight (BWT) 1105 (SD 218) g. We collected detailed information on their nutritional intake during initial hospital stay from the hospital records. Mean intakes of energy (94.1 kcal/kg/day, SD 15.5), protein (1.4 g/kg/d, SD 0.4) and fat (4.3 g/kg/d, SD 1.1) during the first three weeks of life were calculated. At the mean age of 22.5 (SD 2.1) years the subjects underwent a clinical examination including measurements of weight, height, body composition (dual x-ray absorptiometry) and resting energy expenditure (indirect calorimetry).

Results: We found that neonatal energy, protein and fat intakes predicted adult body composition. When adjusted for sex, age, BWT SD score and GA, a one g/kg/d higher protein intake predicted 11.1% higher lean body mass (LM) (95% CI 3.7 to 18.9) and 8.5% higher resting energy expenditure (0.2 to 17.0) (Figure 1). Similar associations were seen with higher early intake of fat but not of carbohydrate. Adjustments for highest parental education or preand postnatal medical complications had little effect on our results.

Conclusions: At relatively low neonatal protein intake levels, additional protein intake is reflected by healthier body composition, accompanied by a higher metabolic rate, twenty years later.

Novel mechanisms of metabolic improvements after bariatric surgery

Di Lorenzo N.1, Camperchioli I.1, Carrano F.M.1

1Dept. Of Experimental Medicine and Surgery, Universitŕ di Roma Tor Vergata V.le Oxford 81, 00133 Roma Italy

Overweight and obesity in European adults are responsible for about 80% of cases of T2DM, 35% of ischaemic heart disease and 55% of hypertension. Additionally osteoarthritis, respiratory difficulties, infertility, psychosocial problems and other factors which reduce life expectancy, quality of life and disability, are extremely costly in terms of both absence from work and use of health resources. Bariatric surgery has proven to be the most effective treatment for morbidly obese patients, with long-term studies providing evidence of a substantial reduction of mortality and a decreased risk of developing new health-related comorbidities. A BMI reduction of 5 points leads to T2DM reduction of 33%, 27% for hypertension, 20% for hyperlipidemia. Obesity is accompanied by increased arterial stiffness, left ventricular hypertrophy, and diastolic dysfunction, all associated with a marked improvement even as early as 6 months after bariatric surgery. In addition to its significant benefits on weight, surgery has tremendous effects on glucose homeostasis and may lead to complete remission of T2D, due to the significant improvement in hepatic and muscular insulin sensitivity. Although lifestyle and pharmacological interventions can control glucidic metabolism, they do not reduce the incidence of cardiovascular events in obese individuals with diabetes or in other high-risk groups with increased body weight. Apart from its malabsorptive effects, bariatric surgery reduces the long-term incidence of diabetes by about 80% (Swedish Obese Subjects study) by modifying some gut hormones pattern (GLP-1, GIP, PYY and ghrelin) and their metabolic effects. Experimental studies suggest that changes in gut microbiota are associated to body weight gain and fat accumulation by the mucosal production of RELMβ, a key factor in glucose homeostasis. At last, the increasing level of inflammatory factors (IL-1, IL-6 and TNF) in obese people represents a future promising field of research.

Fecal transplantation in obesity and metabolic syndrome

Nieuwdorp M.1

1AMC-VUMc

Alterations in (small) intestinal microbiota are associated with obesity and insulin resistance, with the latter usually characterized by low grade endotoxemia. We recently showed that fecal transplantation (infusing intestinal microbiota from lean donors) in male recipients with metabolic syndrome has beneficial effects on the recipients’ microbiota composition and glucose metabolism via lowering plasma endotoxin levels (Vrieze, Gastroenterology 2012). Moreover, preliminary data suggest that 4 weeks daily oral gavage with one of the identified small intestinal bacterial strains (butyrate producer Eubacterium hallii) has dose dependent beneficial effects on insulin sensitivity and liversteatosis in male db/db mice. Moreover, we found that intestinal bacterial strains are involved in visceral adipose tissue inflammation. Combined our data suggest that specific intestinal bacterial strains might be developed as therapeutic targets to normalize inflammatory tone and insulin sensitivity in humans.

Targeted therapy in obesity

Svacina S.1

13rd Medical Department, 1st Medical Faculty, Charles University, Prague, Czech Republic

Introduction: The term targeted therapy is used for the use of antibodies against different humoral factors or receptors. This therapy is successful in oncology, rheumatology, dermatology, ophthalmology and gastroenterology. Many experimental and clinical studies were performed in diabetes with controversial results. A review was prepared concerning possible effects of targeted therapy on obesity. As in diabetes there are three possible ways how targeted therapy can be analysed: 1. Discussion about factors which can be targeted in obesity therapy. 2. The effect on body weight in clinical trials and clinical use of targeted therapy in medicine. 3. Experiments with targeted therapy in obesity treatment.

Results: 1. There are many possible targets for antibody treatment in obesity- e.g. proinflammatory factors or some adipokines. The elevation of these factors was described in obesity and related diseases. Only few of this factors were targeted by antibodies in animal or clinical studies. 2. Only few studies of use of targeted therapy in different fields of medicine include data about weight or BMI. The use of targeted therapy in rheumatology can decrease the risk of type 2 diabetes to 0.5. It is independent of BMI. 3. Very few studies in experimental animals use targeted therapy in obesity treatment with promising results. The use of antibodies against FGFR1 (receptor for growth factor FGF21) decreased weight in animals by 10%, decreased insulin resistance, decreased hepatic lipid content and serum lipid levels. The energy expenditure was increased. Promising are also experiments with blocking of soluble activin type II receptors-protecting against diet induced obesity.

Conclusion: Limited data are available on antibody based of obesity and its complication except diabetes. The use of targeted therapy in type 2 diabetes treatment has a long history with limited results. The history of experiments in obesity is shorter but it also starts to be promising.

Introduction and discussion of targeted therapies in obesity

Pereira P.1

1Maptia

Introduction: Targeted therapy was initially used in hematology and oncology and is currently spreading to other fields such as dermatology, neurology, etc. Overweight and obesity in European adults are responsible for about 80% of cases of T2DM, 35% of ischaemic heart disease and 55% of hypertension. Additionally osteoarthritis, respiratory difficulties, infertility, psychosocial problems and other factors which reduce life expectancy, quality of life and disability, are extremely costly in terms of both absence from work and use of health resources. Bariatric surgery has proven to be the most effective treatment for morbidly obese patients, with long-term studies providing evidence of a substantial reduction of mortality and a decreased risk of developing new health-related comorbidities. A BMI reduction of 5 points leads to T2DM reduction of 33%, 27% for hypertension, 20% for hyperlipidemia. Obesity is accompanied by increased arterial stiffness, left ventricular hypertrophy, and diastolic dysfunction, all associated with a marked improvement even as early as 6 months after bariatric surgery. In addition to its significant benefits on weight, surgery has tremendous effects on glucose homeostasis and may lead to complete remission of T2D, due to the significant improvement in hepatic and muscular insulin sensitivity. Although lifestyle and pharmacological interventions can control glucidic metabolism, they do not reduce the incidence of cardiovascular events in obese individuals with diabetes or in other high-risk groups with increased body weight. Apart from its malabsorptive effects, bariatric surgery reduces the long-term incidence of diabetes by about 80% (Swedish Obese Subjects study) by modifying some gut hormones pattern (GLP-1, GIP, PYY and ghrelin) and their metabolic effects. Experimental studies suggest that changes in gut microbiota are associated to body weight gain and fat accumulation by the mucosal production of RELMβ, a key factor in glucose homeostasis. At last, the increasing level of inflammatory factors (IL-1, IL-6 and TNF) in obese people represents a future promising field of research.

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Adipose tissue lies at the crossroad of nutrition, metabolism and immunity and adipose tissue inflammation was proposed as one of the central mechanisms connecting obesity with its metabolic and vascular complications. Resident immune cells constitute the second largest adipose tissue cellular component after adipocytes and as such play important roles in maintaining adipose tissue homeostasis. Obesity-induced changes in their number and function result in activation of local and later systemic inflammatory response marking the transition from simple adiposity to diseases like type 2 diabetes mellitus, arterial hypertension and ischemic heart disease. Although the exact mechanisms responsible for the initiation of adipose tissue inflammation are still poorly understood, accumulation of body fat leads to increased recruitment of several types of proinflammatory immune cells into the adipose tissue, including macrophages, lymphocytes, dendritic and mast cells and neutrophils. Conversely, other immune cell subtypes involved in anti-inflammatory reactions as eosinophils or M2 macrophages are decreased. Weight reduction is associated with profound changes in the amount and characteristics of adipose tissue immune cells; however, the exact roles of diverse subtypes of immune cells in the beneficial effects of different weight reducing procedures remain to be elucidated. Even though we only begin to unravel the complex and dynamic network of immune cells in the adipose tissue, the study of their phenotypes and interactions under different conditions might help discover new immunometabolic pathways and regulatory reactions potentially enabling the development of novel strategies in the treatment of obesity and its complications.

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Human adipocyte function is impacted by mechanical cues

Pellegrinelli V.1,2, Heuvingh J.1, du Roure O.1, Rouault C.1,2,4, Devuider A.1, Klein C.1,2, Lacasa D.1,2,4, Clément K.1,2,4

1INSERM, UMRs 1166, Nutriomics team, F-75013, 2Sorbonne Universités, UPMC Univ Paris 06, UMRs 1166 I. ICAN, Nutriomics team, F-75005, 3Université Paris Descartes, UMR S 872, Paris, F-75006, 4Institute of Cardiometabolism and Nutrition, ICAN, AP-HP, Pitié-Salpêtrière hospital, F-75013, 5PMMH UMR 7636 CNRS/ESPCI/UPMC/Paris, 6INSERM, UMRs U1138team 4, Paris, F-75006

In obesity, adipose tissue undergoes chronic inflammation with deposition of fibrotic deposits organized in rigid collagen fibers around adipocytes which could impact on adipocyte metabolism through both mechanical constraints and biochemical stimuli. To reproduce the fibrotic environment of obese adipose tissue, we developed an experimental 3D model where human mature adipocytes are included in a peptidic hydrogel with decellularized material of adipose tissue (dMAT) from obese subjects. Functional consequences on adipocyte metabolism and inflammatory profile were followed during one week and transcriptional profile of these “fibrotic” adipocytes was screened to determine putative mecanotransduction pathways implicated. The Incorporation of dMAT induced alteration of adipocyte metabolism through a decrease in adipokine secretions (–60% for leptin and –40% for adiponectin), insulin response and lipolytic activity (–30% of glycerol and FFA release). In addition, dMAT increased expression/production of cytokines (IL-6, G-CSF) and fibrotic mediators (LOXL2 and the matricellular proteins THBS2 and CTGF) in adipocytes. CTGF expression levels correlated with the amount of peri-adipocyte fibrosis in WAT from obese individuals. Moreover, dMAT-dependent CTGF promoter activity, which depends on β1-integrin/cytoskeleton pathways, was enhanced in the presence of YAP, a mechanosensitive co-activator of TEAD transcription factors. Mutation of TEAD binding sites abolished the dMAT-induced promoter activity. By reproducing a fibrotic microenvironment, we showed that adipocytes appear as mechanosensitive cells with an inflammatory and metabolic altered phenotype. Fibrosis may negatively affect human adipocyte function via mechanosensitive molecules, in part stimulated by cell deformation. Identification of the molecular actors could give novel insights into adipocyte mechano-transduction and possible link with adipose tissue dysfunctions.

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cutaneous adipose tissue, promoting metabolic glucose dependence and causing mild signs of systemic inflammation even at the early stages of acquired obesity.

T2:RS1.4
Bone Marrow is an Important Contributor to Human Adipogenesis
Bydén M.1, Uzunel M.1, Hird J.L.2, Bergström E.1, Mold J.E.1, Arner E.1, Méggert N.1, Andersson D.P.3, Wiidlund Y.1, Hassan M.1, Spalding K.L.3, Svanh B.1, Ahmadian A.1, Frisén J.1, Bernard S.1, Mattsson J.J.2, Arner P.1
1Department of Medicine (H7) Karolinska Institutet, Stockholm, Sweden,
2Department of Clinical Immunology Karolinska Institutet, Stockholm, Sweden,
3Department of Cell and Molecular Biology (CS) Karolinska Institutet, Stockholm, Sweden,
4Science for Life Laboratory, Division of Gene Technology, Royal Institute of Technology (KTH), School of Biotechnology.
5Department of Laboratory Medicine (H5) Karolinska Institutet, Stockholm, Sweden,
6Institut Camille Jordan, CNRS UMR 5208, University of Lyon, F-69622 Villeurbanne, France

Introduction: Human white adipocytes display a high turnover throughout adulthood. This implies that a continuous supply of precursor cells is required to maintain adipogenesis. Adipose progenitor cells reside in the stroma of white adipose tissue (WAT), but their origins are unclear. As adipocytes can differentiate from bone marrow (BM)-derived mesenchymal stem cells (MSCs) in vitro, it has been proposed that BM may contribute to mammalian adipogenesis but results in animal models have been conflicting.

Methods: Subcutaneous abdominal WAT biopsies were obtained from 65 subjects that had undergone allogeneic BM or peripheral blood stem cell (PBSC) transplantation 3–31 years ago. Donor cell contribution was determined at the bulk and single cell level. Results Over the entire life span, BM/PBSC-derived progenitor cells contribute with ~10% to the subcutaneous adipocyte population. While this is independent of gender, age and different transplantation-related parameters, body fat mass exerts a strong influence with up to 2.5-fold increased donor cell contribution in obese individuals. Exome-sequencing of single adipocytes suggests that BM/PBSC-derived progenitor cells contribute to WAT via either differentiation or cell fusion. This and the continuous, time-dependent, increase in donor cell incorporation in recipients without on-going immunosuppressive treatment, demonstrate that BM/PBSC-infiltration into WAT is not transient, and indicate that BM may contribute to WAT plasticity also under physiological conditions.

Conclusion: Our findings highlight the role of BM as a reservoir for adipocyte progenitors, particularly in conditions of obesity and suggest that BM/PBSC transplantation could be explored to treat conditions with severe adipose dysfunction.

T3:RS1.4
Bone Marrow is an Important Contributor to Human Adipogenesis

T3:RS2 – Physical Fitness

T3:RS2.1
Epidemiology of Physical Fitness – Badge of Sports Versatility of Olympic Champions (OVOV) – one of possible effective tools for improving the recent situation
Koukal J.1
1Czech Olympic Academy

Problem to be solved: A survey of obesity prevalence, complications and obese patient habits was performed 5 times during 2000–2013 in standardized random sample of population of the CzechRepublic with more than 2000 subjects from all regions and ages. Physical inactivity was found as an important risk marker of obesity and its complications. According to our data more than two thirds obese have no intensive physical activity. All 3 metabolic diseases – obesity, hypertension and type 2 diabetes are strongly related to the reported low physical activity in childhood. Sportsmen in all age are less obese. There are less patient with diabetes and hypertension among those who are active in sport. Moreover physical activity in childhood determines the low incidence of diabetes and hypertension for the rest of life. Suggested solution: Olympic gold medalists in the decathlon Robert Změlík (1992 in Barcelona) and Roman Šebrle (2004 in Athens) initiated the creation of an attractive motoric program called Badge of Sports Versatility of Olympic Champions – (Czech abbreviation – OVOV). They set a very ambitious goal – to increase a personal physical activity of girls and boys aged 10 to 15 years to improve their physical fitness and motivate them to begin their possible sports career in a similar way, what has proven themselves. After the successful launch of the project in 2010, the program was expanded. Recently rules, instructions and an evaluation of performances are adapted for the all people in the age span from 7 to 66 plus. Exercise programme OVOV consists of 60 m run, long jump, ball throw,1000 m run, shuttle basketball dribbling, swimming, rope-skipping, medicine ball throw, two-legs triple jump, pull ups on sloped bench, push-ups and sit-ups.

Results: Comparison and analysis of data from the period 2010 – 2014 will be presented.

T3:RS2 – Physical Fitness

T3:RS2.2
Musculoskeletal Health and Function: Effect of obesity
Thivel D.1
1Laboratory of the Metabolic Adaptations to Exercise under Physiological and Pathological Conditions

Conditions: Clermont University, Regional Center for Human Nutrition (CRNH Auvergne) For years researched have been focused on the link between obesity and physical activity level. Although this remains an important area that definitely needs deeper explorations, physical fitness appears as one of the most important health indicators in our patients (more than physical activity itself). Yet aerobic fitness has long been considered as the primary factor supporting good health, musculoskeletal fitness is now recognized as a crucial parameter in maintaining overall health and fitness (Armstrong & Welsma, 1997). Basically, musculoskeletal fitness may represent the individual overall capacity to conduct daily tasks that rely on muscle strength, gait, flexibility, balance or posture. Is obese patients’ musculoskeletal fitness impaired? How does obesity exactly impact musculoskeletal health and function? What about weight loss? Does it favor improved musculoskeletal fitness parameters? This talk will first try to identify the exact link between MSK function and obesity and how it affects overall health in adults and kids with obesity. We will then try to question the impact of different weight loss strategies (dietary intervention, physical activity programs or bariatric surgery) on MSK fitness in obese adults and youth.

T7:RS2 – LifeCourse Perspective

T7:RS2.1
Overweight and obesity: Life course and multigenerational studies
Koukal I.1,2
1Centre for Health Equity Studies (CHESS), Stockholm University/Karolinska Institutet, Stockholm, Sweden,
2Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden

Introduction: Optimal birth size and good health in early life is an important health outcome in its own right and is also one predictor of subsequent health and education. Current methodological developments in life course epidemiology create unique opportunities to investigate how early circumstances and exposures shape later outcomes and how parental
and grandparental characteristics influence health and social outcomes of descendant generations.

Methods: We attempt to model continuities in birth outcome and body size across generations together with social mobility patterns in a dynamic way that allows for bidirectional and time changing effects. In this way, we aim to examine the scope for breaking the ‘chains of risk’ between generations, and to highlight new potential ways to reduce long term inequalities. We mainly use data from the Uppsala Birth Cohort Multigenerational Study (www.chess.su.se/ubcosmg/) and other linked register data where we can apply a life course and intergenerational approach to analysis.

Results: Multiple sub-studies demonstrate associations between social and health characteristics across more than two generations. Examples include social patterning of pre-pregnancy body mass index, weight gain in pregnancy, size at birth, childhood overweight and obesity as well as incidence of diagnosed eating disorders.

Conclusion: When mechanisms by which poor health and adverse parental (and grandparental) socioeconomic position translate into social and health disadvantage in the offspring and following generations (and which thus lead to re-emergence and reproduction of health inequalities in subsequent generations) are better understood, new opportunities for more effective health equity interventions and policies will emerge.

Acknowledgement: The Uppsala Birth Cohort Multigenerational Study is currently supported by grants from the Swedish Research Council and the Swedish Research Council for Health, Working Life and Welfare.

T7:RS2.2 Life-course Epidemiology and Obesity

Kelleher C.C.1

1National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin, Belfield, Dublin 4, Republic of Ireland

There has been mounting interest in the developmental and life-course origins of adult chronic disease, including the role played in the current global burden of overweight and obesity. Body weight may be influenced during critical periods such as pregnancy, growth and adolescence and in healthy ageing. There may be latent, cumulative or trajectory factors at play at different time points and the interplay between social, environmental and constitutional factors has to be understood, not just from a mechanistic perspective, but also to identify most effective interventions. Maternal and child health provides an important context with two separate potentially critical periods such as pregnancy, growth and adolescence and in healthy ageing. We analysed data from 1236 adolescents evaluated at 13, 17 and 21 years under the EPITeen cohort (Porto, Portugal). Education was defined according to the parent with highest education. Weight and height were measured at each moment and overweight was defined as BMI≥85th percentile (and grandparental) socioeconomic position translate into social and health disadvantage in the offspring and following generations (and which thus lead to re-emergence and reproduction of health inequalities in subsequent generations) are better understood, new opportunities for more effective health equity interventions and policies will emerge.

Acknowledgement: The Life-course cross-generation cohort study is funded by the Health Research Board in the Republic of Ireland. The National Nutrition surveillance Centre is funded by the Health Service Executive.

References:

T7:RS2.3 Specific associations of maternal and paternal obesity risk-allele scores with offspring early growth

Heude B.1, Koudou Y.1, Clément K.2, Ong K.K.1, Charles M.A.1

1Institut National de la Santé et de la Recherche Médicale, Center for Research in Epidemiology and Population Health, Early origin of the child’s health and development team, Villejuif; Paris Descartes University, France.
2Institut de Cardiometabolism and Nutrition, Centre de Recherche en Nutrition Humaine Ile de France, Pitié-Salpêtrière Hospital, Paris; Institut National de la Santé et de la Recherche Médicale U872 team Nutriomique, Paris, France.
3Medical Research Council Epidemiology Unit, University of Cambridge, Addenbrooke’s Hospital, Cambridge; Department of Paediatrics, University of Cambridge, Addenbrooke’s Hospital, Cambridge, England

Introduction: Early postnatal growth has been suggested to be influenced by maternal corpulence. We aimed to investigate the respective role of maternal and paternal genetic susceptibility to obesity in offspring body size and fat mass from birth to 5 years.

Methods: 833 mother-father-offspring trios from the EDEN mother-child cohort were genotyped for a set of 16 polymorphisms previously identified by genome-wide-association studies of adult BMI. A genetic susceptibility score was built by summing the number of alleles carried. Outcomes were age- and sex-adjusted SD scores (SDS) for weight, length, BMI and skinfolds at birth, 1, 3 and 5 years, and fat mass percent (FM% obtained from bioelectric impedance) at 5 years. Maternal and paternal scores were investigated in association with these outcomes in repeated cross-sectional analyses using linear regression models allowing adjustment for sex, maternal height and breastfeeding.

Results: There was no association between maternal genetic score and any anthropometric outcome (p > 0.13), whereas paternal genetic score was significantly associated with weight (B = 0.033 ± 0.014 SDS per allele; p < 0.0001), height (B = 0.035 ± 0.014; p < 0.016) and BMI (B = 0.047 ± 0.014; p < 0.001) as early as 3 years. Patterns of associations were similar at 5 years, when paternal score was also significantly associated with skinfolds SD-scores (B = 0.041 ± 0.015; p = 0.007), and FM% (B = 0.032 ± 0.016; p < 0.043).

Conclusion: Paternal and maternal genetic susceptibility to obesity seem to play distinct roles in offspring early postnatal growth. Further investigations are needed to explain these differences, and especially to find out whether environmental constraints during fetal life could be responsible for the absence of genetic effect from the maternal side.

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T7:RS2.4 Does education influence the overweight tracking from adolescence to early adulthood?

Anajo I.1,2, Barros H.1,2, Torres A.1, Ramos E.1,2

1EPIUnit – Institute of Public Health, University of Porto, Porto, Portugal,
2Department of Clinical Epidemiology, Predictive Medicine and Public Health, University of Porto Medical School, Porto, Portugal,
3School of Social and Political Sciences (ISCSP), University of Lisbon (UL), Lisbon, Portugal

We aimed to study how social factors, such as participants’ and parental education, influences overweight tracking from adolescence to early adulthood. We analysed data from 1236 adolescents evaluated at 13, 17 and 21 years under the EPITeen cohort (Porto, Portugal). Education was evaluated as complete years of schooling, and parental education was defined according to the parent with highest education. Weight and height were measured at each moment and overweight was defined as BMI≥85th percentile from WHO growth reference (at 13y) or BMI≥25.0 kg/m² (at 21y). The tracking of overweight was summarized in 4 categories: ‘stable normal’-normal BMI at both moments; ‘decreasing’-overweight at 13y/normal at 21y; ‘increasing’-normal at 13y/overweight at 21y; ‘stable overweight’-overweight at both moments. The associations were summarized...
by odds ratio (OR; 95% CI) adjusted for sex and physical activity at 13y, through multinomial regression (reference ‘stable normal’). From 13 to 21y, 16.3% of participants remained overweight; 7.8% were classified in the category ‘increasing’ and 10.8% in the ‘decreasing’. In comparison to highly educated (>12y), participants with 10–12y of education were more likely to increase their BMI (OR = 2.37; 95% CI: 1.44–3.88) or to remain overweight (1.70; 1.17–2.47). The same trend was observed for parental education; participants whose parents completed 6y of schooling were 2.3 times (95% CI: 1.23–4.24) more likely to be in the ‘increasing’ and 2.0 times (95% CI: 1.21–3.33) more likely to be in the ‘stable overweight’. Similar trends were observed in those participants more deprived using perceived social class and income adequacy. Besides the effect on overweight at 13y, education and unfavourable social conditions also impacts on overweight tracking to adulthood.

T4:RS1 – Addiction

T4:RS1.1
Brain imaging and phenotyping

Pagotto U1,2
1Dept. of Medical and Surgical Sciences Endocrine Unit, S.Orsola-Malpighi, Hospital Alma Mater, University of Bologna, Bologna, Italy

Human food intake is not only under the control of the hypothalamus but, mainly by hedonic mechanisms, also influenced by cortical and subcortical areas related to cognition and reward. The activation of the brain in response to food or food cues in animals and in humans is under intense scrutiny by using neuroimaging methods as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI). Neuroimaging studies confirmed and highlighted the involvement of multiple brain areas as prefrontal, orbitofrontal, somatosensory cortices, insula, thalamus, hypothalamus, amygdala and others in the reward properties of food. However, important phenotypic differences in the interaction between external food related stimuli and brain regions activated have been found when lean/normal subjects were compared to overweight/obese patients. Somatosensory response to food cues seems to be hyper-responsive in obese individuals; moreover brain areas controlling executive drive seem to over-react to the anticipation of pleasure during cue exposure in obese compared to lean subjects, furthermore the areas of the brain in obese individuals involved in cognitive control and inhibitory behaviour seem to be more resistant to the perception of reward after food exposure in comparison to what observed in the brain of lean subjects. All these alterations in the neuronal response to food cues may stimulate the ingestion of energy rich foods and the propensity to become obese. However, functional imaging studies are still limited by a number of still unsolved methodological issues that determine different and very often contrasting results. In particular, differences in the stimuli used and the conditions of presentation during functional imaging and even more importantly, differences in the population sampling may explain the large fragmentation of the results obtained.

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T4:RS1.2
Eating disorders and obesity: Shared comorbidities, risk factors and therapy response

Fernandez-Aranda F1,2
1Department of Psychiatry, University Hospital of Bellvitge-IDIBELL, Barcelona, Spain,
2CIBEROBN Research Network, ISCIII, Spain

Eating disorders (ED) and obesity share some biological and environmental risk factors, behaviors and intermediate neurocognitive phenotypes. A controversial theory postulates that ED and obesity form part of a broad spectrum of eating-related and weight-related disorders. Nevertheless, contradictory findings in the literature do not allow differentiating ED according to weight-related phenotypes. Obese patients with a comorbid ED (mainly binge-eating disorder (BED)) have higher eating, general and personality psychopathology and a poorer prognosis. The estimated rate of lifetime obesity in ED is nearly 30%, particularly in BED/BN, and it seems to become more and more prevalent among ED patients (as preceding, coexisting or consequent condition). Patients with lifetime obesity are characterized by later age of onset, higher ED severity and greater general psychopathology when compared with patients without lifetime obesity. Furthermore, a number of clinical and personality differences between obese patients with and without a comorbid ED have been observed. As in the case of obesity, in ED findings from neuroimaging studies suggest that similar neuronal circuits, modulated by dopamine, are activated in addiction and ED by either drugs or hyperpalatable food. These studies have postulated a Food/Eating addiction model. In ED patients, higher food addiction is associated with the bingeing ED subtype (namely AN-BP, BN and BED), with more severe eating pathology and overall psychopathology and a greater BMI, but also with specific personality vulnerabilities. The presence of ED in obese patients, and mainly binge- and/ or purge symptomatology, must be taken into account in clinical practice and research. Although the ‘Food Addiction’ construct is able to differentiate between ED/Obese subjects and Healthy Eating/Weight controls, it needs to be further explored and tested to understand its implication.

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T1:RS2 – Lipid Metabolism

T1:RS2.2
Anatomy of adipose organ: News and views

Cinti S.
1Department of Experimental and Clinical Medicine, University of Ancona, Italy

Gross anatomy dissections of adult mice revealed that subcutaneous and visceral fat depots are joined together to form a unique structure. The anterior subcutaneous part of the organ is quite complex and composed by interconnected depots located in the interscapular, subcapsular, deep dorsal cerebral, deep ventral cerebral and axillo-thoracic areas. The axillo-thoracic area is joined with mediastinic depot by projections following aortic arch arterial branches. Mediastinic fat surrounds aorta and its main branches and, by passing the aortic hiatus, forms a continuum with the inter-renal, peri-renal and retroperitoneal areas surrounding the abdominal aorta. Inter-renal fat is continuous with mesenteric fat and perirenal, parametrial and perivesical fat in females and with periureteral and perivesical fat in males. Perivesical fat is connected with the gluteal area of the posterior subcutaneous depot. This last depot is composed also by inguinal and dorso-lumbar areas. Anterior and posterior subcutaneous depots are joined by a thin fat bridge along the lateral parts of the body. Omental depot is separated by the rest of the abdominal fat by the peritoneal ligaments including the spleen. White and brown adipocytes are the main parenchymal cell type of this organ and their prevalence at different sites depend mainly on age, genetic background, nutritional state and environmental conditions. These new anatomical observations, reinforce the concept of adipose organ and open new perspectives on the plasticity of this organ with particular reference to the browning phenomenon and its therapeutic implications.

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Inducibility of triglyceride turnover in white fat – a marker of lean phenotype

Flachs P., Zouhar P., Svobodova M., Janovska P., Bardova K., Madsen L.1,2, Kristiansen K., Jones J.G.1, Kaput J.1
1Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic, 2Department of Biology, University of Copenhagen, Denmark, 3National Institute of Nutrition and Seafood Research, Bergen, Norway, 4Biocant, Centre for Neuroscience and Cell Biology, University of Coimbra, Cantanhede, Portugal

Introduction: White adipose tissue (WAT) is essential for energy storage, while energy expenditure in this tissue normally contributes relatively little to total energy balance. Nevertheless, UC1P-independent activation of lipolysis of triglycerides (TG) and fatty acids (FA) re-esterification (futile TG/FA cycle) in adipocytes in abdominal fat could be involved in prevention of dietary obesity by calorie restriction combined with n-3 FA intake (Flachs et al, Diabetologia 2011), as well as in activation of whole-body lipid catabolism in response to β3-adrenergic agonist (Motillo et al, J. Lip. Res. 2014) in mice.

Methods: To further characterize the role of TG/FA cycle in WAT, we studied its possible activation in response to cold-exposure using obesity-resistant A/J and obesity-prone C57BL/6J mice. Male mice were maintained and killed at 30oC, or after 2 days or 7 days of exposure to 6oC. TG turnover in WAT was assessed using 2H-NMR (see Zouhar et al at this meeting).

Results: Cold-exposure resulted in lower weight of both subcutaneous and gonadal (g) WAT and in decreased TG and NEFA plasma levels at day 2, which normalized at day 7. qRT-PCR analysis of gWAT indicated induction of genes involved in lipolysis, glyceroneogenesis, FA oxidation, and mitochondrial biogenesis at day 2, and increased incorporation of 2H from 2H2O administered for 40 hrs before killing) into tissue TG at day 7. All these changes were more pronounced in A/J mice, in the absence of detectable induction of UC1P at the protein level.

Conclusion: Our results support the view that regulated TG/FA cycle activity in gWAT is essential for adrenenergically-activated non-shivering thermogenesis and could contribute to genetically-determined differences in propensity to obesity in mice.

ATGL and HSL deficiency contribute to mitochondrial dysfunction and insulin resistance in human adipocytes

Jocken J.1, Goossens G.1, Essers Y.1, Hoebers N.1, Blaak E.1
1Department of Human Biology, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University Medical Center+, The Netherlands

Introduction: The mobilization of fat stored in adipose tissue is mediated by adipose triglyceride lipase (ATGL) and hormone-sensitive lipase (HSL). We have previously shown that adipose tissue lipase expression is reduced in obese insulin resistant versus obese insulin sensitive subjects. Subsequently, we hypothesized that reduced adipose tissue lipase expression may provide less lipid ligands for peroxisome proliferator-activated receptor (PPAR) activation, which in turn disrupts mitochondrial oxidation, contributes to lipid accumulation and insulin resistance in human adipocytes.

Methods: Cell culture experiments were performed, using siRNA-mediated knock-down and pharmacological inhibition, to investigate the role of ATGL and HSL in mitochondrial substrate oxidation, lipid accumulation and insulin sensitivity in human primary adipocytes.

Results: In human adipocytes, ATGL and HSL knock-down decreased mitochondrial respiration and oxidative phosphorylation (OXPHOS) protein content and attenuated palmitate oxidation, which was accompanied by reduced expression of the PPAR target CPT1a. Interestingly, HSL and ATGL gene silencing increased lipid accumulation and reduced insulin-stimulated glucose uptake, which was attributable to disrupted insulin signalling at Ser1101 of the insulin receptor substrate-1 and downstream Akt activation at Ser473. PPAR agonist treatment partly restored these defects.

Conclusion: We demonstrated that reduced ATGL and HSL expression and activity in human adipocytes results in mitochondrial dysfunction and insulin resistance in human adipocytes, which is at least partly mediated by impaired PPAR signalling. Targeting adipocyte lipases may be a promising strategy to improve insulin sensitivity in obesity and type 2 diabetes.
metabolic health in obesity are due to lifestyle. For example, physical activity can contribute to a better metabolic state despite obesity. However, it is not excluded that the differences arise because of genetic reasons. The gene-environment interaction can also be intertwined with epigenetics. This review discusses the gene-environment interactions and touches on epigenetics in the context of diet, obesity and metabolic health. The main focus is on twin studies.

T4:RS2.3
Meal frequency and type 2 diabetes
Kahleova H.1, Belinova L.1, Molinska H.1, Kazaeva L.1, Dezortova M.1, Hajek M.1, Tura A.2, Hill M.1, Pelikanova T.1
1Institute for Clinical and Experimental Medicine, Prague, Czech Republic, 2Institute of Biomedical Engineering, National Research Council, Padua, Italy

Large prospective studies demonstrated that frequent snacking may lead to weight gain and increased risk of type 2 diabetes. The aim of our study was to compare the effect of six (A6) vs. two meals a day, breakfast and lunch (B2) on body weight, hepatic fat content, insulin resistance and beta cell function.

Methods: In a randomized, open, crossover, single-centre study (conducted in Prague, the Czech Republic), we assigned 54 patients with type 2 diabetes treated by oral hypoglycaemic agents (mean diabetes duration 8.1 ± 5.8 years) to follow two regimens of a hypocaloric diet, each for 12 weeks: A6, and B2. Randomization and allocation to trial groups (n=27 and n=27) were carried out by a central computer system. Individual calculations of energy requirements for both regimens were based on the formula: [resting energy expenditure (REE) × 1.5] – 500 kcal. The diet in both regimens had the same macronutrient and energy content. Hepatic fat content (HFC) was measured by proton magnetic resonance spectroscopy. For statistical analysis, 2×2 crossover ANOVA was used.

Results: The intention-to-treat analysis included all participants (n=54). Body weight decreased in both regimens (p < 0.001), more in B2 (–2.3, 95% CI: −2.7, −2.0 kg in A6 vs. −3.7, 95% CI: −4.1, −3.4 kg in B2; p < 0.001). HFC decreased in response to both regimens (p < 0.001), more in B2 (−0.03; 95% CI: −0.033, −0.027% in A6 vs. −0.04; 95% CI: −0.041, −0.035% in B2; p = 0.009). Fasting plasma glucose and C-peptide decreased in both regimens (p < 0.001), more in B2 (p = 0.004 and p = 0.04, respectively). Fasting plasma glucagon decreased in B2 (p < 0.001), while it increased (p = 0.04) in A6 (p < 0.001).

Conclusions: Our results suggest that for type 2 diabetic patients on a hypocaloric diet eating larger breakfast and lunch may be more beneficial than six smaller meals during the day.

T5:RS2.1
From monogenic to polygenic obesities
Aldhoun Hainerova1,2
1Department of Paediatrics, Third Faculty of Medicine, Charles University, Prague, Czech Republic, 2Institute of Endocrinology, Prague, Czech Republic

Body weight is a highly heritable trait and genetics of obesity has intensively been studied for decades. A discovery of leptin in 1994 and subsequent molecular genetic studies led to identification of mutations in a few genes with profound effect on body weight. Analyses of these genes have helped to unravel important system maintaining homeostatic control of energy balance. An overview of molecular-genetic and clinical research in the field of rare cases of monogenic obesities will be presented. However, in most individuals, genetic variation plays a major role in determining variability can contribute to a better metabolic state despite obesity. However, it is not excluded that the differences arise because of genetic reasons. The gene-environment interaction can also be intertwined with epigenetics. This review discusses the gene-environment interactions and touches on epigenetics in the context of diet, obesity and metabolic health. The main focus is on twin studies.

T3:RS3.3
From monogenic to polygenic obesities
Alwajda A.1,2
1Department of Paediatrics, Third Faculty of Medicine, Charles University, Prague, Czech Republic, 2Institute of Endocrinology, Prague, Czech Republic

Body weight is a highly heritable trait and genetics of obesity has intensively been studied for decades. A discovery of leptin in 1994 and subsequent molecular genetic studies led to identification of mutations in a few genes with profound effect on body weight. Analyses of these genes have helped to unravel important system maintaining homeostatic control of energy balance. An overview of molecular-genetic and clinical research in the field of rare cases of monogenic obesities will be presented. However, in most individuals, genetic variation plays a major role in determining variability can contribute to a better metabolic state despite obesity. However, it is not excluded that the differences arise because of genetic reasons. The gene-environment interaction can also be intertwined with epigenetics. This review discusses the gene-environment interactions and touches on epigenetics in the context of diet, obesity and metabolic health. The main focus is on twin studies.
individual susceptibility or resistance to environmental factors which influence energy intake and expenditure. Molecular genetic research has focused on the identification of common gene variants affecting body weight. Genome-wide association studies of body mass index using large sample sets have found numerous susceptibility genetic variants and loci. The cumulative effect of these variants is relatively small and could only explain up to 5% of obesity heritability. Rare gene variants, copy number variants, and epigenetic changes have also been suggested as other mechanisms contributing to the heritability of obesity. Fat mass and obesity associated gene is still the strongest known genetic susceptibility locus for obesity. The role of polygenic effects in the mechanism of obesity has been investigated in relation to different possible aspects (e.g. dietary intake, food preferences, eating behaviour, weight changes in response to altered energy balance) but mostly remains unclear. Discovering underlying mechanisms and insights into the biology of polygenic effects on body weight is further needed as it would help target novel preventive and therapeutic strategies.

T5:RS2.2
Intervening early for healthy growth during pregnancy and infancy
McAuliffe FM.1
1University College Dublin

Pregnancy presents a unique époque in life with considerable potential to influence not only maternal health but also the health of the next generation. Maternal nutrition is essential to ensure normal fetal development. Glucose is the main energy substrate for fetal growth and it is now apparent that there is a strong, continuous association between maternal glucose levels below those diagnostic of diabetes and the incidence of macrosomia and its inherent complications. Maternal diet, and particularly its carbohydrate type and content, influences maternal blood glucose concentrations. However, different carbohydrate foods produce different glycaemic responses. The glycaemic index is a method for assessing the glycaemic responses of different carbohydrates. It has been shown that a low glycaemic diet blunts the mid and late pregnancy increase in insulin resistance typically seen in westernized societies. It is postulated that eating primarily high glycaemic carbohydrate foods results in fetoplacental overgrowth, excessive maternal weight gain and leads to a predisposition to fetal macrosomia, while intake of low-glycaemic carbohydrates predisposes to normal infant birth weight and normal maternal weight gain. In addition maternal behaviour, lifestyle such as exercise and nutritional supplements can be modified to promote an optimal in utero environment for the fetus. The ROLO study, which was a large RCT of low glycaemic index diet in pregnancy, did not impact birthweight but significant maternal benefits in terms of gestational weight gain and glucose tolerance were observed. The PROPS RCT examined the impact of a probiotic supplement in women with gestational diabetes and found that probiotics attenuated the normal third trimester rise in lipids. These types of pregnancy interventions hold potential to improve pregnancy outcome for the fetus and infant and may even have beneficial effects on childhood health.

T5:RS2.3
Protective and obesogenic early feeding practices
Hunsberger M.1
1Section for Epidemiology and Social Medicine, University of Gothenburg, Gothenburg, Sweden

Objective: To review the protective and obesogenic early feeding practices in the literature and present finding from the identification and prevention of Dietary- and lifestyle-induced health Effects In Children and infants (IDEFICS) study.

Methods: Findings from IDEFICS study, including exclusive breastfeeding and introduction of complementary foods will be presented along with a current review of the literature on early feeding practices. IDEFICS is a multi-centre study in eight countries examining risks for overweight/obesity in over 16,000 children. In the IDEFICS cohort, exclusive breast-feeding across the eight countries was examined in relation to overweight. In the Swedish IDEFICS cohort (n=1837) we examined introduction to välling, a uniquely Swedish milk cereal drink (MCD). In both studies, children for whom early feeding practices were described at baseline and weight and height were recorded are included. In the välling study, we included children who had both baseline and two year follow-up anthropometric measures. The children were 2–9 years old at the 2007–2008 baseline and 4–11 years old at follow-up.

Results: Exclusively breastfeeding for 4–6 months was protective against future overweight. Combination feeding was not protective. In Sweden, MCD was consumed by the majority (68.7%) of Swedish children, especially those born to native Swedish parents. MCD consumption was associated with an increased mean BMI-z-score over two years and overweight at follow-up survey.

Conclusions: Early feeding practices contribute to future overweight. Both the type of food and the timing of introduction are important factors.

Acknowledgement: On behalf of the IDEFICS study consortium. For more information visit http://www.ideficsstudy.eu/. We gratefully acknowledge the financial support of the European Community Sixth RTD Framework Programme Contract No. 016181 (FOOD).

T2:RS2 – Adipose Tissue Oxygen Tension and Angiogenesis

T2:RS2.1
Adipose tissue oxygenation in obesity
Hodson L.1
1Oxford Centre for Diabetes, Endocrinology and Metabolism, University of Oxford, Oxford, UK

Subcutaneous white adipose tissue is a complex metabolic organ that responds rapidly and dynamically to alterations in nutritional state. With an increasing degree of obesity there is a concomitant increase in white adipose tissue dysfunction, moving the tissue toward a proinflammatory phenotype. Low oxygenation (also referred to as hypoxia) of subcutaneous white adipose tissue has been proposed as a key underlying mechanism triggering tissue dysfunction; evidence for this to exist is more compelling in rodent, than human models. Factors that may play a pivotal role in this transition include an increase in cell size (diffusion distance) and a decrease in blood flow per unit tissue mass. Subcutaneous white adipose tissue blood flow is markedly lower in obese than non-obese subjects in both the fasted and fed states. Tissue oxygen partial pressure (pO2) reflects the balance between oxygen delivery and consumption, therefore the supply of oxygen to the tissue plays an integral role in tissue oxygenation. It would be reasonable to anticipate that oxygen delivery to the tissue is compromised in obesity. In humans, subcutaneous adipose tissue oxygenation has been assessed by expression of hypoxia-sensitive genes/protein or direct assessment of oxygen tension and the effects on intermediary metabolism, in lean and obese subjects; findings are inconsistent. Here, I will discuss the different approaches used and the importance of integrative physiological techniques to try and elucidate what defines subcutaneous white adipose tissue hypoxia in humans.

Abstracts

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13
T8:RS2.2
Adipose tissue angiogenesis and metabolic disorders
Bouloumié A. 1,2
1 Inserm, UMR1048, Team 1, Institute of Metabolic and Cardiovascular Diseases, Toulouse France,
2 Paul Sabatier University, Toulouse, France

The adipose tissue endothelium plays a major role as an active surface of exchange of cells, hormones, nutrients and oxygen between blood and adipocytes. The adipose tissue (AT) produces a large number of adipokines exhibiting angiogenic activity. With obesity, the global angiogenic potential of AT rises, an effect to be related to potential hypoxic modulation and/or accumulation of proangiogenic macrophages. This capacity certainly plays an important role to maintain adipose tissue buffering capacity against lipids. It will allow adequate metabolic responses as well as accurate extraction of lipids from the blood but also might be linked to adipogenesis and the formation of new adipocytes. The adipose micro-environment exhibits distinct angiogenic states depending on the anatomic location of the fat mass. An elevated and chronic pro-angiogenic pressure in the visceral adipose tissue could trigger an accelerated aging process or senescence of endothelial cells leading to a pro-inflammatory phenotype together with endothelial dysfunction. Therefore, angiogenesis in adipose tissue may be considered as a beneficial event which in long term could drive metabolic disorders.

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T8:RS2.3
Moderate normobaric hypoxia, a new paradigm for metabolic flexibility
Keijer J. 1, Duivenvoorde L. 1, Schathorst E. 1
1 Human and Animal Physiology, Wageningen University, Wageningen, The Netherlands

Tools to quantify health status are required for substantiation of health improvement by nutrition. Health can be defined as being metabolic flexible. Metabolic flexibility can be assessed by challenging homeostasis. This can be done invasively, as is done in the oral glucose tolerance test. It can also be done non-invasively, using indirect calorimetry. We used indirect calorimetry to examine the fasting-refeeding response of mice as a tool to assess the health effect of interventions with diets with varying lipid composition. We also developed a mild oxygen restriction (OxR) challenge to assess metabolic health. In the OxR challenge oxygen availability is reduced from 21% O2 (normoxia) to 12% O2 for a limited period of time and the metabolic effects are examined. OxR was able to reveal a difference in response between adult and old mice that were otherwise healthy. OxR was also applied after short term (5 day) feeding of high fat diet and low fat diets to mice and showed diet dependent differences in OxR response in liver and white adipose tissue and in serum. While 90% of body oxygen is used in mitochondria and adipose tissue is an important metabolic organ, little is known about the response of white adipose tissue mitochondria to decreased body oxygen availability. This was examined using the OxR challenge and our results will be presented.


T8:RS2 – Multidisciplinary Clinical Management

T8:RS2.1
Diabetes management in obesity
Roden M. 1
1 Department of Endocrinology and Diabetology, Medical Faculty, Heinrich-Heine University,
2 German Diabetes Center, Leibniz Center of Diabetes Research,
3 German Center for Diabetes Research, Düsseldorf

Obesity is tightly linked to type 2 and type 4, but increasingly also to type 1 diabetes, and generally worsens the course of disease by favoring insulin resistance and vascular complications. This requires simultaneous management of diabetes and obesity in most cases. Lifestyle modification aiming at prolonged weight loss and does not only prevents or delays, but can even cause remission of diabetes. Despite ongoing debates on the optimal dietary intervention, overall calorific restriction seems more important than specific nutrient modulation. In overweight and obese patients, glucose lowering treatment should therefore also aim at avoiding weight gain. Metformin, the first-line drug for type 2 diabetes treatment, induces some weight loss, which is more pronounced with GLP-1 analogs and SGLT-2 inhibitors. Novel drugs such as 11β-hydroxysteroid dehydrogenase inhibitors can specifically reduce nonalcoholic fatty liver along with minor weight loss in patients at high risk of diabetes. Finally, bariatric surgery not only markedly improves obesity, but also proves successful in reversing type 2 diabetes.

T8:RS2.2
Management of obesity-associated arterial hypertension
Jordan J. 1
1 Institute of Clinical Pharmacology, Hannover Medical School, Germany

Obesity and arterial hypertension are additive in terms or cardiovascular risk. There is hope that new vascular biomarkers may prove useful in individual risk prediction in these patients. Obese patients require more medications to have their blood pressure controlled and are prone to treatment resistant arterial hypertension. Data from good quality clinical trials on the utility of weight loss in the management of hypertension is surprisingly scarce and the available data is rarely translated into clinical practice. Information on how to combine weight loss interventions with antihypertensive medications, which are ultimately required in many patients, is virtually non-existent. Antihypertensive treatment recommendations for lean hypertensives may not be simply extrapolated to obese hypertensives and have to take into account the metabolic comorbidities, particularly insulin resistance and dyslipidemia. Given their positive metabolic profile, renin angiotensin system inhibitors are a good choice for the treatment of obese hypertensive patients. Yet, most patients will require antihypertensive combination therapy. Dihydropyridine calcium channel blockers are a good choice as combination partner. From an antihypertensive point of view, low dose thiazide diuretics are an excellent combination partner for renin angiotensin system inhibitors while potential metabolic side effects may occur. Beta-blockers while efficiently lowering blood pressure and having to take into account the metabolic comorbidities, particularly insulin resistance and dyslipidemia may be particularly useful. However, there is a substantial risk for hyperkalemia, particularly in patients with type 2 diabetes mellitus.
University and University General Hospital, Prague, Czech Republic Hyperlipoproteinemias and dyslipidemias (HLP and DLP), representing one from the most important risk factors for cardiovascular diseases (CVD), occur very often in patients with obesity. However, there is no equation between HLP and DLP and obesity. Many patients with severe HLP (before all patients with familial hypercholesterolemia) are even slim. (The hypercholesterolemia in patients with anorexia is a different story). The lipid disorder in patients with obesity is characterized by hypertriglyceridemia, low HDL-C and increased concentration of small dense LDL particles. It is named atherogenic dyslipidemia (ADLP), lipid triad or atherogenic lipid phenotype. ADLP occurs very often in combination not only with obesity, but also with hypertension and diabetes mellitus type 2. This combination of several risk factors is often described as a “Metabolic Syndrome” which is connected with elevated cardiometabolic risk. The treatment of the patient with obesity and ADLP has to be complex, it is necessary to influence all risk factors. The non-pharmacological treatment represents the first step in the therapy of ADLP. Pharmacological treatment is based on statins and it is supported by evidence based medicine. The combination of statins with fibrates is also recommended in patients with ADLP. Niacin is no more available in Europe and the data for omega-3 fatty acids are not very convincing. Despite the fact, that ADLP represents a very important risk factor for CVD, the first and main target for the HLP/DLP treatment is LDL-C. For the treatment of elevated LDL-C levels high dose statins are drugs of choice. The future of the lipid lowering therapy is closely connected with very promising group of PCSK9 inhibitors. Mipomersen and lomitapide are already approved for the treatment of homozygotes of familial hypercholesterolemia. CETP inhibitors and also alfa/delta PPAR agonists have to be evaluated in clinical trials.
Obesity is a chronic disease with multifactorial etiology and complex mechanisms, associated with a high rate of morbidity and mortality. The main principle of the clinical management is the long-term patient-centered intervention, aiming to reduce the global health risk through weight loss and its maintenance over time, lifestyle optimization and the control of associated co-morbidity. The success of the intervention implies a multifactorial and thus a multidisciplinary approach represented by structured programs that include optimal hypocaloric diet, sustained physical activity, cognitive-behavioural psychotherapy, specific pharmacotherapy (where available) and bariatric surgery. Existing data supports the effectiveness and clinical utility of using the multidisciplinary approach. A trained medical team, a functional obesity treatment network, common protocol and financial support, are important requirements for a successful intervention. Besides the medical treatment individualized to each patient, any intervention aiming to reduce the social and environmental determinants of obesity, including factors related to the physical environment, social values, technology and the economy, is beneficial. Therefore, health care providers should collaborate with political and social departments in order to ensure an optimal multidisciplinary treatment of people with obesity.

**Keywords:** obesity, multidisciplinary treatment

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**T8:WS1.2 Multidisciplinary treatment in adults**

**Roman G.**

1Iuliu Hatieganu University of Medicine and Pharmacy, Clinical Center of Diabetes, Nutrition, Metabolic diseases, Cluj-Napoca, Romania

Obesity is a chronic disease with multifactorial etiology and complex mechanisms, associated with a high rate of morbidity and mortality. The main principle of the clinical management is the long-term patient-centered intervention, aiming to reduce the global health risk through weight loss and its maintenance over time, lifestyle optimization and the control of associated co-morbidity. The success of the intervention implies a multifactorial and thus a multidisciplinary approach represented by structured programs that include optimal hypocaloric diet, sustained physical activity, cognitive-behavioural psychotherapy, specific pharmacotherapy (where available) and bariatric surgery. Existing data supports the effectiveness and clinical utility of using the multidisciplinary approach. A trained medical team, a functional obesity treatment network, common protocol and financial support, are important requirements for a successful intervention. Besides the medical treatment individualized to each patient, any intervention aiming to reduce the social and environmental determinants of obesity, including factors related to the physical environment, social values, technology and the economy, is beneficial. Therefore, health care providers should collaborate with political and social departments in order to ensure an optimal multidisciplinary treatment of people with obesity.

**Keywords:** obesity, multidisciplinary treatment

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**T8:WS1.3 Pregnancy and obesity: The experiences of obese women receiving antenatal care**

**Williams L. T.¹,², Knight-Agarwal C. R.¹, Davis D.², Davey R.²**

¹Griffith Health Institute, Griffith University, Australia, ²Faculty of Health, University of Canberra, Australia

**Introduction:** Maternal obesity has implications for both mother and baby including increased health risks from gestational hypertensive disorders, caesarean section and stillbirth. Despite the increasing prevalence of maternal obesity, little is known of the experiences of these women within the health care system. The aim of this research was to investigate the views and attitudes of obese pregnant women receiving antenatal care.

**Methods:** A qualitative study using individual interviews was undertaken at a large teaching hospital in South-eastern Australia after obtaining approval from the relevant Human Research Ethics Committees. Women were recruited through the antenatal clinic at the major public hospital, and sixteen pregnant women with a BMI of 30 kg/m² or above agreed to participate. The semi-structured interview protocol was developed after a review of the literature and after conducting focus group interviews with obstetricians and midwives. Questions explored the lived experiences of the women around being pregnant at their body size, and their perceptions of how this affected their antenatal care. Interviews were audio recorded, transcribed verbatim and data analysed for recurrent themes using Interpretative Phenomenological Analysis.

**Results:** While the experiences of each participant differed, four themes emerged: Judgemental attitudes of staff; Poor communication exists; More resources required; Maternal motivation is the key.

**Conclusion:** Obese pregnant women lack knowledge of the health risks associated with their pregnancy, and there was no consistent approach to the issue by health professionals. Consistent but non-judgemental support is required to assist obese pregnant women achieve recommended nutrition and weight gain goals.

**Acknowledgement:** Rebecca Shepherd, Alice Downing and Kathryn Lawson assisted with recruitment and conducted some of the interviews as part requirement of the research component of the Master of Nutrition and Dietetics at the University of Canberra.

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**T8:WS1.4 Bariatric surgeon’s qualification – how important is it**

**Dolezalova K.¹,²**

¹OB klinika – Center for Treatment of Obesity and Metabolic Disorders, Prague, Czech Republic, ²1st Faculty of Medicine, Charles University, Prague, Czech Republic

**Introduction:** Differences in requirements for bariatric surgeon qualification may be noted among countries & different obesity/bariatric scientific societies. Clinical outcomes after bariatric procedures vary widely across hospitals and surgeons and proficiency of the operating surgeon may be an important factor underlying such variation.

**Methods:** Overview of qualification requirements of the American / ASMBS/ society, and the International Federation /IFSO/ are confronted with „real life” results reported from large centres.

**Results:** The ASMSB requirements vary due to individual US State policy. There’s a threshold of min.100 stapled procedures. The IFSO requires min. of 200 procedures to warrant surgeon’s qualification. In our high volume bariatric center >600 ops./year, close correlation between surgeon’s qualification/years of experience/volume and re-admission/complication rates was found. Surgeons with >10 years bariatric experience and with >50 complex operations/year exhibit significantly lower (1.1 +0.2% vs 11.2% +7.8% P < 0.001) re-admission/complication rates. Similar data were reported by the Michigan group (Birkmeyer et al.). The bottom quartile of surgical skill, as compared with the top quartile, was associated with higher complication rates (14.5%vs.5.2%, P < 0.001) and higher mortality (0.26%vs.0.05%, P = 0.01).

**Conclusion:** The official bariatric qualification requirements, as well as the practical skills vary widely. The findings suggest that greater surgical skills are associated with fewer postoperative complications and lower rates of reoperation and readmissions after bariatric surgery.
SPECIAL SESSIONS

Wednesday, 6 May, 2015

EASO OMTF Teaching Course: Multidisciplinary Treatment in Adults

Anti-obesity drugs today

Mitic D D.1
1Center for Obesity, Clinic for Endocrinology, Diabetes and Diseases of Metabolism, Clinical Center of Serbia, School of Medicine, University of Belgrade, Belgrade, Serbia

There are five anti-obesity drugs for long-term use that are approved by FDA in USA: orlistat; lorcaserin; phentermine/topiramate; bupropion/naltrexone and liraglutide while in Europe EMEA approved orlistat and recommended use of bupropion/naltrexone. Orlistat is a potent and selective inhibitor of pancreatic lipase that reduces the intestinal digestion of fat. Lorcaserin is a selective 5-HT2C receptor agonist that specifically activates 5-HT2C receptors relative to other 5-HT receptor subtypes. Activation of the serotonin-2C receptors in the hypothalamus reduces the food intake. Phentermine and extended-release topiramate was approved in September 2012. Primary mechanism of phentermine is appetite suppression while topiramate has an effect on energy balance. Fixed-dose combination of naltrexone (opioid receptor antagonist) and bupropion (dopamine and nor-epinephrine reuptake inhibitor) has a synergistic effect in reducing appetite and induction of weight loss. Liraglutide in a dose of 3 mg is a once-daily injectable glucagon-like peptide-1 (GLP-1) analogue that regulates appetite and food intake by decreasing hunger and increasing feelings of fullness and satiety after eating. Liraglutide was approved in USA by FDA at the end of December 2014 for treating obese subjects with BMI of 30 or a BMI of 27 with weight-related comorbidities, together with exercise and a reduced-calorie diet. Recently it was reported a discovery of unimolecular, dual incretin coagonist (GIP and GLP-1) with proven efficacy across animal and human models of obesity and diabetes. It was suggested that the polytherapeutic drug strategy in the future could possibly rival bariatric surgery concerning efficacy, safety, achievement and duration of weight loss.

Who Session: Population Trends

WHO.1 Childhood obesity trends in bulgaria

Petrova S1, Duleva V1, Konstantinova M2, Rangelova L1, Dimitrov P1, Bojilova D1
1National Center of Public Health and Analysis, Sofia, Bulgaria,
2Clinic of Endocrinology, Diabetes and Genetics, University Pediatric Hospital, Sofia, Bulgaria

Introduction: Given the high recent prevalence of childhood overweight and obesity in Bulgaria we aimed to investigate their trends among children aged 0–18 years from 1998 to 2013.

Methods: Data were analysed from 5 cross-sectional studies conducted on nationally representative samples of children in different age: 7–18 years old (1998 and 2011); of age 7 years (2008 and 2013) and children 0–5 years (2007). Height and weight were measured in all surveys, in some studies waist circumferences (WC) were measured. BMI-for-age were estimated using IOTF cut-offs and WHO definitions. Percentile distributions of WC in sex–gender groups were calculated.

Results: Using IOTF cut-offs, the prevalence of overweight of children 7–18 years old showed an increasing from 11.8% in 1998 to 23.4% in 2011, as obesity has raised from 3.2% to 8.4%. The highest rising in overweight rate was observed in 7–9 years children (overweight 14.1%, incl. obesity 3.5% in 1998 vs. overweight 30.2%, incl. 11.8% obesity in 2011). It was observed a parallel significant increasing in the median values of WC in both genders. The overweight aroused still in early childhood – in children aged 1–4 years it was 10.8%, incl. 2.6% obesity. Data for 7 years old children recorded a trend for significant increasing of overweight and obesity in the 3 survey periods (1998, 2008, 2011) but the study in 2013 showed a stabilization of the rates in boys and decreasing of those among girls (overweight 29% in 2011 vs. 25.3% in 2013, obesity 13.2% vs. 9.7%). The medians of WC have decreased in both genders. The rates of overweight and obesity defined by WHO references were much higher in all age–gender groups but the trends were the same.

Conclusion: The prevalence of overweight and obesity among children of age 7–18 years were more than doubled in the period 1998–2011. The findings from a study on 7 years old children in 2013 suggested that childhood obesity levels were starting to plateau or even fall.

EASO PPHTF and WHO Europe Join Workshop: Primary Prevention of Overweight and Obesity

WHO plans for action on primary prevention of obesity

Breda J.1
1Nutrition, Physical Activity and Obesity, Division Noncommunicable Diseases and Health

Promotion Through the Life-course, WHO Regional Office for Europe Unhealthy diets and excess body weight are leading risk factors for NCDs. Of the six WHO regions, the European Region is the most severely affected by NCDs; cardiovascular disease, diabetes, cancer and respiratory diseases together account for 77% of the burden of disease and almost 86% of premature mortality.A new European Food and Nutrition action plan has been adopted and a Physical Activity Strategy is being developed with the priority concerns include an overall excess consumption of energy, but also excessive consumption of saturated fat, trans-fats, sugar and salt. The new action plans on diet and PA thus aims to provide guidance to Member States on the types of policy options available. This is informed by the rapidly expanding evidence base to inform policy development. Action has tended to be taken in the area of providing information rather than making changes to day-to-day environments (e.g. nutrition labelling; price of food; marketing to children, environment and PA). The overall need for comprehensive approach will be discussed together, with a core package of policies likely to be most effective.

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Prevalence of obesity is changing in last last years. We have analyzed data from five surveys from 2000 to 2014 – using the same methods in representative population sample of Czech Republic. We have found the evidence of progression in obese and overweight group from 2000 to 2008 and later stabilization. There are more than 34% overweight and 22% of obese in Czech population in 2014. No statistically significant difference according to place where people live was found. It seems that number of obese and overweight is stable during last five years. Number of underweight (BMI under 18) increases in 18–20 years old female group. Waist circumference increases in male – more than 60% are in high (102 cm) or moderate (94 cm) risk of metabolic complications. The average increase of weight gain is 0.25 kg per year from the age of 18 years. The most critical period for weight gain is in 7th decade of life. Although the weight is stable at last five year, physical activity decreased more than we expected but consistently with increase of waist circumference. Prevalence of diabetes is 6 x times more than in lean subjects. (18% vs. 3%). Hypertension 5 times (45% vs 8%) but 86% overweight and 27% obese male do not perceive it as problem. The most important predictor of low BMI in adults are regularly physical activity in adolescent age, regularly meal and consumption of fruits and vegetable. Otherwise most important predictor of high BMI are fastfood consumption, car ownership and consumption of sausages. Physical activity reduces incidence of diabetes 21% vs 6% and hypertension 50% vs.33% regardless to BMI.

Conclusion: There are several explanations of stabilization of population BMI respectively incidence obesity and overweight. Obese people die sooner than overweight and lean and life expectancy increased about 7–8 year in Czech republic and old people often increase weight. May be, that also our recommendations and actions deliver first results...

Acknowledgement: Supported of project „Live Healthy“ of General Health Insurance Company

The prevalence of obesity has increased dramatically across Europe over the past 3 decades. Because obesity is a major risk factor for prevailing NCDs such as coronary heart disease and type 2 diabetes have become one of the biggest public health challenges of this century. How this epidemic will unfold in the next twenty years is uncertain since surveillance and monitoring data are often lacking and future projections in each country have not been carried out. Using available data on adult Body Mass Index prevalence, normal weight, pre-obese overweight and obesity trends were projected to 2030 for all 53 World Health Organization Euro-region. By 2030, overweight was predicted to increase in 41 of the 53 Euro-region countries. For obesity, increases were predicted in 47 and 34 countries for males and females respectively by 2030. The initiative also highlights the value of statistical modelling of trends and makes the case for good quality national surveillance data by which to make more accurate estimates, since the majority of data were self-reported so obesity rates are likely to be underestimated.

Thursday, 7 May, 2015

T8: C51 – Should Children, Elderly and Adults who are Moderately Obese be Offered Surgery?

Angrisani L.1
1General and Endoscopic Surgery Unit, S. Giovanni Bosco Hospital, Naples, Italy

The published literature documents the effectiveness of bariatric surgery in adult patients with a BMI <35. According to the IFSO Position Statement about Bariatric Surgery in Class I obesity the use of surgery should not be extended in children/adolescents or elderly with BMI <35 kg/m². Data about efficacy and safety of surgery in class I obese adolescents are lacking. As recommended by the ASMBS pediatric committee best practice guidelines, the selection criteria for adolescents being considered for bariatric procedure should include a BMI ≥35 kg/m² with major co-morbidities or with a BMI ≥40 kg/m² with minor co-morbidities. The optimal weight for lowest mortality appear to be in the overweight/class I obesity range in the elderly and there is no clear guidance regarding intentional weight loss in older adults, as it is unclear that benefits outweigh risks. However, the BMI with its failure to account for gender, fitness, age or race, is not a reliable and fair approach to the denial of surgery to patients for whom this is the only effective treatment. These surgical decisions should be guided, as for other diseases, by the patients’ states of health and the risk/benefits of the operation.
Abstracts

T1/T2:CS1.1
Central or Peripheral Regulation in Obesity and Insulin Sensitivity: The need to Focus on Central Regulations

Dulloo A.G.1

1Department of Medicine / Physiology, University of Fribourg, Switzerland

In general, research directed at the ‘periphery’ should be considered as equally important as that directed at ‘central regulations’. The issue here is about relative focus in a time window that represents the forthcoming years – say till 2020 at least. It is argued that in order to understand the mechanisms leading to obesity, insulin resistance and cardiometabolic diseases that will eventually have the greatest therapeutic impact, the major focus over the coming years should be directed at ‘central regulations’. The case is put forward that cellular and molecular information gathered at the ‘periphery’ has been spectacular over the past two decades, but there has been no significant advances in the identification of key components of the several control systems that regulate body weight, body composition and insulin sensitivity. Knowledge relative to ‘central regulations’ need to catch-up since lessons from the past suggest that major advancements pertaining to our understanding of the pathogenesis of obesity and its cardiometabolic risks only occur when research at the periphery has been fully integrated with that of ‘central regulations’, rather than focused only at the periphery per se.

T1/T2:CS1.2
We need to focus on peripheral mechanisms/insulin sensitivity

Vettor R.1

1Department of Medicine DIMED, University of Padua, Italy

Obesity is a complex disease with an abnormal adipose tissue expansion because of an alteration of energy balance due either to an impaired CNS control of food intake or to a reduction of energy expenditure due to a reduction of muscle insulin sensitivity and oxidative capacity with a channeling of fuel substrates towards adipose tissue. Insulin resistance could therefore appear with a different time sequence in the different tissues accordingly with the origin of caloric overflow. In both situations the expansion of adipose tissue due to energy excess could be limited by the appearance of insulin resistance. A failure in the capacity to store energy efficiently is the major cause of ectopic lipid accumulation, inflammation and insulin resistance because of the capacity of muscle and liver to fully metabolize fatty acids is insufficient to match the excessive fatty acid uptake by cells. Adipose cells could be found also within skeletal muscle bundles and fibres and this inter-muscular adipose depot (IMAT) is increased in obesity and is strongly related with the appearance of insulin resistance. Moreover, in obesity IMAT is infiltrated with macrophages which produce pro-inflammatory cytokines that affect skeletal muscle insulin sensitivity in a paracrine way. The expanding adipose tissue mass and the related metabolic abnormalities linked with insulin resistance and inflammation could cause muscle insulin resistance. The majority of insulin-stimulated glucose uptake occurs in muscle and therefore factors that acutely modulate insulin sensitivity, anticipating weight gain are centered primarily on nutrient sensing mechanisms within muscle and their interactions with the insulin-signalling. These sensing mechanisms can detect changes in nutrient availability and provide a means of regulating mitochondria function and insulin sensitivity. Defects in the sensing of energy status, and the ability to respond appropriately, result in metabolic diseases such as obesity.
thermore, body composition measurement is a very useful tool to evaluate the quality of weight loss, and this is especially evident following bariatric surgery, when some patients achieve significant reductions in BMI but increasing fat percentage at the same time. Discrepancies between body weight and body composition also takes place in aging, where sarcopenia and fat excess are clinically relevant. These findings prove that evaluating body composition and fat distribution should be incorporated to clinical practice in order to better diagnose obesity and to improve the assessment of risks, treatment indications and therapeutic outcomes.

Acknowledgement: Collaboration of all components of the Obesity Unit is very much appreciated.

CS.2
Should weight/adipose tissue loss or general health be the goal? We should focus on general health

Tsigos C.1
1School of Health Sciences and Education, Harokopio University, Athens, Greece

Obesity is a global epidemic that is associated with a large spectrum of negative health outcomes, many of which can be improved by weight loss. Hence the current guidelines for weight management recommend weight loss for all obese adults. However, there may be subpopulations of obese persons, such as the elderly and the metabolically healthy or highly fit, that may not be adversely affected by their excess adiposity or may not necessarily benefit from weight loss. Also, despite the established association between obesity and cardiovascular risk, obese individuals with cardiovascular disease tend to have better prognosis than normal weight individuals, presenting an “obesity paradox”. Furthermore, weight loss in obese elderly or patients with established cardiovascular disease and type 2 diabetes appears to increase mortality risk. Also, given the difficulty to maintain weight loss in the long-term, it is not clear whether the benefits of weight loss outweigh the potential detrimental effects of weight cycling. Thus, obesity is a complex condition that is not always associated with adverse health outcomes and weight loss by itself may not be the most appropriate recommendation for all obese individuals. Therefore, setting the goal of maintaining a healthy lifestyle with improved diet quality and high level physical activity and cardiopulmonary fitness may be more appropriate in some groups of obese individuals, than focusing on weight loss alone.

EASO/IFSO-EC Young Investigators United (YIU) Scientific and Awards Session

YI.1
Bariatric operations that do not work

Fiennes A.1
1St Anthony’s Hospital, Surrey SM3 9DW, United Kingdom

Over the 50-year lifetime of bariatric surgery operative procedures have become obsolete, either because they were ineffective and based on a wrong (or absent) disease model, or because they were hazardous, whether effective or not. New hopefuls have come and gone. Yet other procedures have persisted, despite an initial basis on a wrong model. The paradoxical success of these procedures has led to revisions of the disease model and to new understandings of their mechanism of action – for example the “regulatory” effects of various bypass procedures. Nonetheless there are also failures of apparently understood operations. Among them the most intriguing paradigm is that of weight regain after regulatory surgery, partly because it implies an adaptive homeostatic response, expressed by some individuals more than others. As obesity grows and as bariatric surgery enters middle age these failures challenge us to better research into physiological responses, into the perceived role of behavioural factors and into the relationship between the two.

YI.2
Prevention and management of obesity united

Visscher T.L.1
1Research centre for the prevention of overweight Zwolle, Windesheim University of Applied Sciences Zwolle & VU University Amsterdam, The Netherlands

Nearly 400 years after William Harvey discovered the blood circulation, we are still discovering the field of prevention. It is only less then 40 years ago that Sir. Geoffrey Rose argued that a population-based approach targets the real, underlying determinants of impaired health. Only less than 20 years ago, Swinburn and Egger described the obesogenic environment with their ANGELO-framework, and about 10 years ago, Kremers described his EnRG-framework hypothesizing an interaction between individual environmental determinants of energy-balance related behaviours. To date there is no doubt regarding the impact of obesity prevention. Evidence is increasing on the successes of community-based programs, including EU-programs, counteracting the real underlying determinants, supporting professionals and individuals, and leading to decreases in obesity. At the same time evidence shows the success of obesity management approaches. But, those successes are hard to maintain, especially when attention for health promotion is lacking. To have a real impact on the population’s health, the field of prevention and the field of management should be united. Hence, obesity management is only successful within healthy environments. And, as health behaviour is also the key element in obesity management, obesity management approaches should benefit from prevention expertise. Whereas our parents are trained to treat the disease, our new generation of clinicians is (or should be) trained to deal with the individuals’ own responsibility to live healthily. Uniting obesity prevention and management is an extremely important direction for Young Investigators United.

Friday, 8 May, 2015

Special Session: Stigma, Discrimination and Health Related QoL

SS.1
The psychology of anti-fat bias in an obesogenic environment. Is behavioural justice required?

Hill A.2
2Academic Unit of Psychiatry & Behavioural Sciences, Leeds University School of Medicine, 101 Clarendon Road, Leeds LS2 9JL, UK

The rise in interest in anti-fat bias parallels the recognition of obesity as a public health problem and a general failure to bring about change. Calls to ‘wage war’ on obesity and using stigma to change obesity-relevant behaviour have been challenged on human rights and social justice grounds. This presentation will address a series of questions. Namely, what is anti-fat bias? Who holds anti-fat attitudes? What is the resultant experience of those who are obese? What are the consequences of anti-fat bias? What is behavioural justice and how could it be applied to obesity? Anti-fat bias is apparent in the prevailing attitudes to and beliefs about obesity and the people who are obese. The main components are dislike (the aesthetics of appearance), judgements of health (weight as a metric of health; weight change indicative of health improvement/decline), and morality (blame, lack of willpower). The overarching emotion is fear, as the stereotyping of fat is a mainly negative portrayal of character, social exclusion, and poor health. Such views are widely held, implicitly by all, and explicitly by the majority of general public, health professionals and people who are obese. Anticipated and actual discrimination and victimization experiences are evidenced in questionnaires, diary records and qualitative interviews with children and adults who are obese. The associated disparity and disadvan-
An important part of interventions in childhood obesity is the engagement of family members and open discussion about children's weight. However, parents are often reluctant to talk about their children's weight, with health care professionals and with children themselves. One potential reason for parental reluctance to discuss children's body weights is the pervasiveness of stigmatizing attitudes towards obesity, which encompass blame directed at the parents of obese children. Stigmatizing attitudes are transmitted directly and indirectly through multiple channels, including the media, family members, peers, school policies, and even clinicians. The aim of this talk is to review the literature on obesity stigma as transmitted within the family. The talk centres on adults’ framings of links between their childhood experiences of becoming aware of their own weights, and their attitudes and practices concerning weight talk as adults. Specifically, this presentation examines whether their own childhood experiences of weight talk influence parents' and grandparents' decisions not to talk to their children or grandchildren about weight. The talk concludes with a review of recent research on effective childhood obesity prevention and intervention messages that protect children's self-esteem.

Saturday, 9 May, 2015

T2:CS2 – Lipotoxicity and Skeletal Muscle: Are Ceramides to Blame?

T2:CS2.1 Lipotoxicity and Skeletal Muscle: Are Ceramides to Blame? YES

Amati F.1

1Department of Physiology and Institute of Sport Sciences, University of Lausanne, Lausanne, Switzerland

Lipotoxicity is one of the hypotheses being explored to explain the mechanisms by which obesity leads to insulin resistance (IR). Also known as the lipid metabolite theory, lipotoxicity occurs when fatty acid in excess of the oxidative needs spillover into harmful pathways of non-oxidative metabolism. Within the muscle fibers, it has been shown that it is not intramyocellular triglycerides that confer IR but particular lipids intermediates, among which ceramides and diacylglycerols (DAG). Since the 90s, animal models established these relationships and presented mechanisms to explain the deleterious effect of these metabolites. Indeed, distinct disruptions of the insulin-signaling cascade have been found for DAG and for ceramides. Recent human studies are still not agreeing on the role of DAG, with controversies and dissimilar results among different studies. At the contrary, the negative effect of ceramides and their role in the induction of skeletal muscle IR seems to be consistent across human studies.

T2:CS2.2 Lipotoxicity and Skeletal Muscle: Are Ceramides to Blame? No

Schröven P.1

1Departments of Human Biology and Human Movement Sciences, Maastricht University Medical Center, Maastricht, The Netherlands

Fat accumulation in skeletal muscle is an early hallmark in the development of type 2 diabetes mellitus. Indeed, type 2 diabetic patients have elevated levels of intramyocellular triglycerides (IMTG), which is highly correlated with insulin resistance. However, endurance trained athletes also have high amounts of IMTG despite being very insulin sensitive. This so-called athletes paradox has learned that it is not the triglyceride accumulation in the muscle cell per se that induces insulin resistance. Rather, research in the last decade has revealed several mechanisms by which fatty acid intermediates can interfere with insulin signaling. These fatty acid intermediates include diacylglycerol, fatty acyl-CoA, acylcarnitines and ceramides, but so far no uniform mechanism is available that explains how fat accumulation in the muscle leads to insulin resistance. More recent data also point towards an important role for lipid droplet dynamics in skeletal muscle insulin sensitivity. Thus, in skeletal muscle lipid droplets are coated with PLINs, which are involved in regulating turnover of lipid. Overexpression of PLINs in muscle can prevent lipid-induced insulin resistance, and endurance trained athletes have high PLINs levels. It can therefore be concluded that not one single fatty acid intermediate – including ceramides – is responsible for skeletal muscle lipotoxicity, but rather a complex regulation of lipid droplet turnover determines lipotoxicity.

SS.4 Is stigmatization getting worse as overweight becomes the norm?

Hilbert A.1

1Integrated Research and Treatment Center Adiposity Diseases, University of Leipzig Medical Center, Leipzig, Germany

Weight stigma increased over the last decades of the 20th century as prevalence rates of obesity rose substantially. However, for the recent years, when prevalence rates of obesity showed smaller gains, time trends of weight stigma are unclear. Weight stigma includes pervasive negative stereotypes and attitudes about obesity that can extend to actual discrimination, evidenced in multiple domains of life. Furthermore, stigmatized overweight and obese individuals often have the tendency to internalize weight stigma, and thus stigmatize themselves. Such a self-stigma has been found to be highly psychopathologically relevant and associated with lowered quality of life. This study sought to examine time trends of stigmatizing attitudes and, for the first time, of self-stigma. Data from four representative surveys of the German population (N = 7000) were analyzed for time trends between 2005 and 2015. The results did not show any change in stigmatizing attitudes from 2005 to 2012. A total of 23% of the population held definitive stigmatizing attitudes toward obesity, with higher proportions in those with less education and higher age. Similarly, the extent of self-stigma did not show any variations from 2012 to 2015 and was found in 13% of overweight and obese individuals, especially in women and in those of lower age. These results suggest a temporal stability of stigmatization and self-stigma over the recent years, as overweight and obesity show only slight increases. Levels of stigmatizing attitudes and self-stigma are substantial as overweight remains to be the norm.
**T2-CS2.3**

**Leptin administration stimulates the myogenic action of irisin through nitric oxide-dependent mechanisms, but reduces its browning effect on subcutaneous fat in mice**

Rodríguez A.1,2,4, Becerril S.1,2,4, Méndez-Giménez L.1,2,4, Ramirez B.1,2,4, Sáinz N.3, Catalán C.1,2,4, Gómez-Ambrosio J.1,2,4, Frühbeck G.1,2,4

1. Metabolic Research Laboratory, Clínica Universidad de Navarra, Pamplona, Spain
2. Department of Endocrinology & Nutrition, Clínica Universidad de Navarra, Pamplona, Spain
3. CIBER Fisiopatología de la Obesidad y Nutrición (CIBERobn), Instituto de Salud Carlos III, Spain
4. Obesity and Adipobiology Group, Instituto de Investigación Sanitaria de Navarra (IDISNA), Pamplona, Spain

**Introduction:** Obese leptin-deficient ob/ob mice show high adiposity and reduced muscle mass with leptin administration promoting weight loss and inducing muscle accretion through PGC-1α-dependent mechanisms.

**Objective:** Our goal was to analyze in vivo and in vitro the effect of leptin on FNDC5, a novel PGC-1α-dependent myokine that is synthesized and cleaved to form irisin that induces white adipose browning.

**Methods:** Twelve-week-old male wild type and ob/ob mice were divided in three groups as follows: control, leptin-treated (1 mg/kg/d) and pair-fed.

**Results:** Leptin administration was associated with increased gastrocnemius weight and cell surface area, higher Pgc1a and Fndc5 transcript levels and a modest increase in serum irisin. Leptin stimulated Fndc5 mRNA expression through nitric oxide (NO)-dependent mechanisms in murine C2C12 myocytes and activated both basal and irisin-stimulated myogenosis, as evidenced by increased myocyte proliferation, higher myogenin and myonectin transcript levels together with lower mRNA expression of myostatin and dystrophin and the muscle atrophy-related factors MuRF1 and MAFbx. Interestingly, leptin reduced Fndc5 expression in a NO-independent manner in murine differentiated subcutaneous adipocytes. Furthermore, leptin counteracted the irisin-induced up-regulation of both brown (Ucp1 and Cidec) and beige (Tmem26) adipocyte-specific genes and the increase in UCP1-positive cells.

**Conclusion:** Taken together, the results provide evidence for a regulatory role of leptin on FNDC5/irisin, favoring muscle accretion but reducing fat browning.

**T2-CS2.4**

**Impact of high fructose diet on skeletal muscle metabolism in healthy men**

Seyssel E.1,2,3, Meugnier E.1,2,3, Laville M.1,2,3, Vidal H.1,2,3, Leq K.A.4, Tappy L.5

1. Centre de Recherche en Nutrition Humaine Rhône-Alpes (CRNH-RA), Centre Hospitalier Lyon Sud, Pierre-Bénite, France
2. Centre Européen pour la Nutrition et la Santé (CENS), Pierre-Bénite, France
3. Université Lyon 1, INSERM UMR1060, Laboratoire CarMeN, Oullins, France
4. Nestlé S.A. Nestlé Research Center, Lausanne, Suisse
5. Department of Physiology, Faculty of Biology and Medicine, University of Lausanne, Lausanne, Switzerland

**Introduction:** Changes in lifestyle, characterized by increased consumption of calorie-rich foods and reduced energy expenditure are major determinants of the current epidemic of obesity. Also the increase of fructose intake representing about 8% of total energy intake in Europe and USA seems to reinforce obesity status.

**Methods:** Ten healthy normal weight first-degree relatives of type 2 diabetic patients were submitted to two different diets during 7 days: (a) control diet and (b) high fructose diet (3.5g fructose/kg fat-free mass/day). Insulin sensitivity was determined after each diet using a euglycemic hyperinsulinemic clamp. Energy metabolism and skeletal muscle gene expression were evaluated after each diet.

**Results:** High fructose diet increased significantly body weight (+0.9kg), intrahepatic lipids content (+79%), intramyocellular lipids content (+26%) concomitantly with a shift in the use of substrates as energy fuel toward preferential oxidation of carbohydrates instead of lipids. Hepatic insulin sensitivity index significantly decreased. Transcriptomic analyses on skeletal muscle highlighted profound effects on mitochondria potentially involved in the metabolic shift.

**Conclusion:** A short term fructose overfeeding diet leads to deleterious metabolic alterations classically observed in metabolic syndrome. Deciphering the mechanisms responsible for the rapid metabolic shift and mitochondrial damage is currently under investigation using a combination of human hepatocytes and myotubes cell models.

**Special Session: EASO/EFAD Roundtable, Dietary guidelines for the prevention and treatment of Obesity in Europe – What do the dietitians use?**

An overview of dietary guidelines used in Europe for obesity management

Covers E.1

1. Amsteling, institute of primary care, Amstelveen, The Netherlands; 1-co-chair of the EFAD specialist dietetic network (ESDN) on obesity 2; chair of the Dutch Network of Obesity dietitians 3.

Several European countries have introduced multidisciplinary evidence based guidelines for obesity management over the past decade. An important part of these guidelines concerns dietary guidelines. On the other hand, general guidelines for healthy nutrition for the population are widely used as a treatment tool in obesity management. Our research question was: which dietary guidelines are used in obesity management in European countries, and how specific are they? We carried out a survey among the EFAD members and asked them to send in the multidisciplinary guideline that is in use. Guidelines in English, French, German, and Dutch/Flemish were studied. For guidelines in different languages we asked a summary in English. We studied the guidelines to find: which countries have guidelines; do these guidelines contain dietary guidelines; are these used by health professionals for obesity management; how specific are the dietary guidelines; how do these guidelines differ from the general guidelines? Finally, conclusions are drawn on the content: do all guidelines emphasize the same nutritional aspects, for instance on fat, fibre, alcohol? And, if not are these differences based on evidence?

**Acknowledgement:** We wish to thank all associations of dietitians and dietitians in national obesity networks for their contribution to the collection of data.

**References:**

3. Interdisziplinäre Leitlinie der Qualität S3 zur “Prävention und Therapie der Adipositas” http://www.adipositas-gesellschaft.de
ORAL SESSONS

Wednesday, 6 May, 2015

T1/T2:OS1 – Organ Cross Talk

T1/T2:OS1.1
Effects of gut microbiota manipulation by antibiotics on host metabolism in obese humans

Reijnders D.1,2, Goossens G.H.3,4, Neis E.5,6, Van der Beek C.M.1,3, Most J.1, Holst J.J.1, Lenaerts K.7,8, Kooite R.S.9,10, Nieuwdorp M.1,9,10, Dejong C.H.1,9, Blaak E.E.1,2

1Department of Human Biology, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University Medical Center+, Maastricht, The Netherlands
2Department of Surgery, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University Medical Center+, Maastricht, The Netherlands
3Top Institute Food and Nutrition, Wageningen, The Netherlands
4NFF Center for Basic Metabolic Research, Department of Biomedical Sciences, The Panum Institute, University of Copenhagen, Denmark
5Department of Vascular Medicine, University of Amsterdam, Amsterdam, The Netherlands
6Department of Internal Medicine, University of Amsterdam, Amsterdam, The Netherlands
7Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic
83rd Department of Internal Medicine, 1st Faculty of Medicine of Charles University and the General Teaching Hospital, Prague, Czech Republic
9Department of Medicine and Department of Neuroscience, Diabetes, Obesity and Metabolism Institute, Icahn School of Medicine at Mount Sinai, New York, USA
10High Field MR Centre, Department of Biomedical Imaging and Image Guided Therapy, Medical University of Vienna, Vienna, Austria

Background: Recent studies indicate that gut microbiota manipulation affect metabolic health but human data are scarce. Here, we investigated the effects of gut microbiota knock-down by antibiotics on insulin sensitivity, metabolic parameters and inflammation in obese humans.

Methods: 57 male subjects (BMI 31.2 ± 2.6 kg/m², age 59 ± 7 years, HOMA-IR 4.5 ± 0.2) with impaired glucose metabolism were allocated randomly to amoxicillin (AMOX; broad-spectrum), vancomycin (VANCO; aimed at gram positive bacteria) or placebo (PLA) for 7 days, 1500 mg/d. Hepatic and peripheral insulin sensitivity, plasma cytokine concentrations, gut permeability, plasma LPS-binding protein, IL-6, IL-8, TNF-α, leptin and GLP-1 concentrations were measured. Adipose tissue and skeletal muscle biopsies were collected for microarrays. Feces was collected for analysis of microbiota composition and energy excretion.

Results: AMOX and VANCO had no significant effect on insulin-mediated suppression of endogenous glucose production and insulin-stimulated glucose disposal compared to PLA. However, insulin-stimulated non-oxidative glucose disposal (glucose storage) significantly decreased after AMOX compared to PLA (-3.2 ± 1.5 vs. 2.6 ± 1.6 μmol/kg/min, p = 0.017). Antibiotics did not affect energy intake and expenditure, substrate oxidation, gut permeability, plasma LPS-binding protein, IL-6, IL-8, TNF-α, leptin and GLP-1 concentrations. Feces and biopsy analyses are currently ongoing.

Conclusion: The present study demonstrates for the first time that robust knock-down of intestinal bacteria by antibiotics has no significant effects on insulin sensitivity, host energy metabolism and systemic inflammation, but decreases insulin-stimulated glycogen storage in obese men.

T1/T2:OS1.2
Dose-dependent effects of thiazolidinediones in dietary obese mice

Flachs P.1, Tvrzicka E.2, Svobodova M.3, Zouhar P.4, Kopecky J.1

1Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic
24th Department of Internal Medicine, 1st Faculty of Medicine of Charles University and the General Teaching Hospital, Prague, Czech Republic

Introduction: Thiazolidinediones (TZD) are used for treatment of insulin resistance in diabetic patients; however, the therapy is associated with unwanted side effects. The insulin-sensitizing action of TZD is thought to result from activation of PPARγ in white adipose tissue, associated with the secretion of adiponectin and consequent stimulation of AMP-activated protein kinase (AMPK) in other tissues. Our results suggested that the effects of TZD, administered at sub-optimal doses with respect to the improvement of insulin sensitivity in mice, may involve a change in plasma lipid profile resulting from modulation of hepatic lipid metabolism, independent of the adiponectin–AMPK axis. The aim of the present study was to further characterize the dose-dependent mechanism of TZD action.

Methods: C57BL/6 mice were assigned to dietary treatment using: (i) a high fat diet (HF); (ii) HF diet with “low” dose of rosiglitazone (~10 mg/kg diet (HF+R10)); (iii) HF diet with “high” dose of rosiglitazone ~100 mg/kg diet (HF+R100).

Results: Rosiglitazone in a dose-dependent manner induced high molecular weight form of adiponectin in plasma. Only the R100 mice exhibited significantly higher activity of the hepatic AMPK a2 isoform. Conversely, the R10 mice showed elevated hepatic lipid content, upregulated expression of genes associated with de novo lipogenesis, namely FAS and SCD-1. These mice also exhibited specific enrichment of palmitoleate in plasma lipids.

Conclusion: Different mechanisms contribute to the insulin-sensitizing effect of TZD, depending on the dose of the drug. New strategies for treatment of diabetic patients may be based on the use of sub-optimal doses of TZD in combination with other interventions.

T1/T2:OS1.3
Insulin regulates hepatic triglyceride secretion and lipid content via the brain

Scherer T.1,2, Lindtner C.3, O’Hare J.4, Zielinski E.5, Freudenthaler A.4, Baumgartner-Parzer S.5, Tödtler K.1, Heeren J.1, Kršák M.1,2, Scheja L.1,2, Fürnissm C.3, Buettner C.3

1Department of Medicine and Department of Neuroscience, Diabetes, Obesity and Metabolism Institute, Icahn School of Medicine at Mount Sinai, New York, USA
2Department of Medicine III, Division of Endocrinology and Metabolism, Medical University of Vienna, Vienna, Austria
3Department of Biochemistry and Molecular Cell Biology, University Medical Center Hamburg-Eppendorf, Hamburg, Germany
4High Field MR Centre, Department of Biomedical Imaging and Image Guided Therapy, Medical University of Vienna, Vienna, Austria

Introduction: Hepatic lipogenesis is increased in obesity and insulin resistance. Thus, a key mechanism of the liver to prevent steatosis is its ability to increase the export of triglycerides (TG) packaged as very low–density lipoproteins (VLDL). Insulin action comprises of direct effects on peripheral organs, but also of indirect effects that are mediated via the CNS (1). Systemic hyperinsulinemia decreases VLDL production by the liver, yet it is unknown whether brain insulin can independently regulate TG flux.

Methods: To study the role of brain vs. systemic insulin signaling on hepatic TG secretion, we performed tyloxapol infusion studies in male Sprague Dawley rats during systemic or isolated brain hyperinsulinemia. The latter was accomplished by infusing insulin or vehicle for 4 hrs into the 3rd ventricle (ICV).
Results: ICV insulin infusion increased hepatic TG secretion compared to controls. In the experiment involving a hyperinsulinemic euglycemic clamp, the TG flux increased (0.85 ± 0.05 μmol/kg/min; P = 0.020; n=4), which is in agreement with prior reports (2). Furthermore, prolonged ICV insulin infusion in rats via osmotic minipumps reduced hepatic lipid content as assessed by non-invasive-H'-magnetic resonance spectroscopy (1.25 ± 0.15 vs. 0.75 ± 0.12; % water signal; P = 0.018; n=8 per group) and lipid profiling independent of changes in hepatic de novo lipogenesis. Conversely, mice that lack the insulin receptor in the whole brain had reduced hepatic TG flux compared to littermate controls, which was again assessed by tyloxapol studies (154 ± 6 vs. 126 ± 12 μmol/kg/h; P = 0.038; n=9 per group).

Conclusion: These studies identify brain insulin signaling as an important permissive factor in hepatic VLDL secretion that may protect against hepatic steatosis.

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References

T1/T2-O51.5
Colonic short-chain fatty acids infusions promote fat oxidation and improve metabolic parameters in overweight males

Canfora E.E.1,2, van der Beek C.M.1,2, Goossens G.H.1,2, Jocken J.J.1,2, Lenzaerts K.1,2, Holst J.J.1,2, Dejong C.H.1,2, Blaak E.E.1,2
1Top Institute Food and Nutrition, Wageningen, the Netherlands.
2Department of Human Biology; NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University Medical Centre+, the Netherlands.
3Department of Surgery; NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University Medical Centre+, the Netherlands.
4Novo Nordisk Foundation Center for Basic Metabolic Research, Copenhagen, Denmark.
5University of Copenhagen, Denmark

Short-chain fatty acids (SCFA), formed by microbial fermentation of dietary fiber, are believed to be involved in the etiology of obesity and diabetes. The aim of this study was to investigate effects of colonic administration of physiologically relevant mixtures of SCFA on human substrate and energy metabolism. In this randomized, double-blind, crossover study, twelve overweight males (BMI ≥ 25 kg/m² ≤ 34.9 kg/m²) were included. Subjects underwent four test days, with rectal administration of a SCFA mixture high in acetate (HA), high in propionate (HP), high in butyrate (HB) and a placebo (PLA). The primary outcomes fat oxidation and energy expenditure (EE) were measured via an open-circuit ventilated hood system. Blood samples were collected during fasting and after a 75 g glucose drink (postprandial), before and 30, 60, 90 and 120 minutes after colonic infusions. Distal colonic infusions with all SCFA mixtures increased fasting fat oxidation, compared to PLA (p < 0.001). Fasting EE increased after HA and HP, compared to PLA (p < 0.05). HB and HP enhanced fasting PYY concentrations (p < 0.05); and all SCFA mixtures increased postprandial PYY concentrations (p < 0.01). Fasting free glycerol concentrations were reduced after HB, compared to PLA (p < 0.05). Fasting plasma IL-1β concentrations decreased after HA, compared to HP and PLA (p < 0.05). Colonic infusions did not affect plasma glucose, GLP-1, TAG and FFA concentrations. This study showed that colonic infusions of SCFA mixtures, in concentrations and ratios reached after dietary fiber intake, beneficially modulate whole body substrate metabolism, with a pronounced increase in fat oxidation, EE and plasma PYY. Increasing colonic SCFA concentrations may yield new mechanisms for treating or preventing metabolic disorders.

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T1/T2-O51.6
Restoration of insulin sensitivity in obese condition by chronic stimulation of the abdominal vagus nerves.

Malbert C.H.1, Caurery N.1, Guérin S.1, Divoux J.L.2, Picq C.3, Henry C.3
1Ani-Scans, Dept of human nutrition, INRA, 35590 Saint-Gilles, France.
2Axionic, 2720 chemin Saint-Bernard, 06224 Vallauris Cedex, France.
3Sorin Group, 4 Avenue de Réau mur, 92140 Clamart, France

Introduction: Alternatives therapies to improve insulin resistance in obese patients are eagerly investigated because of the relative failure of the behavioral approaches and the irreversibility of bariatric surgery. Since the vagus regulates the afferent limb of insulin secretion (Blat et al, 2002), vagal stimulation represents an attractive tool. Surprisingly, vagal nerve stimulation (VNS) has never been investigated for restoration of insulin sensitivity in obese.

Methods: 16 adults mini-pigs were made obese (87 ± 5.3 kg) by 3 months obesogenic diet supplied at 200% of the metabolic requirement. Once obese, silicon cuff incorporating two electrodes were implanted around the dorsal and ventral abdominal vagus using laparoscopy. In half of the...
animals, these electrodes were connected to a double channel current stimulator placed under the skin (stimulated group) while the other half received only a sham device (sham). After 6 months of VNS (Val-Laillet et al, 2010), the animals were tested for insulin sensitivity using an euglycemic-hyperinsulinemic clamp. Body composition was also investigated using CT scan. Vagal tone was extracted from heart rate variability in conscious animals.

Results: Insulin sensitivity index was significantly larger in stimulated versus sham group (3.8 ± 0.51 vs 2.3 ± 0.24, p < 0.01) as a result of larger glucose infusion rate (1.9 ± 0.16 vs 1.4 ± 0.16, p < 0.01). The glyceemia was not different between groups at the onset of the clamp. The increased insulin sensitivity was not associated with changes in body composition neither for the subcutaneous nor the abdominal fat contents. Similarly, the LF/HF ratio indicative for vagal tone was not significantly different between groups (2.1 ± 0.03 vs 2.0 ± 0.07 for Stimulated vs Sham, p > 0.05).

Conclusions: Insulin sensitivity was improved in obese animals after VNS. This improvement is not associated with changes in body composition or in vagal tone.

Acknowledgement: We acknowledge the technical support of R Comte (UMR Pegas) for the insulin dosage.

T3:OS1 – Eating Behaviour and Patterns

T3:OS1.1
Uncontrolled and emotional eating as behavioural pathways in genetic susceptibility to obesity

Konttinen H1, Llewellyn C2, Wardle J1, Silventoinen K1, Kaprio J1, Joensuu A1, Perola M3, Männistö S4, Salomaa V1, Jousilahti P1, Hakulinen A1

1University of Helsinki, Helsinki, Finland,
2University College London, London, United Kingdom,
3National Institute for Health and Welfare, Helsinki, Finland

Introduction: Appetite has been hypothesized to be one mechanism mediating the effects of genes on weight. We examined whether two appetitive traits, uncontrolled and emotional eating, mediated the associations between known obesity-related genetic variants and adiposity.

Methods: Participants were from two population-based Finnish cohorts: 25–74 year-olds (DILGOM, N=3834) and 21–26 year-old twins (FinnTwin12, N=9953). Genotyping was performed using the cardo-metabochip in DILGOM and the Illumina 670 chip in FinnTwin. A weighted polygenic risk score (PRS) of 90 BMI-related loci was calculated based on a recent meta-analysis of the GIANT consortium. BMI and waist circumference (WC) were measured in a health examination. The TFFQ-R18 was used to assess uncontrolled eating (UE) and emotional eating (EE). Age and sex adjusted analyses were first conducted separately in each cohort and the results were then combined using fixed-effects meta-analysis.

Results: The combined estimates indicated that the PRS was positively associated with BMI (β=0.43, P < 0.001), WC (β=0.13, P < 0.001) and appetitive traits (β=0.08 for UE; β=0.06 for EE; P < 0.001). The highest PRS quartile was related to 1.40 (95%CI 1.12–1.74) and 1.36 (95%CI 1.09–1.71) increased odds of reporting high UE and EE compared with the lowest quartile. Mediation models indicated that UE and EE partly mediated (βindirect=0.023–0.024, P < 0.01) the associations between the PRS and BMI, with similar effects for WC.

Conclusion: Genetic predisposition to obesity may partly exert its effects through two appetitive traits reflecting lack of control over eating and eating in response to negative emotions. Targeting these eating behaviours, as well as the food environment, may increase success in obesity prevention and treatment.

Acknowledgement: We thank the Genetic Investigation of ANthropometric Traits (GIANT) consortium. Research relating to this abstract was funded by the Academy of Finland (# 265796).

T3:OS1.2
Appetite and food intake patterns in children

Syrd H1, van Jaarsveld C.H1, Llewellyn C1, Wardle J1
1Department of Epidemiology and Public Health, University College London, London, England

Introduction: Food responsiveness (FR) and satiety responsiveness (SR) are genetically influenced appetitive traits that are implicated in excess weight gain. They are hypothesised to act through energy intake, but no studies have examined associations with food intake in daily life. We predicted that higher FR would be associated with more frequent activation of the urge to eat and hence higher meal frequency, and lower SR with slower meal offset and hence larger meal size.

Methods: Data were from 1102 families (n=2203 children) from the Gemini twin birth cohort. Appetite was assessed with the FR and SR scales from Child Eating Behaviour Questionnaire when children were 16 months. Diet diaries (3 days) were completed by parents when children were 21 months. Diary analysis was done using the ‘Diet In Nutrients Out’ (DINO) programme by the Medical Research Council Human Nutrition Research Unit (Cambridge, UK). Meal size (total kcals per eating occasion) and meal frequency (eating occasions per day) were determined from analysis of timed diary data. Associations between appetite and meal size/frequency were analysed adjusting for age, gender, gestational age, and clustering by family.

Results: Higher FR was associated with more frequent meals (B=0.13; SE=0.04, p = 0.001) but not with meal size (p = 0.42) or total daily energy intake (-0.55). Lower SR was associated with larger meal size (B=-11.38; SE=2.10, p < 0.001) but not with meal frequency (p = 0.15). Lower SR was associated with higher total energy intake (B=-19.40; SE=8.52, p < 0.02).

Conclusion: SR and FR predicted different consumption patterns, both of which potentially predispose to overeating. Food-responsive children eat more frequently, and less satiety-responsive children eat more on each eating occasion. Different strategies may be required for reducing the impact of FR and SR on overconsumption and weight gain.

Acknowledgement: Recruitment and data collection was funded by Cancer Research UK. Food diary analysis was carried out by MRC Human Nutrition Research (Cambridge, UK) and funded by Danone, UK

T3:OS1.3
Impact of high plasma acetyl ghrelin level on eating behaviour in obese women

Julien B1, Seyssel K1, Feugier N1, Lambert-Porcheron S2, Drai J1, Laville M1, Disse E1
1Centre de Recherche en Nutrition Humaine Rhône Alpes, Hospices Civils de Lyon, Université Lyon 1, 2Département de Biochimie, Centre de Biologie Sud, Hospices Civils de Lyon, Université Lyon 1

Introduction: Acyl ghrelin, a stomach 28-amino acid peptide, is an orexigenic hormone stimulating appetite and food intake. In obesity, circulating plasma ghrelin levels are lower than in lean population. Surprisingly, some of obese subjects exhibit high ghrelin levels (HGL). We hypothesized that HGL in obesity could enhance hunger and induce eating disorders compared to low ghrelin levels (LGL). The aim of that study is to assess the association between ghrelin levels, hunger, and eating behaviour in obese women.

Methods: 55 obese women were selected and divided into 2 groups according to their acyl ghrelin levels (7.51 ± 5.85 pg·mL⁻¹ in LGL and 65.77 ± 45.04 pg·mL⁻¹ in HGL; p < 0.0001). We assessed eating disorders using the EDI-2 (Eating Disorders Inventory-2) and TFFQ (Three Factor Eating Questionnaire). Anxiety and depression were assessed by HAD scale. Biological and anthropometric profiles were also investigated.

Results: Anthropometric and metabolic parameters were not different between groups. Anxiety and depression scores were similar. Cognitive restraint, uncontrolled eating and emotional eating scores were not statistically different between groups. Hunger score was similar (3.38 ± 0.43}
A higher plasma ghrelin level in obesity is not associated with altered eating behaviour phenotype.

Conclusion: A higher plasma ghrelin level in obesity is not associated with altered eating behaviour phenotype.

T3:OS1.4
Timeline over which compensatory mechanisms are activated during weight loss with a very-low calorie diet

Nymo S.1, Jørgensen J.1, Kulseg B.2,3, Truby H.1, Martins C.1,2
1Obesity Research Group, Department of Cancer Research and Molecular Medicine, Faculty of Medicine, Norwegian University of Science and Technology, Trondheim, Norway.
2Centre for Obesity, Department of Surgery, St. Olav Hospital—Trondheim University Hospital, Trondheim, Norway.
3Nutrition & Dietetics Department, Monash University, Melbourne, Australia

Introduction: Diet-induced weight loss (WL) activates several compensatory mechanisms, such as increased hunger and reduced fullness feelings, reduced resting metabolic rate (RMR) and increased exercise efficiency (Ef). Little is known regarding when these mechanisms are activated and how they respond with progressive WL. The aim of this study was to determine the timeline over which compensatory mechanisms (changes in subjective feelings of appetite, RMR, Ef) are activated during WL with a very-low calorie diet (VLCD).

Methods: Twenty-two adult participants (11 men), with an average BMI of 38 ± 4.4 kg/m² underwent 8 weeks of VLCD followed by 4 weeks of weight maintenance. Body weight, RMR, Ef (10, 25 and 50W) and subjective feelings of appetite (in fasting and for 2.5h after a meal) were measured at baseline, day 3, when participants lost 5% and 10% of their baseline weight, at week 9 and at week 13.

Results: Significant WL (1.8 ± 1.7kg) was seen by day 3, and progressively at each subsequent time point, with an average reduction in body weight of 19 ± 4% at week 9, which then stabilized. RMR fell significantly after 5% WL, but then stabilized. Ef (all intensities) increased significantly for the first time at week 9 and then stabilized. A significant increase in fasting hunger and desire to eat was observed by day 3, but not at other time points. AUC for prospective food consumption was significantly reduced at week 9, but not other time points.

Conclusion: The magnitude of WL required to activate the different compensatory mechanisms in response to a VLCD seems to differ: 5% WL for a reduction in RMR and 19% WL for an increase in Ef. Fasting hunger and desire to eat changed only transiently at day 3 and AUC for prospective food consumption transiently with 19% WL.

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T3:OS1.5
Normal weight obesity in adolescents – associations with health behaviours and metabolic risk factors

Ofstadottir A.S.1, Torfadottir J.E.1, Arngrímsson S.A.1
1Research Center for Sport and Health Sciences, School of Education, University of Iceland, 2Educational Research Institute, School of Education, University of Iceland, 3Unit for Nutrition Research, Faculty for Food Science and Nutrition, University of Iceland.

Introduction: Adolescents often focus on physical appearance rather than health. This may affect their health behaviours. Normal weight obesity (NWO) applies to individuals with normal body mass index (BMI), but excessive body fat. Our aim was to explore metabolic disorders and lifestyle in this group.

Methods: Randomly selected 18 year old students (n = 191) from three highschools in the capital area in Iceland, with BMI within normal range (18.5–24.9 kg/m²) participated. Waist circumference was measured and bodycomposition assessed with dual energy X-ray absorptiometry (DXA). Aerobic fitness was measured with maximum oxygen uptake test on treadmill. Dietary habits were evaluated with 24-hour recall and questionnaires about diet and lifestyle, and blood samples were taken. NWO was defined, according to Lohman’s criteria; BMI within normal range and percentage body fat above 17.6% in males and above 31.6% in females.

Results: In total 40% (n=76) were defined as NWO, thereof 60% (n=46) were male participants. Fewer participants with NWO ate breakfast on a regular basis, consumed vegetables frequently, slept enough, and were physically active compared with participants without NWO. No difference was detected between the two groups in energy-, macronutrient micro- nutrient intake. Mean difference in aerobic fitness was 3.4 ml/kg/min between the groups in favor of the non-NWO group (P = 0.01). NWO was positively associated with having one or more risk factors for metabolic syndrome (Odds Ratio OR=2.2; 95% confidence interval CI: 1.2, 3.9) and high waist circumference (OR=7.4; 95%CI: 2.1, 25.9).

Conclusion: High prevalence of NWO was observed in the study group. Promoting healthy lifestyle with regard to nutrition, sleep and physical activity in early life should be emphasized.


T6/T7:OS1.1
Obesity and Discrimination – A Systematic Review

Spaholz J.1,2, Baer N.2, König H.H.1, Riedel-Heller S.G.2, Sikorski C.1,2
1Leipzig University Medical Center, IBB AdiposityDiseases, Leipzig, Germany, 2Institute of Social Medicine, Occupational Health and Public Health (ISAP), Leipzig University, Leipzig, Germany, 3Department of Medical Sociology and Health Economics, University Medical Center

Background: Research on obesity has shown that stigma often accompanies obesity on different societal levels. Obese individuals are often faced by a variety of prejudice and stereotypes. It has not been systematically evaluated, whether and to what extent negative attitudes translate into objective determinants of inequality, e.g. discrimination.

Methods: A systematic literature search was conducted, using Medline, ISI Web of Knowledge and The Cochrane Library without time limits. Studies pertaining to (a) prevalence estimates and (b) forms of weight-based discrimination towards obese individuals were included.

Results: 19 studies were included, indicating that weight discrimination is common and pervades many aspects of life for individuals with obesity. Often, no conceptual distinction between attitudes and discrimination were made. Experimental findings were in accordance with non-experimental findings, documenting that disparate treatment was visible on a behavioural level and not only a subjective perception. Findings from community-based studies reported prevalence estimates between 6.1% and 60.7%. A female gender and an increased body weight (BMI>35) were associated with higher rates of weight-based discrimination.

Conclusions: The results provide evidence that discrimination in obesity and its negative consequences are highly relevant issues within society and need to be the focus of potential legislative interventions.

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Abstracts

T6/T7:OS1.2
The impact of labelling on acceptance of obesity

Oldham M.1, Robinson E.1
1Psychological Sciences, University of Liverpool, Liverpool, England

Introduction: Visual exposure to obese body weights has been shown to increase acceptance of heavier forms. However, despite rates of obesity increasing dramatically since 1972, acceptance of heavier body weights has not become common, as obesity is still a widely stigmatised condition. The way in which obesity is typically portrayed could explain why increased exposure to obesity may not have resulted in a greater acceptance of heavier body weights. The aim of the present work was to examine whether labelling heavier body weights as ‘obese’ has an effect on whether exposure to heavier body weights reduces negative attitudes towards the obese.

Methods: 276 Participants were visually exposed to obese or healthy weight males with either no attached label, a label describing the males’ weight status or a condition in which attention was drawn to the males’ weight, before being asked to make judgements about the acceptability of an obese person’s weight.

Results: Exposure to obese males in the absence of a label increased acceptance of the obese person’s weight, relative to exposure to healthy weight males (p < .05). There was also a significant interaction, whereby exposure to obese males labelled as obese did not increase acceptance of the obese person’s weight. There was little evidence that exposure to obese males increased acceptance of an obese person’s weight when attention had been drawn to weight during visual exposure.

Conclusion: Visual exposure to obese body weights reduces negative attitudes towards the obese. However, the context in which exposure occurs is of importance. These findings support the theory that the way in which obesity is typically portrayed in popular media will not increase acceptance of heavier body weights as a result of visual exposure.

T6/T7:OS1.3
The weight of knowing you are overweight: Perceived weight status and risk of future weight gain in us and uk adults

Robinson E.1, Hunger J.2, Daly M.3
1University of Liverpool, 2University of California, 3University of Stirling

Introduction: Identifying oneself as overweight is presumed to act as a prerequisite to successful weight management efforts. However, the psychological burden attached to the label of ‘overweight’ may actually propagate further weight gain. Our objective was to determine the effect that perceiving oneself as ‘overweight’ has on risk of future weight gain.

Methods: Three longitudinal cohort studies were used: National longitudinal study of adolescent health (Add Health), Midlife in the United States (MIDUS) and the National Child Development Study (UK cohort). 3,899 US adults (Add Health), 3,372 US adults (MIDUS) and 6,740 UK adults participated. Primary measures were body mass index (BMI) and perceived weight status.

Results: Perceiving oneself as being ‘overweight’ at baseline was significantly associated (both before and after adjusting for potential confounders) with an increased risk of weight gain in the Add Health cohort (B = 1.056, SE = .175, p < .0001), the MIDUS sample (B = .376, SE = .134, p = .005) and the UK sample (B = .802, SE = .117, p < .001). The association between perceived overweight and weight gain was mediated by stress induced over-eating; perceiving oneself as overweight was associated with a greater likelihood of over-eating in response to stress, which in turn predicted weight gain.

Conclusion: Perceiving oneself as being ‘overweight’ is counter-intuitively associated with an increased risk of further weight gain. The stress and stigma associated with perceiving oneself as ‘overweight’ may be more detrimental than beneficial to weight management in our current social climate.

T6/T7:OS1.4
Outcomes of a Health-At-Every-Size intervention in local health centers across the province of Quebec

Gagnon-Girouard M.P.1, Bégin C.1, Provencher V.1, Turcotte M.1, Paquette M.C.2, Mongeau L.2
1University Laval, 2Ministère de la Santé et des Services Sociaux, 3Université de Montréal Public Health Research Institute

Introduction: Health-At-Every-Size (HAES), a non-dieting approach, promotes the regulation of eating based on the decrease of dietary restraint, and the appropriation of internal cues of hunger and satiety (intuitive eating), as well as self-acceptance. Controlled studies have demonstrated that HAES interventions improve physiological and psychological functioning of participants. The Quebec government recently implemented a HAES intervention called “Choisir de Maigrir?” in local health and social services centers (HSSC). In the context of scarce resources devoted to public health, the aims of the present study are to document the efficacy of this intervention and to verify whether the core dimensions of HAES are actually associated with putative benefits. Outcomes were core dimensions of the HAES approach (restraint, intuitive eating, body esteem), eating behaviors, psychological distress, and body mass index (BMI).

Methods: Within 33 HSSC, 216 women receiving the HAES intervention and 110 women on a waiting list were tested. Participants completed self-reported questionnaires before and after the intervention, as well as one year later.

Results: Linear mixed models analyses computed according to a group (HAES vs. control) by time (baseline, post-test, follow-up) design revealed significant group by time effects for restraint, intuitive eating, body esteem, eating behaviors, psychological distress and body mass index (BMI).

Conclusion: The HAES intervention showed sustained improvement on core HAES dimensions, psychological profile and eating behaviors. Intuitive eating seems to play a central role in the beneficial changes that were observed among participants.

T6/T7:OS1.5
Changing adolescent health behaviours: Empirical evidence and practical ways forward

Tucker E.1
1Department of Politics, Philosophy and Religion, Lancaster University, Lancaster, UK 1

Introduction: Adolescents are a key target for intervention programmes. However, adolescents are very difficult to reach. This paper asks what we might consider when designing more effective interventions in the future and, coming from an ethical and philosophical perspective, suggests that interventions ought to focus on adolescent self-understanding and decision-making rather than focussing on particular health behaviours.

Methods: The paper draws on empirical studies and meta-analyses to identify features of successful interventions, models from developmental and health psychology, research into positive youth development, and philosophical insights into value formation and autonomy development.

Results: There are many influences on adolescents that mean health considerations are unlikely to weigh heavily in their decisions: the invisibility of future health, adolescents’ interactions with others and the environment, social practices, and their attitudes and values. Adolescents prioritise many things over health, for example, worries about fitting in. They operate within systems of consumerist norms, in the grip of marketing and brand culture. They have heightened body image, self-consciousness and a desire to make autonomous choices. Parental influence gives way to the influence of peer networks. These factors are often bound up with risk-taking behaviour. Adolescence is a distinctive part of development.
that requires specific intervention design strategies. The paper argues that an ecological approach enables deeper understanding of the challenges that intervention designers face, and suggests ways to improve intervention strategies. **Conclusions:** Consideration of the complex influences on adolescent health behaviours offers a better understanding of why they are hard to reach. Indications are that interventions should focus less on individual health behaviour outcomes. Instead, successful interventions may include those that focus on personal and social skills.

**T6/T7:OS1.6**

**Governing ‘obesities’ – interdisciplinary obesity research in practice**

**Hillersdal L.¹, Winther J.¹, Jespersen A.P.¹**

¹University of Copenhagen

**Background:** Obesity is a complex problem demanding complex solutions. This proposal stands at the centre of the large interdisciplinary research consortia “Governing Obesity” at the University of Copenhagen. Researchers from different parts of biomedicine, the social sciences and the humanities seek to develop novel means and methods to treat and prevent obesity and its consequences. The expectation is that these interdisciplinary collaborations will lead to effective interventions at the societal and individual level. A part of our involvement in this initiative has been to investigate how interdisciplinary obesity research is done in practice and how scientific claims and translational aspirations are interpreted and negotiated across disciplines. **Method:** Through ethnographic fieldwork including focus groups and interviews, it is explored how obesity as a research object is operationalised in interdisciplinary research collaboration. **Results:** Interdisciplinary collaboration does not necessarily work upon a common perception of what obesity is, epistemological openness or data integration. Rather, we argue that complexity-oriented interdisciplinary collaboration raise questions about where to locate the “interdisciplinarity” and its effects. We find that an qualification of interdisciplinary obesity research is done in practice and how scientific claims and translational aspirations are interpreted and negotiated across disciplines. **Acknowledgement:** Governing Obesity is one of the 18 initiatives established in 2013 based on a grant from the University of Copenhagen Excellence Programme for Interdisciplinary Research (2016). We are very grateful for the funding.

**Thursday, 7 May, 2015**

**T1/T2:OS2 – Adipose Tissue Plasticity and Oxidative Phenotype**

**T1/T2:OS2.1**

**Targeting miR-125b-5p to fight obesity via browning of white adipose tissue**

**Giroud M.¹,², ³, Karbiener M.⁴, Barquisseau V.⁵, Pisani D.¹,², ³, Mairal A.⁴, Beranger G.¹,², Beuzelin D.⁵, Ghandour R.¹,², ³, Chambard J.¹,², ³, Balagueer T.¹,², Scheideker M.², Langin D.³, ⁴, Amri Z.¹,², ³**

¹Université Nice Sophia Antipolis, iBV, UMR 7277, Nice, France, ²CNRS, iBV, UMR 7277, Nice, France, ³Inserm, iBV, U1091, Nice, France, ⁴RNa Biology Group, Institute for Molecular Biotechnology, Graz University of Technology, Graz, Austria, ⁵Inserm, UMR1048, Obesity Research Laboratory, Institute of Metabolic and Cardiovascular Diseases, Toulouse, France

The recent discovery of functional brown adipocytes in adult humans has led to the consideration of their use to increase energy expenditure in the treatment of obesity. Furthermore, in rodents and humans, islands of brown adipocytes, termed “brite” (brown-in-white) adipocytes, emerge within white adipose tissue (WAT) after cold exposure or β3-adrenergic receptor stimulation. The identification of factors which trigger an increased mass/activity of human brite adipocyte is of great interest for the treatment of obesity. One of these factors is microRNA known to interfere with the translation of messengers in proteins. Using hMADS cells, able to differentiate into human white adipocytes and convert into functional brite adipocytes, we identified miR-125b as down regulated upon this conversion. In human and rodent, miR-125b expression was down regulated in BAT compared to WAT: miR-125b mimic transfection in hMADS brite adipocytes decreased basal oxygen consumption and maximal mitochondrial respiration (figure 1). We showed that miR-125b levels were down regulated in sub-cutaneous (sc) WAT and in BAT upon both in vivo β3-adrenergic receptor stimulation and cold exposure, and thus associated with BAT activation and brite recruitment. Finally, we found that miR-125b mimic injection in scWAT inhibited β3-adrenergically-induced UCP1 expression and mitochondriogenesis (figure 2). Our observations are in favor of an important role of miR-125b in the control of white to brite adipocyte conversion via regulation of mitochondriogenesis. miR-125b loss of function should allow a better understanding of the mechanisms underlying the role of this miRNA in the browning of white adipocytes, paving a way for the development of new therapies.

**Acknowledgement:** DIABAT
Mitochondrial dysfunction is one of the hallmarks of obesity. Sirtuin 1 (SIRT1) and poly(ADP-ribose) polymerases (PARPs) are NAD+-dependent enzymes that regulate mitochondrial and energy metabolism. In animal studies, calorie shortage increases NAD+ biosynthesis and subsequently SIRT1 activity but inhibits PARP activity. We aim to study whether long-term weight loss mimics mechanistic responses of calorie shortage to boost mitochondria function in human white adipose tissue (WAT).

**Background and aims:**
Mitochondrial dysfunction is one of the hallmarks of obesity. Sirtuin 1 (SIRT1) and poly(ADP-ribose) polymerases (PARPs) are NAD+-dependent enzymes that regulate mitochondria and energy metabolism. In animal studies, calorie shortage increases NAD+ biosynthesis and subsequently SIRT1 activity but inhibits PARP activity. We aim to study whether long-term weight loss mimics mechanistic responses of calorie shortage to boost mitochondria function in human white adipose tissue (WAT).

**Materials and methods:**
Nineteen obese subjects with body mass index (BMI) ranges 29–39 enrolled in a 12-month weight loss program. As controls, 19 healthy lean subjects with BMI ranges 21–24 were studied. Total RNA was extracted from subcutaneous WAT biopsies, taken at 0, 5 and 12-month time points. The whole genome-scale expression profiles of WAT were analyzed using Affymetrix U133 Plus 2.0 chips. Total PARP activity in WAT was measured using PARP Assay kit. Expression of nicotinamide phosphoribosyltransferase (NAMPT), was analyzed in WAT using quantitative RT-PCR.

**References**
Paradoxical dissociation between metabolic improvements albeit increased adipose tissue collagens after bariatric surgery induced weight loss

Liu Y.1,2, Aron-Wisnesky J.1,2, Pelloux V.2,3, Marcelin G.4,5, Torcivia A.4, Le Naour G.1, Charlotte F.1, Sasso M.1, Miette V.1, Tordjman J.1,2, Clément K.1,2

1Institute of Cardiometabolism and Nutrition (ICAN), Pitié-Salpêtrière Hospital, Paris, France,
2Inserm UMR U1166, UPMC, Nutriomique, France,
3Echosens, Paris,
4Department of Surgery, Assistance Publique-Hôpitaux de Paris, Pitié-Salpêtrière hospital,
5Department of Pathology, Pitié-Salpêtrière hospital

Introduction: During metabolic improvements after weight loss induced by bariatric surgery (BS) in morbid obesity, the extracellular matrix (ECM) of subcutaneous white adipose tissue (scWAT) shows important remodelling. However the latter and its links with metabolic improvements need to be further studied. Here we kineatically characterized sc-WAT changes at expression level and collagen accumulation after BS and their relationships with metabolic improvements.

Methods: 102 obese candidates for BS were recruited. Gene expression levels of sc-WAT were evaluated by microarray in 42 women before (T0) and 12 months (T12) after BS. Collagen accumulation was evaluated by histochemistry (picrosirius red) in samples collected during BS (T0) and 3 (T3), 12 (T12) months after. sc-WAT stiffness was evaluated by the new medical tool (Adiposcan). Degraded collagen I was evaluated by immunohistochemistry, and, procollagens and degraded collagens measured in tissue explants.

Results: Expression levels of major ECM genes, e.g. COL3A1, COL6A1, COL6A2, ELN, CTGF, MMPs and their inhibitors, and cross-linking enzymes (LOX) drastically changed at T12, confirming important remodelling. Intriguingly, these changes were accompanied by an increased accumulation in total and pericellular collagen (collagen I and III) at T3, T12. Pericellular collagen accumulation remained significant after adjustment for adipocyte size variation and was not associated with metabolic improvements. At T12, we observed no significant change of sc-WAT stiffness. However the latter and its links with metabolic improvements need to be further studied. Here we kineatically characterized sc-WAT changes at expression level and collagen accumulation after BS and their relationships with metabolic improvements.

Conclusion: Major ECM remodelling at expression levels one year after BS is accompanied by increased pericellular collagen accumulation in sc-WAT. This feature might be a witness of ECM adaptation after weight loss and of an accumulation of degraded collagens. Studies are ongoing to confirm whether this accumulation corresponds to degraded or newly synthesized collagens.

Methods: To study the function of EndoG in adipose tissues EndoG knockout (EndoG KO) mice were used.

Results: In brown adipose tissue (BAT), lack of EndoG did not result in any noticeable reduction in the expression of mitochondrial OxPhos genes. However, we found an increase in the expression of thermogenic genes (UCP1, DIO2) that was associated to reduced lipid accumulation in brown adipocytes. Moreover, EndoG KO mice had a 40% reduction in the mass of major BAT depots. The analysis of BAT revealed that, as in BAT, expression of mitochondrial genes was not affected by the lack of EndoG. Interestingly, we found a noticeable increase (2–4 fold) in the expression of UCP1, DIO2 and PGC-1α that correlated with the appearance of brown adipocyte-like cells interspersed among white adipocytes. The increased browning of BAT elicited by the lack of EndoG was associated to a better glucose tolerance.

Conclusion: We demonstrate that lack of EndoG is associated to an increased browning of BAT that correlates with decreased fat mass and improved glucose tolerance.

Lack of mitochondrial endonuclease g enhances brown adipocyte recruitment in white adipose tissue and improves glucose homeostasis

Pardo R.1, Canals X.2, Sanchis D.1, Villena J.A.1

1Laboratory of Metabolism and Obesity. Vall d’Hebron, Research Institute. Barcelona, Spain,

Introduction: Compelling evidence suggests that mitochondrial function in white adipose tissue (WAT) is a determinant of whole body insulin sensitivity. Also, increased energy expenditure and improved insulin sensitivity elicited by calorie restriction or thiazolidinediones is associated to an increased recruitment of brown adipocyte-like cells in WAT. Full differentiation and thermogenic activity of brown adipocytes highly depends on the PGC-1α/ERRα tandem of transcriptional regulators. Recently, it has been reported that endonuclease G (EndoG), a mitochondrial endonuclease, regulates cardiac mitochondrial biogenesis in a PGC-1α/ERRα-dependent manner. However, the role of EndoG in adipose tissues remains unexplored.

Methods: Diet-induced weight loss decreases adipose tissue oxygen tension and is accompanied by improved insulin sensitivity in overweight and obese individuals

Vink R.G.1, Roumans N.1, Blaak E.E.1, Mariman E.C.1, van Baak M.A.1, Goossens G.H.1

1Department of Human Biology, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University Medical Centre+, Maastricht, The Netherlands

Introduction: Recent studies have indicated that adipose tissue (AT) oxygen partial pressure (pO2) may underlie AT dysfunction. Although AT hypoxia is present in rodent models of obesity, we have demonstrated that AT pO2 was increased in obese insulin resistant compared to lean insulin sensitive individuals, and was inversely associated with peripheral insulin sensitivity. Therefore, the objective of this study was to investigate the effects of diet-induced weight loss on abdominal subcutaneous AT pO2, AT blood flow (ATBF), AT inflammation and oxidative markers, systemic inflammation and insulin sensitivity in overweight and obese individuals.

Methods: Fifteen overweight and obese individuals underwent a 5-week very-low-caloric diet (VLCD, 500 kcal/d) and a subsequent 4-week weight-stable diet. Body weight, adiposity, AT pO2 (optochemical measurement system), ATBF (133Xe wash-out), plasma insulin and glucose concentrations, and HOMA-IR were determined and an AT biopsy was collected (fat cell size and micro-array analysis) at baseline and at the end of the weight-stable period.

Results: As expected, the VLCD significantly decreased body weight (-9.7%, p < 0.001) and adiposity (-6.0%, p < 0.001) were significantly (-19.7%, p = 0.001) and adiposity (-9.7%, p = 0.001) were significantly decreased after the VLCD. Fasting ATBF did not change significantly (p = 0.54). Micro-array and fat cell size analyses are ongoing and will be available at the time of the congress.

Conclusion: The present study demonstrated for the first time that VLCD-induced weight loss markedly reduced AT pO2, which was accompanied by improved insulin sensitivity. We are currently investigating whether the VLCD-induced decrease in AT pO2 is related to alterations in AT inflammation and oxidative phenotype.

Lack of mitochondrial endonuclease g enhances brown adipocyte recruitment in white adipose tissue and improves glucose homeostasis

Pardo R.1, Canals X.2, Sanchis D.1, Villena J.A.1

1Laboratory of Metabolism and Obesity. Vall d’Hebron, Research Institute. Barcelona, Spain,
Abstracts

T8:OS1 – Co-Morbidities

T8:OS1.1

Insufficient weight loss after bariatric surgery: Does it presage metabolic treatment failure

Fried M.1,2

1OB Klinika – Center for Treatment of Obesity and Metabolic Disorders, Prague, Czech Republic;
21st Faculty of Medicine, Charles University, Prague, Czech Republic

Introduction: Post-bariatric %EWL, BMI changes and other criteria may be considered as relative indicators of treatment success/failure. Metabolic outcomes in patients who did not reach surgically defined success fulfill weight loss (50% EW) are rarely reported.

Methods: 2781 bariatric patients were analysed. Out of them 541 (19.5%) did not maintain 50%EWL in 5 year follow-up. 251 (9.02%) required reoperation. 290 (10.4%) were not reoperated. Both groups were correlated as to metabolic and other outcomes.

Results: Reoperation group: pre-bariatric BMI 42.8 ± 6.7, and mean %EWL at re-do 21.5 ± 3.6 were significantly (p < 0.001) reduced at 3,6,12,18 mths after reop by 10.2% ± 2.1, 23.4% ± 3.5, 8.9% ± 4.1, and 27.8 ± 3.9% respectively. Overall %EWL was 51.3%. In 32 (77.7%) diabetes FPG, Hb1A dropped to (5.1 ± 1.5 mmol/l) and (4.2 ± 0.7%) respectively (p < 0.001). In 10 (22.7%) patients their diabetes improved, and in two (4.5%) no post reop. changes were noted. In the non reoperation group: the still existing 16.5 ± 7.5%EWL was associated with maintenance of lowered glycaemia, from pre-bariatric (7.6 ± 2.1 to 5.9 ± 1.3 mmol/l), p < 0.01), and significant (p < 0.001) decrease in anti-diabetes medication, in systolic BP (10.2 ± 20.1 mmHg, p = 0.01) and triglycerides (36.4 ± 51.3 mg/dl, p = 0.03).

Conclusion: Bariatric reoperations are effective on WL and T2DM. Patients with long-term EWL ≥25% after primary bariatric surgery, still exhibited significant improvement in multiple cardiometabolic parameters (diabetes, hypertension, hyperlipidemia) compared to pre-surgical values. This may further support the weight independent anti-diabetic/metabolic effect of bariatric operations.

T8:OS1.2

Randomized, double-blind, placebo controlled 4 week proof of concept trial of beloranib resulted in rapid and significant weight loss in patients with hypothalamic injury associated obesity

Malloy J.L., Haugen T., Taylor K., Hughes T.E., Kim D.D.

Zafgen, Inc. Boston, MA USA

Beloranib is a methionine aminopeptidase 2 inhibitor that potentially reduces body weight (BW), hunger, and restores balance to the production/utilization of fat; prior studies have shown ~11 % BW loss over 12 wks in exogenously obese patients. Patients with hypothalamic injury associated obesity (HIAO) fail to regulate metabolism and food intake, resulting in rapid intractable BW gain, treatment resistant severe obesity, and associated comorbidities. This was a randomized, double-blind, placebo-controlled study in 14 adults with HIAO. Patients were randomized to receive twice weekly SC doses of 1.8 mg of beloranib (n = 8) or placebo (n = 6) for 4 wks followed by 4 additional wks where all patients received 1.8 mg of beloranib twice weekly. Thirteen out of 14 patients (9 females, age 31.9 yr, BMI 42.8 kg/m², BW 126.4 kg) completed 8 wks of follow up, with 12 patients comprising the pre-specified per protocol population. After 4 wks of randomized blinded therapy, patients on 1.8 mg of beloranib (n = 8) lost an average (±SEM) of 3.40 ± 0.6 kg of BW vs. a reduction of 0.25 ± 0.9 kg for PBO (n = 4; p = 0.01). After 8 wks of treatment, beloranib group lost a total of 6.15 ± 0.9 kg of BW, while placebo group lost 3.0 ± 0.9 kg during the 4-wk open label extension. Lipid profile and markers of inflammation were improved at 4 and 8 wks with beloranib treatment. There were no serious adverse events and 1 adverse event leading to withdrawal (placebo; allergic reaction). All safety measures (laboratory, vital signs, ECGs) were unremarkable. This Phase 2 study demonstrated beloranib was well tolerated and effective in HIAO and supports a novel non-hypothalamic mode of action of beloranib to mediate improvements in BW and cardiometabolic profile.

T8:OS1.3

Improvements in sleep apnoea endpoints and quality of life are related to the degree of weight loss: Results from the randomized, double-blind scale sleep apnoea trial

Zammit G.1, Aronne L.J.1, Foster G.1, Rosenberg R.2, Wadden T.3, Claudius B.4, Dansmark M.5, Blackman A.6

1Clinlab Sleep Disorders Institute, New York, NY, USA, 2Well Cornell Medical College, New York, NY, USA, 3Department of Medicine, Temple University, Philadelphia, PA, USA, 4NeuroTrials Research, Atlanta, GA, USA, 5Perelman School of Medicine, University of Pennsylvania, PA, USA, 6Novo Nordisk, Søborg, Denmark, 7Toronto Sleep Institute, MedSleep, Toronto, ON, Canada

This is a post hoc analysis of the relationship between weight loss (WL) and endpoints related to sleep apnoea and quality of life (QoL) in the SCALE Sleep Apnoea trial. Clinicaltrials.gov NCT01557166. Obese adults (72% male, mean age 49 y, apnoea-hypopnoea index [AHI] 49.2 events/h, body weight [BW] 117.6 kg) with moderate or severe obstructive sleep apnoea (OSA) and unable/unwilling to use continuous positive airway pressure therapy were treated with liraglutide 3.0 mg (n=180) or placebo (n=179), both as adjunct to diet & exercise counselling, for 32 weeks. A pre-specified ANCOVA model included treatment, country and gender as fixed effects and baseline age and BMI parameter values as covariates. Post hoc analyses also included % weight change as a covariate and examined its interactions with other effects. Liraglutide 3.0 mg reduced AHI (~12.2 vs –6.1 events/h, p=0.015) and BW (~5.7 to –1.6%, p<0.0001) vs placebo after 32 weeks. AHI reduction was significantly associated with WL, irrespective of treatment. The reduction in AHI per %WL depended on baseline AHI, with reductions of 0.7, 1.4 and 2.8 events/h for baseline AHI cohorts <30, 30–59 and ≥60 events/h, respectively (all groups, p<0.0001). Greater WL was also significantly associated with greater im-
obesity was more likely with liraglutide 3.0 mg than placebo. Greater improvements in sleep apnoea endpoints and QoL were significantly associated with greater WL, irrespective of treatment. The safety profile for liraglutide 3.0 mg was generally consistent with that seen with liraglutide in type 2 diabetes.

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Abstracts

**T8:OS1.5**

**What is the effect of wine intake in type 2 diabetes and does the wine color matter? A 2-year randomized controlled trial**


1Ben-Gurion University of the Negev, Israel,
2Hadassah Hebrew University Medical Center, Israel,
3University of Leipzig, Germany,
4Harvard School of Public Health, USA

Background: Recommendations for moderate alcohol consumption remains controversial, particularly in type-2 Diabetes (T2D). Long-term randomized-controlled-trials (RCT) are lacking.

Objective: To assess risk/ cardiometabolic effects of initiating moderate alcohol intake in T2D, and if wine-type matters.

Methods: In a 2-year RCT, 224 well-controlled alcohol-abstaining adult diabetics patients were randomized to mineral-water, white-wine and red-wine (150ml/dinner/2-year). Wines and mineral-water were provided. All groups followed a non-calorie restricted Mediterranean diet.

Results: Retention was 94% after one year and 87% after two. Red-wine was superior in modestly increasing HDL-c, and apoA1 with an overall decrease of cholesterol/HDL-c, triglycerides/HDL-c, and apoB100/apoA1 ratios (p < 0.05 for all; vs. mineral-water). Both wine groups modestly improved glucose metabolism. Slow-ethanol-metabolizers [wild-type alcohol-dehydrogenase homozygotes; ADH1B*1] had favorable wine effects on glycemic control parameters as compared to fast-ethanol-metabolizers [ADH1B*2[Arg48His; rs1229984] carriers]. Wine did not alter medication usage, blood pressure, or liver function biomarkers. Overall, decreased metabolic syndrome components were mainly attributed to red-wine (p = 0.039 vs. mineral-water).

Conclusions: This first long-term large scale alcohol trial suggests that initiating moderate wine intake, especially red-wine, among well-controlled T2D, and as part of healthy diet, is apparently safe and decreases cardiometabolic risk. While the genetic interaction supports specific causal roles for ethanol, the red-wine’s superiority suggests further synergy with non-alcoholic constituents. Clinical Trial Registration: NCT00784433

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**T8:OS1.4**

**High remission rate of prediabetes in patients after bariatric surgery**

Brix J M1, Kopp H P1, Spercker C1, Scherthaner G H1, Scherthaner G1, Ludvik B3

1Department of Medicine I, Rudolfstiftung Hospital Vienna, Vienna, Austria,
2Department of Surgery, Rudolfstiftung Hospital Vienna, Vienna, Austria,
3Department of Medicine II, Division of Angiology, Medical University of Vienna, Vienna, Austria

Introduction: A long term follow up of the Swedish Obese Subject study indicated a relative risk reduction for the development of diabetes by 80%. However, no data are available for patients with prediabetes. Therefore we investigated the remission of prediabetes after BS in a large cohort of patients with morbid obesity (MO).

Methods: In total 404 patients with MO (mean age 41 ± 11 years, mean BMI 40.8 ± 16.1 kg/m²) were included before and after BS. All patients with unknown type 2 diabetes (T2D) underwent an oral glucose tolerance test (OGTT; 75g glucose). The thresholds of diagnostic criteria for prediabetes were fasting plasma glucose (FPG) ≥100mg/dl and ≥126mg/dl or 2 hour post-challenge glucose ≥140mg/dl and ≤200mg/dl. HOMA-Insulin resistance (IR) was calculated.

Results: The prevalence of prediabetes was 23.5% (n=95). The prevalence of patients with normal glucose tolerance was 60.2% (n=243) and of patients with T2D was 16.3% (n=66). Two years after BS the remission rate was 94% (89 patients pre-surgery prediabetes were in remission, only 6 patients still had prediabetes). Patients with prediabetes before BS were significantly older (43 ± 11 vs 38 ± 10 years; p < 0.001), had higher triglyceride levels (173 ± 84 mg/dl vs 139 ± 64 mg/dl; p = 0.001), had a higher HOMA-IR (7.6 ± 4.9 vs 4.7 ± 2.8; p < 0.001). There weren’t any differences in BMI. Interestingly the only difference in patients with prediabetes compared to T2D was HOMA-IR (7.6 ± 4.9 vs 10.5 ± 6.8; p = 0.012).

Conclusion: This is the first study evaluating prediabetes in a large cohort of patients before and after BS. Apart from a difference in HOMA-IR, we couldn’t find any significant differences in patients with prediabetes compared to T2D, indicating that prediabetes could be important to assess in patients with MO.

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**T8:OS1.6**

**Change in adipose fatty acid composition in obese diabetic women after bariatric surgery**

Kunesova M1,2, Sedlackova B1, Bradnova O1, Tvrzicka E1, Stankova B3, Sramkova P1, Dolezalova K1,4, Kalouskova P1, Hlavaty I1,3, Hill M1, Fried M1,4, Hainer V1, Vrbikova J1

1Institute of Endocrinology Obesity Management Centre, Prague, Czech Rep.,
24th Dept. Internal Medicine, 1st Medical Faculty, Charles University, Prague, Czech Rep.,
3OB clinic, Prague, Czech Rep.,
41st Medical School, Charles University, Prague, Czech Rep.

Introduction: Bariatric surgery is the most effective method in obesity and type 2 diabetes management. Fatty acid composition of adipose tissue reflects composition of fat in food but also metabolic processing of fatty acids including oxidation and lipogenesis. Effect of different types of bariatric surgery on fatty acid composition in subcutaneous adipose tissue was examined.

Methods: Severely obese women underwent one of the three bariatric methods- biliopancreatic diversion (BDP), laparoscopic gastric banding (LAGB) and laparoscopic greater curvature plication (LGCP). Anthro-
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Abstracts

pometric characteristics and fatty acid composition of adipose tissue was analysed before the treatment, after 6 months and after 2 year follow up. Fatty acid (FA) composition was analysed by gas chromatography. Results were evaluated by bidirectional orthogonal projections to latent structures (O2PLS).

Results: Women in BPD group (n=8), LAGB (n=9), LGCP (n=12) were not significantly different in age, basal weight and body fat per cent. The highest weight loss was found after BPD. Weight loss was predicted by higher decrease in alpha linolenic acid (18:3n-3) and n-3 polyunsaturated FA (PUFA) after 6 months and by lower decrease in n-6 PUFA -dihomogamma-linolenic (20:3n-6) and arachidonic (20:4n-6). In comparison with initial levels significant decrease in percentage of n-3 PUFA was found after 6 months (p < 0.05). After 2 years increase in percentage of monounsaturated FA (MFA), (p < 0.05) and decrease in n-6 PUFA (p < 0.05) in comparison with initial levels was found.

Conclusion: Bariatric surgery lead to significant changes of fatty acid composition in adipose tissue in severely obese diabetic women after two year follow-up. Lower decrease of n-6 PUFA predicted higher weight loss.

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T5:OS1.1 Pre and post-natal growth canalisation: Does prenatal growth predict the pattern of postnatal growth?

Norris T.1, Johnson W.1, Wright J.1, Cameron N.1
1School of Sport, Exercise & Health Sciences, Loughborough University, UK, 2MRC Human Nutrition Research Unit, Cambridge, UK, 3Bradford Institute for Health Research, Bradford, UK.


Methods: Multilevel models were used to model fetal and postnatal growth from the Born in Bradford (BiB) cohort. Fitted values and Z-scores were produced at 20, 30, 40 prenatal weeks & 1, 3, 6, 9, 12, 24 postnatal months. Restricted and rapid growth were defined as a change in conditional Z-score in the fetal period of <-0.67 and >0.67, respectively. Catch-down and catch-up growth were defined in the same way, except in the postnatal period. ANOVAs were used to test for differences in size and growth by type of prenatal growth. Log regression and a sensitivity and specificity analysis were employed to examine the predictive ability of the type of prenatal growth.

Results: Infants experiencing restricted fetal growth remained significantly lighter than those who had not, for the duration of infancy. In this group however, there was a pattern of greater growth than expected during infancy. This was opposite to the pattern observed in infants who had experienced rapid fetal growth, who exhibited less growth than expected during infancy. However, the ability of the type of prenatal growth to predict the pattern of postnatal growth was minimal, with only rapid fetal growth being significantly associated with increased odds of catch-down growth in infancy.

Conclusion: That neither restricted nor rapid fetal growth predicted postnatal catch-up growth may suggest that the timing of canalisation is outside of the fetal period. If infant catch-up and down growth are not associated with periods of restricted or rapid fetal growth, definitions of these growth patterns may need reconsidering.

T5:OS1.2 Growth trajectories of body mass index during childhood: Determinants and health outcome at adulthood

Péneau S.1, Gusto G.2, Goxe D.1, Lantieri O.1, Hercberg S.1,2, Rolland-Cachera M.F.1,5
1Université Paris 13, Équipe de Recherche en Épidémiologie Nutritionnelle, Centre de Recherche en Épidémiologie et Statistiques, Inserm (U1115), Inserm(U1125), Cnam, COMUE Sorbonne Paris Cité, F-93017 Bobigny, 2Institut Inter-Régional pour la Santé (IRSA), F-37520 La Riche, France, 3Unité de Surveillance et d’Épidémiologie Nutritionnelle, Institut de Veille Sanitaire, Université Paris 13 Sorbonne Paris Cité, F-93017, Bobigny, France, 4Département de Santé Publique, Hôpital Avicenne, F-93017, Bobigny Cedex, France

Evidence is currently lacking concerning the development of BMI during childhood, as well as its determinants and health consequences at adulthood. Our aims were to identify BMI trajectories between 0 and 10 years of age; to assess their determinants; and to elucidate the association between these trajectories and metabolic risk factors at adulthood. A total of 1,668 subjects aged 20–60 participated in this retrospective cohort study. Height, weight, waist circumference, fasting blood glucose and lipids and blood pressure were measured at adulthood. Growth was assessed using measured weight and height data from 0–10 years, collected retrospectively from health booklets. Participants reported gestational age, birth weight, early nutrition and parental silhouette. Group-based trajectory modelling was applied to identify BMI trajectories. Associations were assessed using ANOVA and multiple logistic regression. Six distinct patterns of growth trajectory emerged, including three stable (stable-25th, stable-50th, stable-75th) and three ascending (ascending-75th, ascending-overweight, ascending-obesity) trajectories. Determinants of growth trajectory were sex, parental silhouette, gestational age and birth weight (all P < 0.0001). Trajectory groups were associated with adult BMI and waist circumference (P < 0.0001). Subjects in the ascending-overweight (OR (95%CI): 2.71 (1.50–4.90)) and ascending-obesity (OR (95%CI): 3.35 (1.16–9.62)) groups were more likely to present metabolic syndrome during adulthood. This study enabled us to illustrate heterogeneity in patterns of growth trajectories. Child and parental determinants were identified that can be used in overweight surveillance. Trajectories were associated with BMI, waist circumference and metabolic syndrome during adulthood.

T5:OS1.3 Higher childhood BMI is associated with less pubertal gain

Holmgren A.1,2, Niklasson A.1, Nierop A.F.1,2, Gandelier L.1,3, Aronson A.S.1,2, Sjöberg A.1, Lissner L.1,2, Albertsson-Wikland K.2,5
1GPGR, Dep. of Pediatrics, Inst. of Clinical Sciences, Sahlgrenska Academy, Gothenburg, Sweden, 2Dep. of Pediatrics, Halmstad County Hospital, Halmstad, Sweden, 3Musara bv, Leiderdorp, The Netherlands, 4Dep. of Food & Nutrition, & Sport Science, University of Gothenburg, Gothenburg, Sweden, 5Dep. of Public Health & Community Medicine, Inst. of Medicine, The Sahlgrenska Academy, Gothenburg, Sweden

Objective: Our objective was to investigate the impact of body mass index (BMI) in childhood on the pattern of growth during puberty.

Methods: The longitudinally followed Grow up 1990 Gothenburg birth cohort, with growth data from birth until adult height was analyzed, using the QEPS growth model (describing total height as a combination of four mathematical functions; Quadratic -Q, Exponential -E, Pubertal -P and Stop –S, Fig 1.), for calculation of estimates for pubertal growth (1). Individual BMI-SDS values, from 3.5–8 years of age (n = 1908) were calculated for linear and subgroup analyses (low/normal- nw, overweight – ow, obese – ob), based on the IOTF 2012 reference.
**Results:** Ow/ob children already at birth were heavier and grew faster in height in the pre pubertal period compared to nw, due to an increased Q function. Ow/ob children of both genders had 3.4–4.3 months earlier puberty, reduced growth during puberty, boys and girls had 3 cm and 2 cm, respectively, less pubertal gain from the specific pubertal growth function (P) compared to their nw peers. We saw a negative dose-response effect of childhood BMI on pubertal gain, across the whole BMI spectrum (Fig 2–3.). The adult height was not related to BMI in childhood.

**Conclusion:** For the first time, the result of the present study has shown that: the higher the BMI is in childhood, the less is the pubertal gain. Higher childhood BMI was also associated with increased pre pubertal growth due to an increased Q-function and the resulting adult height was similar for ow/ob and nw children.

**Reference**

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**Impact of long-chain polyunsaturated fatty acids during pregnancy and lactation on infant body composition up to 5 years of life – results of the infat-study**

Brei C., Brunner S., Pusch K., Much D., Stecher L., Amann-Gassner U., Hauner H.

1Institute for Nutritional Medicine, Klinikum rechts der Isar, Technische Universität München, Munich, Germany,
2Institute of Diabetes Research, Helmholtz Zentrum München, and Forschergruppe Diabetes, Klinikum rechts der Isar, Technische Universität München, Munich, Germany,
3ZIEL – Research Center for Nutrition and Food Science, Nutritional Medicine Unit, Technische Universität München, Freising, Germany

**Aim:** The ratio of long-chain polyunsaturated fatty acids (LCPUFAs) in the maternal diet may have an impact on offspring body composition. The effect of reducing the n-6/n-3 LCPUFA ratio in maternal diet during pregnancy and lactation on offspring growth and body composition up to 5 years postpartum (pp) was investigated.

**Methods:** In an open-label, randomized controlled trial, 208 healthy pregnant women received a dietary intervention (supplementation of 1.2g n-3 LCPUFAs/day and dietary counseling to reduce arachidonic acid intake) from the 15th week of gestation until 4 months of lactation (intervention group) or follow their habitual diet (control group). We investigated infant fat mass with skinfold thickness (SFT) and abdominal sonographic measurements and child growth. For comparison, multiple linear regression models adjusting for sex, pregnancy duration, ponderal index at birth and breastfeeding status at 4 months were performed.

**Results:** At 5 years of age, anthropometric data of n=114 infants were available. Results showed no difference between groups, neither for the sum of 4 SFT [intervention: 23.9 ± 4.7mm; control: 24.5 ± 5.0mm; mean difference: –0.7mm (95% CI: –2.5; 1.1mm); p = 0.453], nor for other anthropometric measurements. Findings are consistent with results at earlier time-points except for BMI at 4 years pp. Sonographic data were analyzed up to 4 years: area of subcutaneous fat layers differed significantly at 2 and 4 years pp in the adjusted model, showing slightly higher rates at any time point of investigation.
Introduction: Children with a low socioeconomic status (SES) or from non-Western origin are at increased risk for overweight. We explored early growth patterns of children from different SES and ethnic background, who became overweight at age 5.

Methods: Term born singletons without fetal growth retardation were included (n=3387). Weight status at age 5 was determined by international guidelines. BMI-SDS growth patterns between birth and 5 years were created using LMS method and compared between normal and overweight children, stratified by ethnicity (Western/non-Western) and SES (low/mid/high maternal education level, only Western included, n=2437).

Results: At age 5 years, 12.1% of the children were overweight. This was higher in non-Western (23.5%) and low SES children (16.3%). Growth patterns of normal weight and overweight children at age 5 differed from birth onwards (p<0.001). Overweight children had a high birth weight and a relative large increase in BMI-SDS during the first 6 months. Differences in the overall growth pattern of Western and non-Western children were both found for normal weight (p<0.001) and overweight children (p<0.001). BMI-SDS of non-Western normal weight children was significantly higher on almost all ages compared to Western normal weight children. The overweight non-Western children had only a higher BMI-SDS at birth (Δ:0.233, p=0.044 and 3 months (Δ:0.221, p=0.021) compared to overweight Western children. A difference in the overall growth patterns by SES was only apparent in overweight children (p<0.003). Overweight low SES children had a significantly higher mean BMI-SDS at age 5 compared to overweight high SES children (ΔBMI-SDS:0.431, p=0.003).

Conclusion: Overall BMI growth patterns of normal weight and overweight children at age 5 differ from birth onwards. Intervention strategies to prevent childhood overweight should focus on children with high birth weight and early accelerated growth, especially from non-Western origin.

Conclusion: Results do not provide evidence that a dietary intervention to reduce the n-6/n-3 ratio during early life relevantly affects fat mass in the offspring.

T6/T7:OS2 – Drivers of Difference

Living at higher altitude and incidence of overweight/obesity: Prospective analysis of the SUN cohort

Bes-Rastrollo M.1, 2, Diaz-Gutierrez J.J.1, Pons-Izquierdo J.J.1, Donat-Vargas C.1, Sayon-Orea C.1, Martinez-Gonzalez M.A.1, 2
1Dept. Preventive Medicine and Public Health, University of Navarra, Pamplona, Spain, 2CIBERObn, Instituto de Salud Carlos III, Madrid, Spain.

Introduction: Residence at high altitude has been associated with lower obesity rates due to hypoxia conditions. However, there is no evidence of this association in a free-living population. Therefore, our objective was to assess the association between the altitude where each participant of the SUN Project is living and the incidence of overweight/obesity.

Methods: The SUN Project is a dynamic, prospective, multipurpose cohort of Spanish university graduates with a retention rate of 90%. We included in the analysis 9,302 participants free of overweight/obesity at baseline. At the baseline questionnaire participants report their postal code and the time they are been living in their city/village. We imputed the altitude of each postal code according to the data of the Spanish Na-
compensate for lack of other resources such as nutrition knowledge or strategies to promote healthy diets. The lack of socioeconomic inequalities in F&V intake were magnified among individuals who consumed low-dietary costs, high income or education. There was significant interaction of SEP gradients (based on education and income) by dietary costs with interaction terms. Dietary cost was a stronger determinant of F&V intake in low-SEP groups than in high-SEP groups. The aim of this study was to examine the association between F&V intake and dietary costs, testing for effect modification by SEP.

Methods: We used data from the Fenland Study, a population based, cross-sectional study of 10,020 British adults. F&V intake was derived from a semi-quantitative 130 item Food Frequency Questionnaire (FFQ). Retail food prices for each of the foods in the FFQ were combined with dietary costs to estimate dietary costs (GBP/day). General linear models were used to assess associations between SEP, quartiles of dietary costs, and F&V intake. Effect modification of SEP gradients (based on education and income) by dietary costs was examined with interaction terms.

Results: Individuals in the lowest quartile of dietary costs, with low income and low education consumed less F&V than individuals with higher dietary costs. Significant differences compared with lower dietary costs were identified for both SEP and dietary costs, such that socioeconomic differences in F&V intake were magnified among individuals who consumed low-cost diets.

Conclusion: Amplification of socioeconomic inequalities in diet among those consuming low-cost diets indicates the need to address food costs in strategies to promote healthy diets. The lack of socioeconomic inequalities for individuals on high dietary costs suggests that high dietary costs may compensate for lack of other resources such as nutrition knowledge or attitudes towards healthy eating.

Acknowledgement: The SUN Project is funded by the Spanish Government and the Regional Government of Navarra.

T6/T7:OS2.3

Neighbourhood built environment typologies and adiposity in school age children

Barnett T.A.1,2, Van Hulst A.-L.2, Kestens Y.1, Chaix B.1,2, Henderson M.1,3
1Epidemiology and Biostatistics Unit, INRS-Institut Armand-Frappier, Université du Québec, Laval, QC, Canada 1
2Centre de recherche du CHU Sainte-Justine, Montreal, Canada
3École de santé publique de l’Université de Montréal, Montréal, Canada

Background: Neighborhoods are complex multidimensional systems. However, the interrelationship between multiple neighborhood dimensions is seldom seen in relation to childhood adiposity. We created a neighborhood typology using a wide range of neighborhood features and examined associations with adiposity in children aged 8–10 years.

Methods: Data include 512 Montreal-area youth from the first wave of QUALITY, an ongoing study on the natural history of obesity in 630 Quebec youth (8–10 years at baseline) with a history of parental obesity. Anthropometrics and body composition based on dual energy x-ray absorptiometry were obtained. Multiple neighborhood features obtained through in-person neighborhood assessments and geocoded administrative data were summarized using principal components analysis, and contrasting neighborhood types were identified using cluster analysis. We examined associations between specific neighborhood typologies and indicators of total (body mass index z-score and fat mass index) and central (waist circumference and central fat mass %) adiposity using multivariable linear regressions.

Results: Cluster analysis resulted in a 5 distinct neighborhood types characterized by high, moderate or low levels of walkability and safety from vehicular traffic. Children living in neighborhoods characterized by lower levels of safety from vehicular traffic had significantly higher levels of both overall and central adiposity.

Conclusions: Neighborhoods characterized by heavy road traffic with fewer traffic calming measures appear to be the most obesogenic to children, regardless of other features that are associated with walkability. Policies targeting the improved walkability of neighborhoods for children may need to prioritize safety from vehicular traffic.

Acknowledgement: The QUALITY cohort is funded by the Canadian Institutes of Health Research, the Heart and Stroke Foundation of Canada and the Fonds de la recherche en santé du Québec. The QUALITY Residential study was funded by the Heart and Stroke Foundation of Canada.

T6/T7:OS2.4

Obesity as a predictor of impaired physical performance in the elderly: Results of a longitudinal epidemiological study.

De Stefano E.1, Zambon, S.1, Giacomelli L.1, Bengen, L.1, Pigozzo, S.1, Marin R.1, Manzato E.1, Busetto L.1
1Medical department- DIMED University of Padova, Italy

Aim: To evaluate the influence of obesity on muscle strength and physical performance, in a follow-up of 6 years.

Methods: 2911 Italian subjects aged ≥65 years from the Progetto Veneto Anziani (ProV A), were analyzed. Physical performance, and leg muscular strength were measured both at baseline and at the end of follow-up. Study population was stratified by sex BMI classes in according with who classification of obesity. Associations between BMI physical performance and muscular strength were evaluated.

Results: At baseline the normal weight subjects had the best metabolic results in tests of physical performance (8:29 ± 0.03), with significant differences compared with underweight (7:50 ± 0.15, P <0.001), overweight (8:12 ± 0.02, P <0.001), obese I level (7:72 ± 0.04, P <0.001), obese II level (6:67 ± 0.09, P <0.001) and obese III level (5:88 ± 0.24, P <0.001). This association was not modified by further adjustment for leg muscular strength, age, sex, smoking, income, education, physical activity and chronic diseases.

Acknowledgement: The QUALITY Residential study was funded by the Heart and Stroke Foundation of Canada.
At the end of follow-up, a statistically significant reduction in physical performance and muscle strength was observed in overweight, normal weight, overweight, I and II obese subjects, while in obese III level there was a statistically significant reduction only in physical performance and not in muscle strength. In a multiple logistic analysis, adjusting for age, sex, smoking, income, education, physical activity and chronic disease, a significant increased risk of a statistically significant reduction in SPPB test was observed for overweight and obese subjects.

**Conclusion:** In our elderly population, high BMI values affect negatively physical performance and expose the elderly to a risk of a further decline in physical performance with consequent disability.

T6/T7:OS2.5

**Effect modification by obesity on the association between serum 25(OH)D and blood pressure: Results from NHANES 2001–2006**

**Vogt S.1, Baumert J.1, Thoerand B.1, Scragg R.2**

1Institute of Epidemiology II, Helmholtz Zentrum München, German Research Center for Environmental Health, Neuherberg, Germany,
2Section of Epidemiology and Biostatistics, School of Population Health, University of Auckland, Auckland, New Zealand

**Introduction:** The joint effect of low 25(OH)D levels and obesity on hypertension has rarely been examined. We explored a possible effect modification by obesity on the association between 25(OH)D and blood pressure in participants of the US National Health and Nutrition Examination Surveys (NHANES) 2001–2006. **Methods:** The present study included 10,313 participants aged ≥ 20 years. The association of serum 25(OH)D [ng/mL] with systolic and diastolic blood pressure was examined with linear regression. All models were adjusted for age, sex, ethnicity, physical activity, alcohol consumption, smoking status, education, diabetes and kidney disease and prescribed medication for hypertension. Additive interaction was assessed through a cross-product interaction term between 25(OH)D and body mass index [BMI] as well as waist circumference [WC] category (overweight: BMI of 25 – 30 kg/m², / WC of 80 – 88 cm in females or 94 – 102 cm in males; obesity: BMI ≥ 30 kg/m², / WC ≥ 88 cm in females or ≥ 102 cm in males). **Results:** 25(OH)D was significantly inversely associated with both systolic and diastolic blood pressure in obese but not in non-obese participants. While the interaction between 25(OH)D and overweight was not significant in any of the models, a significant interaction between 25(OH)D and obesity was found in the systolic blood pressure models (BMI: β = -0.15, p-value = 0.006; WC: β = -0.14, p-value = 0.004) as well as a smaller, non-significant interaction in the diastolic blood pressure models (BMI: β = -0.09, p-value = 0.03; WC: β = -0.03, p-value = 0.42).

**Conclusion:** Results from this large, cross-sectional sample indicate that obesity modifies the association between 25(OH)D and blood pressure, suggesting a stronger association with 25(OH)D in obese participants.

T6/T7:OS2.6

**Are aga-born obese adults more metabolically healthy than sga-born obese individuals?**

**Matto J.1, CARETTE C.2, Comte B.2,4, Levy-Marchial C.5, Pujos-Guillot E.1,4, Zins M.1, Czernichow S.1**

1Inserm UMS 011 Villejuif, France,
2Department of Nutrition Ambroise Pare University Hospital, Boulogne, France,
3UMR 1019 Human Nutrition Unit, CNRH Auvergne, Clairmont-Ferrand, France,
4Université d’Auvergne, Clermont Universite, 63122 Saint-Genes, Champanelle, France, SINERSM Institute of Public Health, Paris, France

**Introduction:** Recently it has been shown that not all obese individuals display cardiometabolic abnormalities and a “metabolically healthy obese (MHO)” phenotype has been sought. No data on the inverse favorable risk of MHO in adults born small for gestational age (SGA) compared to adults born small for gestational age (SGA) exist. Objective: Assess the risk of metabolically healthy obesity in AGA versus SGA. **Methods:** Individuals were derived from a registry in the city of Haguenau, France. 132 out of 1,308 participants aged 29.5 ± 4.1 years were identified as obese (BMI ≥ 30 kg/m²) and were divided into two groups: SGA (n=74) and AGA (n=58). Metabolic variables such as total cholesterol, HDL-cholesterol, triglycerides, fasting glucose, insulin and blood pressure were obtained and compared by t-test. MHO phenotype was determined using the HOMA-IR index which requires determination of fasting plasma glucose and insulin concentrations. Relative risk (RR) and 95% CI was computed for the probability of metabolically healthy obesity in AGA versus SGA after correction for age, sex and socioeconomic status. **Results:** SGA obese subjects had higher total cholesterol levels (4.9 ± 1.5 vs. 4.2 ± 1.5, p = 0.03) and fasting insulin levels (11.0 ± 4.5 vs. 9.4 ± 3.8, p = 0.04) compared to AGA obese subjects. AGA obese group had a higher favorable risk of metabolic healthy obesity versus SGA obese group RR=1.95 (95% CI 1.06–3.58) independently of age, sex and socioeconomic status.

**Conclusion:** Appropriateness for gestational age confers a higher favorable risk of metabolically healthy obesity compared to smallness for gestational age.

**Acknowledgement:** Funding: Fondation Francophone pour la Recherche sur le Diabète

T3:OS2 – Macro and Micro Nutrients

T3:OS2.1

**Association of high dietary protein intake with the risk of weight gain and total death in subjects at high risk of cardiovascular disease**

**Hernández-Alonso P.1, Salas-Salvadó J.1,2, Ruiz-Canela M.3, Corella D.4, Estruch R.2,3,4, Arós F.1, Gómez-Gracia E.1,4, Fiol M.3, Lapetra J.5, Basora J.1, Serra-Majem L.1, Muñoz M.A.5, Buil-Cosiales P.4, Saiz C.1, Bulló M.1**

1Human Nutrition Unit-URV-IISPV, Spain,
2CIBERobn-ISCIII, Spain,
3Department of Family Medicine-San Pablo Health Center, Spain,
4Department of Clinical Sciences-ULPGC, Spain,
5Primary Health Care Division and Research-IDIBAPS-Jordi Gol, Spain

**Introduction:** Although diets high in dietary protein are widely used to manage overweight and obesity, there is a lack of consensus about their long-term efficacy and safety. The aim of this study was to simultaneously assess the association of long-term high-protein consumption on body weight changes and death outcomes in subjects at high cardiovascular risk. **Methods:** A secondary analysis of the PREDIMED (PREVención con Diet Mediterránea) trial was conducted. Dietary protein was assessed using a food-frequency questionnaire during the follow-up. Cox proportional hazard models, including macronutrient substitution models, were used to calculate the multivariate relative risk of protein intake in body weight and waist circumference changes, and the incidence of cardiovascular outcomes, total, cardiovascular and cancer death. **Results:** Higher total protein intake was significantly associated with a greater risk of weight gain when protein replaced carbohydrates (HR: 1.90; 95%CI: 1.05, 3.66) but not when replaced fat (HR: 1.69; 95%CI: 0.94, 3.03). However, no association was found between protein intake and waist circumference. Contrary, higher total protein intake was associated with a greater risk of all-cause death in both carbohydrate and fat substitution models (HR: 1.59; 95%CI: 1.08, 2.35; and HR: 1.66; 95%CI: 1.13, 2.43, respectively). Animal protein was associated with an increased risk of fatal and non-fatal outcomes when protein substituted carbohydrates or fat.
Conclusion: Higher dietary protein intake is associated with long-term increased risk of body weight gain and overall death in a Mediterranean population at high cardiovascular risk.

Acknowledgement: The authors thank the participants for their enthusiastic collaboration and the PREDMED personnel.

T3:OS2.2 Micronutrient and protein deficiencies after gastric bypass and sleeve gastrectomy: A one year follow-up
Aaron Winewisky J.1,2, Verger E.1,2, Dao M.1,2, Kayser B.1,2, Oppert J.1, Bouillot J., Torciva A., Clement K.1,2,3

Background: Roux-en-Y gastric bypass (GBP) and sleeve gastrectomy (SG) have increased dramatically, potentially increasing nutritional deficiencies prevalence even in purely restrictive procedures. Objective: analyze the effect of food restriction through bariatric surgery (BS) on nutritional parameters. Design: 23 and 29 obese patients undergoing GBP and SG were prospectively followed at baseline and 3, 6 and 12 months after BS (N=14 and N=19 at T12). We evaluated food intake both using a self-administered web-based 24th dietary record, and the PANDiet score (T0, T3, T12), as well as measured serum vitamins and minerals concentration (T0, T3, T6, T12).

Results: We observed suboptimal food intakes with low probabilities of adequacy for protein, fiber, vitamin D and magnesium at T0. The drastic energy and food reduction lead to very low and similar probabilities of adequacy for nutrients at T3 and T12 in both procedures. Serum analyses demonstrated a continuous decrease in prealbumin along the follow-up indicating moderate protein malnutrition in 30% and 35% of GBP patients and 48% and 75% of SG patients, respectively at T3 and T12. Conversely, despite the low probabilities of adequacy observed at T3 and T12, systematic vitamin and mineral supplementation after GBP and SG prevented most nutritional deficiencies except for iron, where 5% of patients displayed iron deficiency at T12 in both procedures.

Conclusion: GBP and SG have comparable effects in terms of energy and food restriction, and risk of micronutrient and protein deficiencies in the first year post BS. Such results suggest that (i) cautious monitoring of protein intake after GBP and SG is mandatory and (ii) systematic vitamin and mineral supplementation in the first year after SG may be beneficial.

Acknowledgement: CRC fibrota valentine lemoine for technical help and agathe arloti as project manager.

T3:OS2.3 Serum vitamin D levels in middle-aged women predict lasting stable differences in BMI and waist-hip ratio: Follow-up over three decades
Lehtinen-Jacks S.1, 2, Leu M.1, Hunsberger M.1, Zetterberg H.1, 3, Lissner L.2
1 School of Health Sciences, University of Tampere, Tampere, Finland, 2 Department of Public Health and Community Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, 3 Department of Psychiatry and Neurochemistry, Institute of Neuroscience a Physiology, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden

Introduction: The chronology of the association between low serum vitamin D (25(OH)D) and obesity is unclear. We assessed 25(OH)D in relation to longitudinal development of BMI, waist-hip ratio (WHR) and height in 38–60 year old women for up to 35 years.

Methods: The Population Study of Women in Gothenburg started in 1968/69 in Gothenburg, Sweden. Anthropometric measures were taken at baseline and at 4 follow-up visits; the latest in 2000/03. Levels of 25(OH)D were analyzed in serum drawn and stored since the baseline in 1227 (84%) women. Linear regression and repeated measures models (SAS PROC MIXED), respectively, were used to model the baseline and the longitudinal associations between 25(OH)D (dichotomized, cutpoint 51.45 nmol/L) and BMI, WHR and height, adjusting for covariates.

Results: At baseline, mean BMI was 25.2 kg/m2 in women low 25(OH)D and 23.8 kg/m2 in the other women (p<0.001). The respective figures for WHR were 0.75 and 0.74 (p<0.001). Adjusted for covariates, low 25(OH)D was associated with higher BMI at baseline (β=1.45, 95%CI 0.97;1.92) and in the longitudinal analyses at all visits (β=1.47, 95%CI 0.99;1.94). When considering only the follow-up visits adjusted for baseline BMI, the association was negligible (β=0.01, 95%CI –0.27;0.24).

Similarly, low 25(OH)D was associated with higher WHR at baseline (β=0.012, 95%CI 0.006;0.019) and longitudinally when all visits were included (β=0.011, 95%CI 0.005;0.018), but not when baseline WHR was taken into account in the repeated measures model (β=0.001, 95%CI –0.007;0.005). No differences in height were observed at baseline or longitudinally.

Conclusion: Lower 25(OH)D was associated with higher BMI and WHR at baseline and this difference was maintained (but not increased) over the 35-year follow-up.

T3:OS2.4 Carbohydrate quantity and quality in relation to body composition among children and adolescents in South China
1 Department of nutrition, food safety and toxicology, West China School of Public Health, Sichuan University, Chengdu, P.R. China

Introduction: It has been suggested that both quantity and quality of carbohydrate have profound effects on long-term health. We aimed to investigate the relation of dietary carbohydrate quantity and quality to body composition among Chinese children and adolescents, who habitually have high carbohydrate consumption, along with an increasing prevalence of obesity.

Methods: Cross-sectional data on 1721 Chinese children (52.7% girls) aged 7–15 years were analyzed. Using 3-day 24 hour dietary recalls, total carbohydrate intake and carbohydrate quality characterized with dietary fiber, the glycemic index (GI) and the glycemic load (GL) were considered. Body weight, height as well as skin-fold thicknesses were measured to obtain body mass index standard deviation score (BMI SDS), percent-age body fat (%BF), fat mass index (FMI) and fat-free mass index (FFMI), as measures of body composition in the present study. Multivariate linear regression models were used to explore the relevance of carbohydrate quantity and quality to body composition.

Results: Among girls, fiber intake and dietary GI were related to %BF and FMI (p≤0.04): girls with lower fiber intake or higher dietary GI had 8.9% or 15.2% higher %BF and 9.5% or 12.7% higher FMI than girls with higher fiber intake or lower dietary GI (adjusted for birth weight, maternal overweight and physical activity). Furthermore, these associations were more pronounced in girls aged 10–12 years. Among boys, higher carbohydrate intake and higher dietary GI were positively related to BMI SDS (p≤0.03; adjusted for birth weight, maternal educational level, and physical activity).

Conclusion: Our data suggest that high carbohydrate quality is positively related to lower body fat mass among children in South China, especially in girls.

T3:OS2.5 Carbohydrate quantity and quality in relation to body composition among children and adolescents in South China
Lehtinen-Jacks S.1,2, Leu M.1, Hunsberger M.1, Zetterberg H.1,2, Lissner L.2
1 School of Health Sciences, University of Tampere, Tampere, Finland, 2 Department of Public Health and Community Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, 3 Department of Psychiatry and Neurochemistry, Institute of Neuroscience a Physiology, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden

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No differences in appetite sensations after animal protein (pork/veal, eggs) vs vegetable protein (beans/peas) when adjusting for dietary fibre

Klingenberg L.1, Kristensen M.D.1, Belza A.2, Bendtsen N.1, Astrup A.1, Roben A.1

1Department of Nutrition, Exercise and Sports, University of Copenhagen, Denmark, 2Novo Nordisk A/S, Denmark

Introduction: There is no consensus yet on whether appetite sensations differ between animal and vegetable protein. The aim of this study was to investigate if meals with vegetable protein affect appetite sensations and ad libitum energy intake differently compared to isocaloric meals with animal protein and similar amounts of macronutrients.

Methods: In a randomized, controlled, single-blinded, 4-way crossover study on 33 healthy males (mean±SD age: 25.8 ± 5.1 y; BMI: 23.2 ± 1.9 kg/m²) appetite sensations and spontaneous energy intake were studied on separate occasions using four different tests meals (3.5 MJ, 18.5 E% from protein). Meals consisted of pork/veal, fava beans/split peas, eggs adjusted for dietary fibres (28.5 g), or eggs without adjustment for dietary fibres (6.0 g). Appetite sensations were recorded at baseline and every half hour using visual analogue scales until the ad libitum meal.

Results: There were no significant differences in subjective appetite sensations or ad libitum intake after vegetable or animal protein sources. However, spontaneous energy intake was lower after egg with fibre compared to egg alone (247 ± 175 kJ, P < 0.05). Further, tendencies were observed towards higher satiety following egg with fibre compared to egg alone and decreased hunger sensations after egg with fibre compared to pork/veal (P < 0.1).

Conclusion: Vegetable and animal protein did not affect appetite sensations or spontaneous energy intake differently when adjusting for dietary fibre content.

Acknowledgement: We thank the kitchen staff at NEXS and the volunteers for their participation

No effect of glycemic index (low vs. High) on ghrelin and leptin in obesity

Boyadzhieva N.1, Handjieva-Darlenska T.1, Karamfilova V.1, Kamenov Z.1

1Department of pharmacology and toxicology, Medical Faculty, Medical University, Sofia, Bulgaria, 2Clinic of Endocrinology, Alexandrovska hospital, Medical Faculty, Medical University – Sofia, Bulgaria

Introduction: Ghrelin and leptin are major players in the regulation of appetite and metabolism. However, there are not enough data in the literature on the effect of different exogenous factors (drugs, diet, glycemic index) on the ghrelin and leptin secretion in obesity. Aim: Thereafter, the purpose of our study was to determine the effect of glycemic index (low vs. high) on plasma levels of ghrelin and leptin, and on the anthropometric parameters in obese subjects. Materials and methods: A 16-week randomised, controlled, dietary intervention was performed in obese adult subjects (n= 30, men and women) with the following mean baseline characteristics: age 46 years, body mass index (BMI) of 32.8 kg/m², waist circumference 110 cm, hip circumference 125 cm, etc. At the beginning and at the end of the study the anthropometric and body tissue parameters were measured. Blood samples were taken for biochemical analyses. Plasma levels of ghrelin and leptin were determined by ELISA methodology.

Result: The results showed higher reduction in body weight in the group on a low glycemic index (LGI) diet in comparison with the group on a high glycemic index (HGI) diet. No effect of the GI on the plasma levels of ghrelin and leptin was determined. However, in the group on LGI diet a slight decrease in leptin concentrations was detected.

Conclusion: The LGI diet has a beneficial effect on the parameters of obesity. More studies are needed to demonstrate the long-term effect of these diets in the regulation of appetite and metabolism.
"What happens at Grandma’s stays at Grandma’s": Explaining differences between parental and grandparental feeding of preschool aged children.

Eli K.1, Howell K.2, Fisher PA.1, Nowicka B.1,3

1Unit for Biocultural Variation and Obesity, Institute of Social and Cultural Anthropology, University of Oxford, Oxford, UK, 2Department of Psychology, University of Oregon, Eugene, USA, 3Unit of Pediatrics, Department of Clinical Sciences, Intervention and Technology, Karolinska Institute, Stockholm, Sweden

Introduction: While extensive evidence shows that family involvement is important in the prevention and treatment of childhood obesity, grandparental feeding of young children remains understudied. This is notable since nearly one quarter of UK and US families rely on grandparents as the main providers of informal childcare. Informal care has been linked to increased risk of overweight in preschoolers.

Methods: 22 parents and 27 grandparents (60% overweight/obese) from 16 families of children aged 3–5 years (56% overweight/obese) were interviewed. The interviews were transcribed and analyzed qualitatively to assess differences between parental and grandparental feeding, and how such differences are negotiated in families.

Results: Parents and grandparents consistently identified sugary foods/beverages and fast foods as problematic. However, in most families, regardless of child weight, grandparents engaged in indulgent feeding practices despite the parents’ stated wishes. The analysis yielded 3 thematic categories: (1) disagreements about feeding stem from parents’ and grandparents’ differing definitions of healthy feeding; (2) differences between parents’ and grandparents’ feeding practices reflect differences in perceived caretaking roles; (3) parents and grandparents negotiate differences in feeding practices through grandparental compliance and parental compromise.

Conclusion: Differences between parents’ and grandparents’ feeding practices are related to concepts of healthy feeding, perceptions of caretaking roles, and extent of time spent with the child. Specifically, the findings suggest that in childhood obesity interventions, clinicians should evaluate to what extent grandparents provide childcare, and ask to involve them in treatment-related discussions.

Is obesity in early childhood associated with impaired cognition? – Findings form the uk millennium cohort study

Martin A.1, Booth J.N.2, Young D.1, Revie M.1, Boyer A.C.1, Johnston B.1, Tomporowski P.D.1, Reilly J.J.2

1University of Strathclyde, Glasgow, Scotland, 2University of Dundee, Dundee, Scotland, 3University of Georgia, Athens, USA

Introduction: Obesity is associated with marked deficits in educational attainment in adolescence. The issue of when these obesity-related deficits appear is unclear. The present study tested the hypothesis that obesity is associated with impaired cognitive outcomes in early childhood.

Methods: Associations between weight status in early childhood (3–5 years) and cognitive performance assessed by British Ability Scale II tests of Pattern Construction (visuo-spatial skills), Naming Vocabulary (expressive language skills), and Picture Similarity (reasoning skills) at age 5 years were examined in the UK Millennium Cohort Study (MCS). Data from 12,349 participants with objectively measured weight status were examined: 76.3% were healthy weight, 18% overweight and 5.5% obese, relative to UK 1990 reference data.

Results: Obese children at 3 years had significantly lower performance in Pattern Construction at age 5 years compared to those of a healthy weight, even after controlling for a wide range of confounders (β = −0.026, p = 0.03). Controlling for confounders, boys who became obese between the age of 3 and 5 years had lower scores in Pattern Construction (β = −0.029, p = 0.03). However, becoming non-obese had a beneficial impact on Picture Similarity performance in girls (β = 0.028, p = 0.04).

Conclusions: Obesity in early childhood showed adverse relationships for some cognitive outcomes but it is unclear if the magnitude of the relationship is of practical importance. Stronger relationships may emerge later in childhood. Study findings might provide education and public health stakeholders with greater motivation to engage with initiatives to both treat and prevent pediatric obesity in future.

Acknowledgement: We are grateful to The Centre for Longitudinal Studies, Institute of Education for the use of these data and to the UK Data Archive and Economic and Social Data Service for making them available. However, they bear no responsibility for the analysis or interpretation of these data.

Circulating mirnas are deregulated in overweight/obese children: Preliminary results of the ifamily study

iacomingo G.1, Russo P.1, Stillitano I.1, Lauria F.1, Marena P.1, Ahrens W.2,3, Siani A.1

1Institute of Food Sciences, CNR, Avellino, Italy, 2Leibniz Institute for Prevention Research and Epidemiology—BIPS, Bremen, Germany, 3Institute of Statistics, Faculty of Mathematics and Computer Science, University Bremen, Bremen, Germany

MicroRNAs (miRNA) are small non-coding RNAs involved in the modulation of gene expression and in the control of cell functions. Alterations of miRNA patterns often occur in cancer and metabolic disorders, including obesity. Recent studies showed remarkable stability of miRNAs in both plasma and serum making miRNAs potential circulating biomarkers for a variety of diseases. The aim of this pilot study is to evaluate whether circulating miRNAs were differentially expressed in plasma samples of overweight/obese and normal weight children belonging to the Italian cohort of the IFamily project (www.ifamilystudy.eu). The IFamily project builds on the IDEFICS cohort (www.ideficsstudy.eu), established in 2006. It aims to assess the determinants of eating behaviour in children and adolescents from eight European countries Ten overweight/obese (age 11.2 ± 1.7 years, BMI 28.2 ± 1.5 kg/m²) and ten normal weight (age 11.9 ± 1.7 years, BMI 16.4 ± 1.7 kg/m²) children were selected for the pilot study from the Italian participants. miScript miRNA PCR Array Human Serum/Plasma panels were employed to screen and compare the expression of 384 miR-
NAs in pooled plasma samples from the two groups. Validation of selected miRNAs was carried out using RT-qPCR. The validation study showed that five specific circulating miRNAs were significantly deregulated in overweight/obese children. Our preliminary results indicate that circulating miRNAs are significantly deregulated in overweight/obese children. The planned completion of the miRNA analyses in selected samples of the eight European countries participating to the IFamily project will allow to assess whether miRNA profiling is a promising strategy to identify children who may suffer from metabolic abnormalities during growth.

**T5:OS2.5**
The alterations in advanced glycation end products, their receptors and adipokines in centrally obese vs. lean adolescents

Gurecká R., Koborová L., Čsongová M., Šebeková K.

1Institute of Molecular Biomedicine, Faculty of Medicine, Comenius University in Bratislava, Bratislava, Slovak Republic

**Introduction:** In adults, central obesity associates with altered levels of adipokines and dysregulated AGE/RAGE pathway (advanced glycation end products/receptor for AGE), which contribute to complications of obesity, such as insulin resistance. We asked whether these alterations are manifested in centrally obese (CO) apparently healthy adolescents.

**Methods:** Plasma samples from 669 adolescents aged 14–21 years, obtained in the cross-sectional study „Respect for Health” were analyzed for adiponectin, leptin, CML (carboxymethyl lysine, most abundant AGE), RAGE, esRAGE (endogenous secretory RAGE) and sVAP-1 (soluble vascular adhesion protein-1) levels using commercial ELISA kits. CO was defined as waist-to-height ratio ≥0.50. To compare groups of lean and CO, we used Mann-Whitney test, p < 0.05 was considered significant.

**Results:** In both genders, levels of leptin were significantly higher, and those of adiponectin and both forms of RAGE lower in CO subjects. Concentration of CML was lower in CO girls, with same trend in boys. sVAP-1 levels did not differ between the groups. Data are given in table (mean±SD).

**Conclusion:** Alterations in AGE/RAGE pathway and adipokine levels are manifested already in centrally obese adolescents, and thus may potentially play a role in development of central obesity-associated cardiometabolic complications in later life.

<table>
<thead>
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<tr>
<td>Adiponectin (ng/ml)</td>
<td>24.1±1.6</td>
<td>16.0±2.3</td>
<td>46.1±31.4</td>
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<tr>
<td>Leptin (ng/ml)</td>
<td>2.0±2.8</td>
<td>7.5±7.6</td>
<td>7.7±7.0</td>
<td>10.3±15.6</td>
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<tr>
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<tr>
<td>CML (ng/ml)</td>
<td>718±241</td>
<td>641±140</td>
<td>772±167</td>
<td>670±142</td>
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<tr>
<td>RAGE (pg/ml)</td>
<td>1750±686</td>
<td>1496±515</td>
<td>1668±633</td>
<td>1368±430</td>
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</tr>
<tr>
<td>p</td>
<td>0.006</td>
<td></td>
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<tr>
<td>esRAGE (pg/ml)</td>
<td>375±203</td>
<td>112±116</td>
<td>364±156</td>
<td>313±133</td>
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</tr>
<tr>
<td>p</td>
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<tr>
<td>sVAP-1 (ng/ml)</td>
<td>507±238</td>
<td>508±222</td>
<td>538±247</td>
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<tr>
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</tbody>
</table>

Fig. 1. Data are given as mean±SD. NS = not significant, p>0.05.

**T5:OS2.6**
Birth weight as a predictor of blood pressure in children aged 5 to 6 years

Lancashire E.R., Gill P., Knowles G., Pallan M., Adab P.

1Public Health, Epidemiology and Biostatistics, School of Health and Population Sciences, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK
2Primary Care Clinical Sciences, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK

**Introduction:** Previous research on the relationship between birth weight (BW) and children’s blood pressure (BP) shows conflicting outcomes. Studies have been criticised for failing to account for potential confounding factors and/or use of unstandardised BP values. This study considers the relationship between BW and a standardized measure of BP in British children aged 5–6 years having adjusted for potential confounding factors. The relationship is considered overall and also by sex/ethnicity using data from the WAVES study.

**Methods:** Measured BP and parent reported BW together with age, sex and objectively measured height data were available for 767 children. Based on age, sex and height-standardised US definitions of high BP children were classified as having normal or elevated (pre, stage 1 and stage 2 hypertensive) BP. Multilevel logistic regression (adjusted for weight status, socioeconomic status, sex, ethnicity and age) was used to explore the relationship between BW (in 100g units) and BP.

**Results:** Overall there was an inverse relationship between BW and current BP. For every 100g increase in BW the odds of having an elevated BP were reduced by 4.2% for SBP (OR=0.958, 95% CIs 0.922–0.994) and 4.7% for DBP (OR=0.953, 95% CIs 0.925–0.982). The outcome for SBP was more evident in girls (OR=0.946, 95% CIs 0.896–0.999) and South Asian (SA) children (OR=0.885, 95% CIs, 0.786–0.996). The outcome for DBP was more evident in boys (OR=0.949, 95% CIs 0.909–0.989) and SA children (OR=0.929, 95% CIs 0.857–0.987).

**Conclusion:** After adjusting for weight status and other potential demographic confounding factors, higher BW was associated with reduced odds of having elevated systolic or diastolic BP. The association varied by subgroup with both relationships more marked among SA children.

**T8:OS2 – Multidisciplinary Treatment**

**T8:OS2.1**
Liraglutide 3.0 Mg: Weight-loss dependent and independent effects

Van Gaal L., P.Sunyer X., Uddén Hemmingsson J., Claudius B., Svendsen C.B., Bays H.

1Diabetology & Metabolism, Antwerp University Hospital, Antwerp, Belgium, 2Columbia University, New York, NY, USA, 3Capio St Goran’s Hospital / Karolinska Institutet, Stockholm, Sweden, 4Novo Nordisk, Søborg, Denmark, 5L-MARC Research Center, Louisville, KY, USA

The SCALE trials examined the efficacy and safety of liraglutide 3.0 mg in overweight or obese adults (n=5,358) with or without prediabetes (NCT01272219); with type 2 diabetes (NCT01272232); or with obstructive sleep apnoea (NCT01557166). Liraglutide 3.0 mg resulted in greater reductions in mean body weight (BW) (5.7–8.2 cm vs 1.2–4.0 cm) compared with placebo (both p <0.001) and also significantly improved secondary endpoints such as HbA1c, fasting plasma glucose (FPG), blood pressure (BP), lipid profile and use of oral antidiabetic drugs (OADs). Impact of weight on Quality of Life-Lite© (IWQoL-Lite©) scores and the apnoea-hypopnea index (AHI) also improved. This post hoc analysis examined the relative contribution of weight loss (WL) to the treatment effect of liraglutide 3.0 mg on key secondary efficacy endpoints. A mediation model was applied to explain the dependent and independent relationship between WL and secondary efficacy endpoints. The degree to which liraglutide 3.0
mg-induced WL mediated its effects on secondary efficacy endpoints was ranked from 0–100%, where 100% indicated the highest likelihood of a WL-dependent effect. Endpoints predominantly driven by WL with liraglutide included WC, diastolic BP, triglycerides, high density lipoprotein cholesterol levels, AHI and IWQoL-Lite® scores (all ranked 88–100%). Endpoints mainly independent of WL included glycaemic outcomes and use of OADs (ranked 18–32%) (Figure). Importantly, for each endpoint, including those largely independent of WL, lowered BW was a significant contributor to the treatment effect. In conclusion, in individuals that are overweight or have obesity, liraglutide 3.0 mg mediates its effects via both WL-dependent and -independent mechanisms.

Acknowledgement: Supported by Novo Nordisk

Fig. 1: Relative contribution of weight loss on secondary efficacy endpoints with liraglutide 3.0 mg

T8:OS2.2
Efficacy and safety of liraglutide 3.0 Mg in adult overweight and obese weight loss responders without diabetes: Results of the 56-week randomised, controlled, scale obesity and prediabetes trial

Astrup A,1 Fujioka K,2 Violante Ortiz R,3 Jensen C.B,4 Lilleøre S.K,4 O’Neil P.3
1University of Copenhagen, Copenhagen, Denmark,
2scripps Clinic, La Jolla, CA, USA,
3Medical Research Unit in Clinical Epidemiology, Mexican Institute of Social Security, Mexico,
4Novo Nordisk, Søborg, Denmark,
5Department of Surgery, Medical University of South Carolina, Charleston, SC, USA

The SCALE Obesity and Prediabetes trial evaluated the efficacy and safety of liraglutide 3.0 mg for weight management in patients without T2D (NCT01272219). This subgroup analysis compared key efficacy and safety outcomes of responders (≥5% weight loss [WL] from baseline) vs non-responders (<5% WL from baseline) for liraglutide 3.0 mg and placebo (PBO) at 56 wks. Overweight/obese individuals (BMI ≥27 kg/m² with ≥1 comorbidity or BMI ≥30 kg/m²) were randomized 2:1 to liraglutide 3.0 mg (n=2487) or PBO (n=1244) as adjuncts to diet and exercise. Mean change from baseline data are LS means with LOCF. At wk 56, more individuals on liraglutide vs PBO were WL responders (63.2% vs 27.1%; p < 0.0001). WL was greater in responders vs non-responders for both liraglutide and PBO (Table). Responders on liraglutide had greater improvements than non-responders across a range of efficacy outcomes. Reductions in FPG and SBP were greater with liraglutide vs PBO for responders and non-responders (Table). Of reported adverse events (AEs), GI AEs were most common and occurred with similar frequency in responders (liraglutide 69.2%; PBO 44.4%) and non-responders (liraglutide 67.2%; PBO 39.6%). Except for gallbladder AEs, AE profiles were similar for responders and non-responders (Table). Mean change in pulse rate from baseline was similar for liraglutide responders and non-responders (Table). In conclusion, more patients on liraglutide 3.0 mg achieved WL ≥5%, with a greater WL seen in the responder population. In both groups, responders had greater improvements in glycaemic, cardiometabolic and health-related QoL outcomes. AE rates were largely equivalent in responders and non-responders.

Acknowledgement: Supported by Novo Nordisk

Fig. 1. Selected efficacy and safety endpoints for responders and non-responders in the SCALE Obesity and Prediabetes trial.

T8:OS2.3
Adipose tissue morphology predicts improved insulin sensitivity following moderate or pronounced weight loss

Eriksson Hogland D.1, Andersson D.P.,1 Bäckdahl J.J., Hoffstedt J.1, Rössner S.1, Thrall E.1, Arner E.1, Arner P.1, Rydén M.*
1Department of Medicine (H7), Karolinska Institutet, Karolinska University Hospital, Huddinge, Stockholm, Sweden,
2Department of Surgery, Karolinska Institutet, Ersta Hospital, Stockholm, Sweden

Introduction: Subcutaneous adipocyte size and adipose tissue morphol-
Rate of weight loss does not affect long-term weight regain

Vink R.G.1, Roumans N.1, Mariiman E.C.1, van Baak M.A.1

1Department of Human Biology, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University Medical Centre+, Maastricht, The Netherlands.

Introduction: Dietary guidelines recommend ‘slow’- over ‘rapid’-weight loss for the management of obesity. This is based on the belief that slow weight loss is preferential for long-term weight management. However, this notion has not been confirmed by scientific studies in which weight loss in the slow- and rapid-weight loss group was similar. Therefore, the objective of this study was to investigate the effect of rate of weight loss, with similar total weight loss, on long-term weight regain in overweight and obese individuals.

Methods: Fifty-seven participants (BMI: 28–35 kg/m²) were randomized to a low-calorie-diet (LCD: 1250 kcal/d) for 12 weeks or a very-low-calorie-diet (VLCD: 500 kcal/d) for 5 weeks. Both groups subsequently underwent a 4-week weight-stable period followed by a 9-month follow-up. Weight and body composition (BodPod) were determined at 4 time points (Figure 1).

Results: Diet-induced weight loss was similar in both groups (LCD: −9.1% and VLCD: −10.0%, p = 0.26, Figure 2). Interestingly, regain of lost weight after follow-up was not significantly different between groups (LCD: +58.6% and VLCD: +54.7%, p = 0.78). Fat-free mass (FFM) loss induced by the diet was higher in the VLCD-group compared to the LCD-group (p < 0.05) and was associated with weight regain during follow-up (whole group: r=0.325, p = 0.018). However, the difference in mean FFM loss between the groups was too small to translate into differences in mean weight regain.

Conclusion: The present study showed that, with similar total weight loss of approximately 10% of initial weight, the rate of weight loss did not affect long-term weight regain. Dietary recommendations concerning the rapidity of weight loss should be critically reviewed in light of recent scientific evidence.

Fig. 2. Body weight at time points T1, T2, T3 and T4 (same as indicated in Figure 1) in the LCD-group and VLCD-group. LCD: low-calorie-diet, VLCD: very-low-calorie-diet.

Weight loss under treatment of hypogonadal men with testosterone undecanoate injections (TU): Long-term experience of 21.678 patient-months from a single urologist’s office registry

Saad F.1, Haider K.S.1, Haider A.1, Doros G.1, Traish A.5

1Bayer Pharma AG, Global Medical Affairs, Berlin, Germany, 2Gulf Medical University, Ajman, UAE, 3Private Urology Practice, Bremerhaven, Germany, 4Boston University School of Public Health, Boston, USA, 5Boston University School of Medicine, Boston, USA

Introduction: This registry assesses long-term effectiveness and safety of TU in a urological setting. Material and Methods: Observational, prospective, cumulative registry study: 347 men (age: 57.32 ± 7.12 years) with total testosterone (T) levels ≤12.1 nmol/L and hypogonadal symptoms received TU 1000 mg/12 weeks following an initial 6-week interval for up to 7 years. Anthropometric parameters were measured every 3 months.

Results: This cohort represented a mixed population with a variety of comorbidities: type 2 diabetes mellitus (n=126, 36.3%), cardiovascular disease (n=68, 19.6%), inflammatory bowel diseases (IBD; n=61, 17.6%), osteoporosis (n=61, 17.6%), Klinefelter’s syndrome (n=36, 10.4%), psoriasis (n=15, 4.3%), 30.8% had normal waist circumference (WC; <94 cm), 30.8% elevated (94 to 102), and 64.8% substantially elevated (≥102 cm). 7.5% had normal weight, 22.8% were overweight, and 69.7% obese. WC decreased progressively from 105.77 ± 8.6 to 97.74 ± 7.05 cm, weight from 103.87 ± 16.38 to 87.82 ± 8.99 kg, and BMI from 33.18 ± 5.35 to 28.42 ± 2.95 kg/m² with statistical significance vs previous year for all three measures over the entire observation period. Weight loss was 16.67% ± 7.7% at 7 years. During the first treatment year and before joining the registry, approximately 5% of patients decided against continuing TRT. Once in the registry, no further dropouts were recorded. During the entire observation time, no major adverse cardiovascular event occurred.

Conclusions: Long-term TRT with TU in an unselected cohort of hypogonadal men resulted in improvements in a variety of anthropometric and metabolic parameters. Long-term TU was well tolerated and excellent adherence suggested a high level of patient satisfaction.

The utility of obesity staging classification systems in selecting persons for bariatric surgery

Valderhaug T.G.1,2, Hjelmesch J.1, Sandbu R.1, Asheim E.T.5, Hertel J.K.1

1Morbid Obesity Centre, Vestfold Hospital Trust, Tønsberg, Norway, 2Department of Endocrinology, Akershus University Hospital, Nordbyhagen, Norway, 3Department of Endocrinology, Morbid Obesity and Preventive Medicine, Institute of Clinical Medicine, University of Oslo, Oslo, Norway, 4Department of Surgery, Vestfold Hospital Trust, Tønsberg, Norway, 5Imperial Weight Centre, Imperial College London, London, UK

Introduction: Increasing numbers of obese people calls for development of evidence based criteria to prioritize the right type of treatment to those that can benefit most. The King’s Obesity Staging Criteria (KOSC) comprises a set of health related domains graded into stage 0, 1, 2, or 3. We aimed to examine whether patients undergoing bariatric surgery differed from those opting for conservative treatment, according to KOSC.

Methods: 2188 consecutive morbidly obese patients who attended our tertiary care center from 2005–10 were graded in the following KOSC stages, functional and gonadal axis, perceived health status, body image and eating behavior. Stages 0–1 represent minor health risk, while stages 2–3 represent established clinical, metabolic, and socio-psychological states linked to obesity.

Results: Out of 2188 patients, a total of 1213 (55%) patients received lifestyle intervention only, 816 (37%) bariatric surgery only and 159 (7%)...
patients received lifestyle intervention and subsequent bariatric surgery. Compared to those who received lifestyle intervention, the patients treated with bariatric surgery were younger (42 vs. 44 years, p < 0.001), had a higher BMI (45.3 vs. 43.3 kg/m², p < 0.001) and had a lower 10 year estimated CVD-risk (10 vs. 12%, p = 0.01). The treatment groups were not statistically different in the obesity staging categories (Figure). Compared to those with the reference BMI of 35–50 kg/m², participants with BMI 50–60 kg/m² had higher odds (OR 1.64, 95% CI 1.26–2.10) of being selected for bariatric surgery.

**Conclusion:** Our data indicate that increasing BMI, rather than an individual patient’s health risks and manifest morbidity, predicted treatment choice in morbidly obese patients.

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**Saturday, 9 May, 2015**

**T1/T2:OS3 – Adipose Tissue Mass and Function**

**T1/T2:OS3.1**

**Effects of 5-year growth hormone supplementation therapy on subcutaneous adipose tissue phenotype and adipokine profile in adult growth hormone deficiency**

Ulkrupcova B., Janakova Z., Kurdirova T., Balaz M., Surova M., Maderova D., Belan V., Payer J., Klimes J., Gasperikova D., Ukropec J.

1Institute of Experimental Endocrinology Slovak Academy of Sciences, Bratislava, Slovakia
2Dr. MAGNET, Bratislava, Slovakia
35th Department of Internal Medicine, University Hospital, Comenius University, Bratislava, Slovakia
4Institute of Pathophysiology, Faculty of Medicine, Comenius University, Bratislava, Slovakia

**Introduction:** Adult growth hormone deficiency (GHD) is associated with central adiposity, enlarged adipocytes and shifts in adipose tissue adipokine profile that might contribute to the whole body metabolic derangements (dyslipidemia, glucose intolerance, insulin resistance). We investigated effects of 5-year GH supplementation on subcutaneous adipose tissue (SAT) phenotype (n=17) and adipokine profile (n=11) in GHD adults in comparison to age, BMI & gender-matched controls (n=17/11).

**Methods:** Metabolic phenotyping included euglycemic hyperinsulinemic clamp (EHC), oral glucose tolerance test (oGTT) & MRI (abdominal fat distribution). Samples of subcutaneous abdominal adipose tissue (SAT) were obtained by needle biopsy and adipokine profile was determined by protein cytokine arrays (RayBio). Fat cell size was measured morphometrically.

**Results:** GH supplementation decreased fat cell size by 13.3% (114.0 vs 98.8μM) and improved adipose tissue insulin sensitivity (EHC: insulin-induced suppression of FFA; 0.35 vs 0.04mM) and whole body glucose tolerance (oGTT: 2h glycemia; 7.94 vs 6.02mM) by 88.6 and 24.2%, resp., without affecting whole body insulin sensitivity or adiposity. Over two-fold changes in SAT adipokine proteins expression included proteins involved in adipocyte proliferation and differentiation (BMP4, EGF, M-CSF, SCF), angiogenesis (BDNF, angiogenin, SDF1, GCP2), neurogenesis (BDNF, CNTF, GDFN, SDF1), browning (BMP4), metabolism (IGF1) and inflammation (MCP1, MCP4, IL2, IL3, IL5, IL10, IL13, M-CSF, MDC, eotaxin, IFNγ).

**Conclusion:** Five-year growth hormone supplementation to GHD adults modulated subcutaneous adipose tissue adipokine profile, with beneficial effects for adipose tissue growth, differentiation and metabolism.

**Acknowledgement:** Pfizer Investigator Initiated Research Grant, EFSD New Horizons

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**T1/T2:OS3.2**

**A role for Wnt signaling in the reversal of metabolic disturbances after gastric bypass in obese mice**

Maris M.¹, Vangointhoven R.¹, Monteiro Carvalho Mor Cunha J.P.², Lannoo M.³, Overbergh L.¹, Matthieu C.¹, Van der Schueren B.¹,²

1Laboratory for Clinical and Experimental Medicine and Endocrinology, KU Leuven, Leuven, Belgium,
2Department of Abdominal Surgery, University Hospitals Leuven, Leuven, Belgium,
3Department of Endocrinology, University Hospitals Leuven, Leuven, Belgium

**Introduction:** Gastric bypass surgery has beneficial effects on obesity-induced metabolic disturbances, but the underlying mechanisms remain unclear. As Wnt genes are positively and negatively correlated with obesity, diabetes, insulin resistance and beta cell dysfunction, our main aim is to reveal a potential role for Wnt signaling in the reversal of these metabolic consequences after gastric bypass surgery in mice.

**Methods:** 8-weeks old male C57Bl/6 mice were fed a high fat diet (60 kcal% fat) for 14 weeks, followed by either Roux-en-Y gastric bypass (RYGB; n=13) or Sham surgery (Sham; n=10). After surgery, mice were maintained on a high fat diet for another 8 weeks (Sham group was pair fed with the RYGB group). Using RNA-Seq and qR-PCR, the mRNA expression profile of Wnt ligands and its antagonists (i.e. secreted Frizzled-related proteins (sFRP)) was determined in pancreatic islets and epididymal white adipose tissue of RYGB and Sham mice.

**Results:** 8 weeks post-surgery, Sham mice returned to their pre-surgery weight (43.4 g ± 6.9), whereas RYGB mice showed a 43% reduction in body weight, accompanied by improved metabolic parameters, as compared to Sham mice (P < 0.01). Despite a 3-fold reduction in fasting insulin levels in RYGB as compared to Sham mice (P < 0.05), the mRNA expression level of Wnt ligands and sFRP was similar in pancreatic islets. In contrast, epididymal adipose tissue of RYGB mice showed a 75% and 94% decrease in sFRP4 and sFRP5 mRNA expression levels respectively as compared to Sham mice (P < 0.01). Additionally, a trend towards decreased mRNA expression of Wnt5a and Wnt5b could be detected in RYGB as compared to Sham mice (P = 0.1).

**Conclusion:** RYGB surgery strongly reduced the expression level of the secreted Wnt antagonists sFRP4 and sFRP5 in white adipocyte tissue. As secreted proteins are interesting drug targets, a potential role for these secreted proteins in the reversal of metabolic disturbances after RYGB surgery will be studied more in depth.

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Dysregulation of lipid droplet-associated rab proteins in adipocytes as a novel pathogenic component in the development of insulin resistance in obesity

Rabanal Y.1,2, Guzmán-Ruiz R.1,2, Travez A.1,2, Moreno N.R.1,2, García-Navarro S.1,2, López-Miranda J.1,2, Timonhes F.1,2, Vázquez-Martínez R.1,2, Malagón M.M.1,2
1Dept. of Cell Biology, Physiology and Immunology, IMIBIC/Reina Sofia University Hospital/University of Córdoba, Córdoba, Spain, 2CIBER Fisiopatología de la Obesidad y Nutrición (CIBERobn), Instituto de Salud Carlos III, Spain, 3Lipids and Atherosclerosis Unit, IMIBIC/Reina Sofia University Hospital/University of Córdoba, Córdoba, Spain, 4Biomedical Research Laboratory, Endocrinology Department, Hospital Virgen de la Victoria, Málaga, Spain

Introduction: Lipid droplets (LDs) are essential subcellular organelles responsible for lipid storage in adipocytes. LDs are surrounded by a phospholipid monolayer that harbors a variety of proteins, including several members of the Rab family of GTPases such as Rab18, which regulates lipid traffic to and from LDs. Investigating how LD-associated Rab proteins are regulated is pivotal to the understanding of the regulation of lipid storage and mobilization in adipocytes and their contribution to lipotoxicity and metabolic disease.

Methods: Data from two comparative proteomic studies [LDs isolated from control vs. insulin-stimulated 3T3-L1 cells; omental adipose tissue of lean subjects vs. normoglycemic (NIR) or insulin resistant (IR) obese subjects] were screened to identify potential regulators of Rab proteins. One protein was selected (Rab-GDP dissociation inhibitor 2, GDI2) and further characterized.

Results: GDIIs inhibit the dissociation of GDP from Rab, thus preventing their activation and recruitment to target membranes. Accordingly, overexpression of GDI2 in 3T3-L1 cells reduced both lipogenesis and lipolysis and concomitantly inhibited the association of Rab18 to the LD surface. Notably, the expression of GDI2 and/or the distribution of Rab18 were significantly higher in abdominal than femoral subcutaneous (sc) AT in overweight/obese women, and examined depot-specific effects of oxygen tension on metabolism and inflammation.

Methods: 8 overweight/obese (BMI 34.2 ± 1.9 kg/m²) post-menopausal women with impaired glucose metabolism were included. AT PO2 was assessed in abdominal and femoral sc AT using microdialysis-based optochemical measurements. Furthermore, AT blood flow (ATBF) (133Xe wash-out), insulin sensitivity (hyperinsulinemic-euglycemic clamp) and body composition (DEXA) were measured. AT biopsies were collected for gene/protein expression analysis and cell culture experiments to determine effects of AT PO2 (5 vs. 10 vs. 21% O2) on adipogenic differentiation, adipokine expression and secretion, mitochondrial oxygen consumption and glucose uptake.

Results: AT PO2 was significantly higher in abdominal compared to femoral sc AT (62.7 ± 6.6 vs. 50.0 ± 4.5 mmHg, p = 0.017), despite lower ATBF in abdominal than femoral AT (1.8 ± 0.3 vs. 2.8 ± 0.5 ml/100g tissue/min, p = 0.028). Interestingly, abdominal sc AT PO2 was positively associated with BMI (r = 0.89, p = 0.01), systolic (r = 0.86, p = 0.01) and diastolic (r = 0.79, p = 0.03) blood pressure, and 2h-glucose level (r = 0.82, p = 0.02). Results of the cell culture experiments will be available at the time of the meeting.

Conclusion: This study demonstrated for the first time that AT PO2 was significantly higher in abdominal than femoral subcutaneous AT of overweight/obese women, despite slightly lower ATBF, and may contribute to increased cardiometabolic disease risk.
we report that human adipocyte progenitors proliferate in conjunction with adipose tissue capillaries and describe methods whereby they can be clonally isolated from human adipose tissue. These progenitors are amenable to expansion, differentiate in response to classic adipogenic stimuli and survive as adipocytes when implanted into immunodeficient mice. Unexpectedly, adipocytes differentiated from these progenitors strongly (>100-fold) induce the brown adipocyte-specific uncoupling protein-1 in response to adenylate cyclase activation, resulting in a thermogenic phenotype characterized by uncoupled oxygen consumption. These results thus identify human brite/beige progenitor cells associated with expanding adipose tissue vasculature, and suggest that browning of adipose tissue occurs in response to capillary network growth in response to hemodynamic stress.

Acknowledgement: This study was funded by National Institutes of Health grant DK089101.

T6/T7:OS3 – Actions for Change

T6/T7:OS3.1
Addressing the obesity epidemic through a novel user-friendly approach to menu labelling in the west of Ireland
Kerins C.1,2, Gibson L.1,2, Cunningham K.1,2, Jones J.1,2,3, Kelly C.1,2,3
1National Institute for Preventive Cardiology, Moyola Lane, Newcastle, Galway, Ireland,
2Croí, the West of Ireland Cardiac Foundation, Moyola Lane, Newcastle, Galway, Ireland,
3Health Promotion Research Centre, National University of Ireland, Galway, University Road, Galway, Ireland

Introduction: With eating out-of-home becoming more common, menu labelling has garnered growing public and legislative support as a potential strategy for addressing the obesity epidemic. The aims of this research were to examine the impact of novel and user-friendly heart healthy awards on consumers buying behaviour and to explore perceptions of this initiative from food establishment’s perspectives.

Methods: This quasi-experimental study recruited a convenience sample of eight food establishments; all with at least one menu item meeting the heart healthy award criteria. Sales of all menu items sold over an eight week period were tracked; 4 weeks prior to and 4 weeks during display of the awards on their menus. In addition, structured interviews were conducted with staff from each food establishment.

Results: The interviews revealed that consumer demand was the main reason for engaging in the programme. Notably, half of the food establishments made changes to their food practices to improve nutritional profile as a consequence of the programme. The absolute change in menu item selections with an increase of 556 of the healthier menu items sold over the 4 week period. The study was underpowered to detect a statistically significant difference.

Conclusion: The provision of heart-healthy awards on menus may potentially be an important element of a comprehensive obesity prevention strategy. Menu labelling may provide consumers with the information they need to make healthier choices and may also encourage food establishments to improve the nutritional profile of the foods they offer. As the current study used a small convenience sample of food establishments, larger scale studies are warranted.

T6/T7:OS3.2
Can front-of-pack nutrition labelling help consumers choose foods for a healthful diet?
Green J.H.1, Siwajek P1, Fern E.B.2
1Department of Nutrition, Health and Wellness and Sustainability, Nestec SA, Vevey, Switzerland,
2Recently retired from Nestec SA, Vevey, Switzerland

Introduction: The aim of this study was to find out whether hypothetical aliquots of homogenised healthful diets meet the UK’s multiple traffic light (MTL) nutrient profile requirements for green lights for total fat, saturated fat, total sugars and salt.

Methods: The nutrient composition of 7 days’ menus for the US MyPlate and DASH Eating Plan were derived using the USDA nutrient database (Release 27). The total diet was expressed either per 100g for foods or per 100ml for beverages. A healthful diet was also developed from packaged foods using MTL labels to help guide selection.

Results: The MyPlate and DASH diets met the WHO guidelines for total fat, saturated fat and salt, while total sugars provided 22.2 ± 7.5, and 23.3 ± 4.1% energy, respectively (n=7 days, mean ± SD). For both diets, the foods achieved MTL green lights for saturated fat and salt, and beverages for total fat, saturated fat, and salt. All other nutrients achieved only amber lights, with the foods in the MyPlate diet providing 4.9 ± 1.6 g total fat/100g and 6.3 ± 2.2 g total sugars/100g, and the beverages providing 4.5 ± 1.8 g total sugars/100ml. The corresponding amber light values in the DASH Eating Plan were 4.5 ± 0.4 g total fat/100g and 5.7 ± 1.3 g total sugars/100g for foods, and 7.0 ± 0.8 g total sugars/100ml for beverages. A “packaged foods” diet with 4 green lights for foods and beverages provided 21.2% energy from total fat, 8.3% from saturated fat, 23.3% from total sugars and 5.4g salt.

Conclusion: The MTL label is intended to help guide product choice for a healthful diet, but in practice this was found to be difficult to achieve because of the strict thresholds for total fat and total sugars.

T6/T7:OS3.3
The effect of calorie-labelling of meals on macro- and micro-nutrients chosen by young-adults over 9-months
Nikolau C.K.,1 Hankey C.1, Lean M.E.1
1Department of Human Nutrition, University of Glasgow, New Lister Building, 10–16 Alexandra Parade, Glasgow, G3T 2ER

Background: Calorie-labelling has been introduced as a tool to help consumers to control calorie-intake when eating out-of-home. To date, there is limited evidence on whether calorie-labelling has an impact on calories chosen and no evidence on the effect of it on other macro- and micro-nutrients. The aim of this study was to assess the impact of calorie-labelling on energy, macro- and micro-nutrients chosen.

Methods: Young adults were observed when choosing meals over three study-periods, period 1: with calorie-labels (20 weeks), period 2: with...

Fig. 1. Heart Healthy Menu Awards
out calorie-labels (10 weeks), period 3: with calorie-labels and estimated energy requirements (10 weeks). Meal choices were analysed using a nutritional software (WinDiets, 2011). ANOVA was carried out to test for differences between macro- and micro-nutrients during the three periods (SPSS 21, Chicago inc).

**Results:** Energy, four macro- and 19 micro-nutrients levels were derived from 4,200 meals. Mean (SE) for key macro- and micro-nutrients were for Period 1: energy = 661 (6.9) kcal, fat = 31.5 (0.4) g, saturated fat = 10.5 (0.2) g, Vit C = 79.8 (2.9) mg, Vit D = 17.1 (2) mg, Ca = 271.5 (29.5) mg, Na = 1,242 (51) mg. Period 2: energy = 723 (7) kcal, fat = 34.7 (0.4) g, saturated fat = 12 (0.2) g, Vit C = 86.6 (3) mg, Vit D = 26.8 (2.6) mg, Ca = 354 (33) mg, Na = 1,351 (50.4) mg. Period 3: energy = 585 (5.9) kcal, fat = 27.3 (0.4) g, saturated fat = 8.6 (0.2) g, Vit C = 77.2 (2.9) mg, Vit D = 14 (1.7) mg, Ca = 271 (32.9) mg, Na = 1,232 (61.7) mg. All macro- and micro-nutrients, except for B1, Vit C, Vit E, Ca and Na, were significantly different between the three periods (p < 0.001).

**Conclusions:** Calorie-labelling resulted in reduced calorie, fat, saturated fat contents of the meals chosen, without compromising the provision of micronutrients, which were all above recommended daily amounts.

**Acknowledgement:** Authors would like to thank the catering staff for posting the calorie-labels for a period of nine months.

**T6/T7:053.4 Diet and physical activity interventions to prevent or treat obesity in South Asian children and adults: A systematic review and meta-analysis**

Brown T.1, Smith S.1, Bhopal R.2, Kasim A.1, Summerbell C.D.1

1School of Medicine, Pharmacy and Health, Durham University, UK.
2Centre for Population Health Sciences, University of Edinburgh, UK.

**Aim:** To assess the effectiveness of interventions to prevent or treat obesity in South Asian populations.

**Methods:** Systematic review of lifestyle interventions of any duration, in South Asian children or adults in any country that reported an anthropometric measure. There was no restriction on type of comparator; RCTs, CCTs, and before-after studies were included.

**Results:** 29 studies were included, 7 children, 21 adult and one mixed age. 16 studies were conducted in South Asia, 10 in Europe and 3 in USA. Effective trials included physical activity interventions in South Asian men in Norway and South Asian school children in the UK. Meta-analyses of interventions in children showed no significant difference between intervention and control. Meta-analyses in adults showed improvement in weight in data from two trials adjusted for baseline differences (-1.20 kgs, 95% CI –2.23 to –0.17). There was no evidence that interventions were more or less effective by country or socio-economic status. **Conclusions:** Meta-analysis found an unclear picture of the effects of interventions on BMI for South Asian children, but did show an improvement in weight (but not BMI or waist circumference) for adults. Evidence of culturally appropriate approaches to and characteristics of, effective interventions in adults were also identified. The protocol for this systematic review was registered with PROSPERO (registration no. CRD42014008800).

**T6/T7:053.5 Are weight management programmes cost-effective?**

Retar L.1, Brown M.1, Suhrcke M.1, Webber L.1

1UK Health Forum, London, UK.
2Centre for Health Economics, University of York, York, UK

**Objective:** As part of the NICE guidance on adult Lifestyle Weight Management programmes, the UK Health Forum used a health and economic model to estimate the potential health and economic consequences of running weight management programmes in UK adults.

**Methods:** We developed an economic evaluation model capable of considering the impact of future changes in body mass index on health and related healthcare costs for adults. Incremental cost-effectiveness ratios, quality-adjusted life year, savings over several different time horizons were estimated. Five interventions were modelled, for example, comparing individual weight loss programmes lasting either 6, 12 or >12 months in length, a weight loss programme involving group sessions; an individual weight loss programme but with supervision from a health professional and finally a weight loss programme that included a combination of different group and supervision sessions. A sensitivity analysis of the critical parameters was also carried out.

**Results:** Results (Fig. 1) showed that interventions resulted in between 0.3kg/m² (<12month programme) and 3kg/m² weight loss (combination programme). Modelling showed that most interventions investigated were cost-effective but only if the rate of regain of BMI was low (<5%, depending on age and sex categories). The sensitivity analysis shows that the critical elements in the likely cost effectiveness are gender, initial BMI, age, rate of regain of BMI and the intervention cost.

**Conclusion:** Given the impact of ‘yo-yo dieting’ and frequent weight regain following trials, the NICE modelling results suggested that continuous weight management interventions over the lifecourse to help prevent obesity-related diseases and reduce the total cost to health services are necessary.

**T6/T7:053.6 Effect of a childhood obesity prevention programme on blood pressure in UK South Asian primary school children: The beaches study**

Pallon M.J.1, Adab P.1

1School of Health and Population Sciences, University of Birmingham, Birmingham, UK

**Introduction:** Childhood obesity is associated with increased cardiometabolic risk, including elevated blood pressure (BP). Behavioural interventions in overweight children have been shown to significantly reduce BP, and evidence suggests that school-based obesity prevention programmes have a favourable effect on BP. This study examines the effect of a school-based childhood obesity prevention programme on BP in South Asian (SA) children aged 6–8 years using data from the Birmingham healthy Eating and Active lifestyle for CHildren Study (BEACHeS; a phase II feasibility study). SA are an important target group as they are vulnerable to the cardiometabolic effects of obesity.

**Methods:** 8 primary schools in Birmingham, UK participated. Children in 4 schools received a 1 yr programme targeting diet and physical activity.
Objectively measured height, weight and BP data were available pre- and post-intervention for 230 and 245 children in the intervention and control arms respectively (89% SA). Multiple linear regression models were developed for systolic and diastolic blood pressure (SBP and DBP) to estimate differences in the study arms post-intervention. **Results:** In unadjusted analyses, SBP and DBP were significantly lower in the intervention arm compared with control (-2.48 mmHg for SBP (95%CI: -4.50, -0.45), -1.96 mmHg for DBP (95%CI: -3.72, -0.20)). These differences remained after adjustment for sex, age, ethnicity, height, baseline BP and post-intervention BMI z-score (-2.08 mmHg for SBP (95%CI: -4.00, -0.17), -1.97 mmHg for DBP (95%CI: -3.70, -0.24)). **Conclusion:** The BEACHeS programme lowered SBP and DBP in young SA school children by approximately 2 mmHg. This translates into a significant reduction in cardiometabolic risk in this vulnerable population.

**Acknowledgement:** The NPRI funding partners for the study are: British Heart Foundation; Cancer Research UK; Department of Health; Diabetes UK; Economic and Social Research Council; Medical Research Council; Research and Development Office for the Northern Ireland Health and Social Services; Chief Scientist Office, Scottish Executive Health Department; Welsh Assembly Government and World Cancer Research Fund.

**T3:OS3 – Genes and Metabolic Function**

**T3:OS3.1** Fluoxetine induces plasticity in hypothalamic circuits controlling leptin sensitivity and food intake

Scabia G.1, Mainardi M.2, Barone I.1, Scali M.2, Ceccarini G.1, Vitti P.1, Fisserosso T.1, Maffei L.1, Santini F.1, Maffei M.2
1Department of Clinical and Experimental Medicine. Obesity Center, University Hospital, Pisa, 2Institute of Neuroscience, CNR, National Research Council, Pisa, 3Department of Neuroscience, Psychology, Drug Res. and Child Hth. NEUROFARBA, Univ. of Florence, Florence, Italy, 4Institute of Clinical Physiology, CNR, National Research Council, Pisa

**Introduction:** Leptin (LEP), a satiety hormone secreted by white adipose tissue, signals to the brain, namely the arcuate nucleus of the hypothalamus (ARC), the status of the energy stores and acts by activating the anorectic POMC neurons and by inhibiting the orexigenic NPY neurons. LEP discovery represented a promising pharmacological therapy for obesity, but treatment of obese patients has substantially failed. Indeed obese patients display high plasmatic LEP levels, suggesting resistance to this hormone. Our previous work has shown that hypothalamic LEP sensitivity can be enhanced via environmental cues, that promote neural plasticity. Fluoxetine (FLX), a selective serotonin reuptake inhibitor, is widely used for treating major depression and is known to induce neural plasticity. Fluoxetine (FLX), a selective serotonin reuptake inhibitor, is widely used for treating major depression and is known to induce neural plasticity. Fluoxetine induces plasticity in hypothalamic circuits controlling leptin sensitivity and food intake.

**Methods:** Adult mice were treated for 3 wks with FLX added to drinking water. Body weight and food intake were monitored. LEP sensitivity was assessed by monitoring feeding intake after LEP injection and by calculating the activation level of STAT3 by immunofluorescence. Hypothalamic plasticity was assessed by quantifying the excitatory and the inhibitory inputs on POMC and NPY neurons by immunofluorescence.

**Results:** We observed a significant reduction in body weight and increased locomotor activity, and a higher sensitivity to LEP anorectic action. We looked for molecular correlates of these modifications: in the ARC, FLX induced a stronger signaling activation in response to LEP and significant rearrangements of synaptic excitation/inhibition ratio on NPY and POMC neurons.

**Conclusion:** Our results indicate that FLX treatment enhances LEP sensitivity in adulthood by modulating neuronal response and by stimulating neural plasticity in the ARC.

**T3:OS3.2 Impact of caloric restriction on gut barrier integrity in obese women**

Ort B.1, Normand K.1, Büttner J.1, Eichhorn C.1, Hastreiter L.1, Skurt T.1, Hauner H.2,3
1Center of Life and Food Science Weihenstephan, Technische Universität München, Department of Clinical Nutritional Medicine, Freising-Weihenstephan, Germany, 2Charité-Universitätsmedizin Berlin, Forschungsgruppe Geriatrie am EGBZ, Berlin, Germany, 3Charité-Universitätsmedizin, Medizinische Klinik mit Schwerpunkt Hepatologie und Gastroenterologie, Berlin, Germany, 4Institute of Nutritional Medicine, Klinikum rechts der Isar, Technische Universität München, Munich, Germany

**Introduction:** This study addresses the hypothesis that a disrupted gut barrier function contributes to subclinical inflammation in obesity. Specific aim of the study was to investigate whether caloric restriction affects gut permeability and decreases gut-derived inflammatory load in obese women.

**Methods:** 20 obese women (BMI 34.9 ± 3.8/kg/m²) underwent a caloric restriction protocol of 800 kcal/d (formula diet, kindly provided by MOD-IFAST®, Nutrition & Santé, France) with additional 200g of vegetables for 28 days. Anthropometric and clinical parameters, gut permeability and insulin sensitivity were analysed before and immediately after intervention. To assess gut permeability we used a standardized four-sugar-test (mannitol, lactulose, sucrose, sucralose) and measured plasma zonulin and lipopolysaccharide binding protein (LBP).

**Results:** The dietary intervention induced a mean weight loss of 6.9 ± 1.9 kg. In parallel, total cholesterol, HDL-cholesterol, LDL-cholesterol, triglycerides and fasting blood sugar values showed significant reductions. HOMA-IR, chemerin, leptin, hsCRP and LBP decreased, whereas RANTES and MCP-1 were unaffected. The intestinal permeability marker zonulin was significantly reduced after weight loss, and the sugar absorption test indicated a significant improvement of the intestinal barrier.

**Conclusion:** Our findings demonstrate that a four-week dietary restriction plus weight loss improves gut barrier integrity in obese women.

**T3:OS3.3 Fine mapping of a GWAS-derived obesity candidate region on chromosome 16p11.2**

Volckmar A.1, Song J.Y.2, Jacob I.3, Putter C.4, Goebel M.2, Bern L.1, Struve C.1, Haas K.1, Knoll N.1, Galler A.1, Illig T.3, Reinehr T.3, Wang H.J.1, Hebebrand J.1, Hinney A.1
1Department of Child and Adolescent Psychiatry, Universitätsklinikum Essen, University of Duisburg-Essen, Essen, Germany, 2Institute of Child and Adolescent Health, School of Public Health, Peking University, China, 3Institute of Medical Biometry and Epidemiology, University of Marburg, Germany, 4Institute of Epidemiology, Helmholtz-Zentrum Munich, Germany, 5Hannover Unified Biobank, Hannover Medical School, Hannover, Germany, 6Institute of Medical Informatics, Biometry and Epidemiology, University of Duisburg-Essen, Germany, 7Vestische Hospital for Clinic of Children and Adolescents Medicine, Datteln, University of Witten/Herdecke, Witten, Germany

Large-scale genome-wide association studies (GWASs) have identified 32 chromosomal loci associated with increased body mass index in population-based studies on adults. One of these SNPs, rs7359397, tags a large region (approx. 1MB) with high linkage disequilibrium (r²>0.7), which comprises five genes (SH2B1, APOBR, sulfortransferases: SULT1A1 and SULT1A2, and TUFM) were screened for mutations (dHPLC, SSCP, Sanger re-sequencing) in 95 extremely obese children and adolescents. Detected
non-synonymous variants were genotyped (TaqMan® SNP Genotyping, MALDI TOF-PCR-RFLP) in independent large study groups (up to 3,210 extremely obese/overweight cases, 485 lean controls and 615 obesity tri-
MALDI TOF, PCR-RFLP) in independent large study groups (up to 3,210
variants in all screened genes. Two polymorphisms rs180743 (APOBR
os). In silico analyses predicted a functional implication for
rs180743 (APOBR Pro428Ala). Both APOBR variants are located in the
repetitive region with unknown function. Variants in APOBR contributed
as strongly as variants in SH2B1 to the association with extreme obesity in
the chromosomal region chr16p11.2. In silico analyses implied no func-
tional effect of several of the detected variants. Further in vitro or in vivo
analyses on the functional implications of the obesity associated variants are
warranted.

T3: O53.4
Cardiorespiratory fitness, body composition and health
related quality of life 2 years after Roux-en-Y gastric bypass
surgery in adolescents
Brisman M1, Ekboom K1, Hagman E1, Milrid S1, Gronowitcz E1,
Flodmark CE1, Olbers T1, Marcus C1
1Karolinska Institutet, Department of Clinical Science, Intervention and
Technology, Division of Paediatics, Stockholm, Sweden,
2Dept of Surgery, Sahlgrenska University of Gothenburg,
3Childhood Obesity Unit, University Hospital, Malmö

Introduction: Obesity in adolescents is a worldwide health problem. We
have previously shown promising results two years after Roux-en-Y gas-
tric bypass surgery on weight loss, metabolic risk markers and quality of
life in adolescents – the AMOS study. The aim of the current study was to
describe the two-year outcome in cardiorespiratory fitness, body composi-
tion, physical activity and the relationship with health-related quality of
life for adolescents in a subset of the AMOS study.
Methods: Forty-one adolescents (10 boys, 31 girls, age 14–18 years, body
mass index 35–69 kg·m−2) were included and underwent surgery. In ad-
toition to anthropometrical measurements participants performed a sub-
maximal bicycle test, a six minute walk test, dual-energy X-ray absorpti-
ometry and the Short Form-36 Health Survey as well as a short interview
at baseline, one and two years after surgery.
Results: Relative VO2max per kg body mass (+51%) and per kg fat-free
mass (+18%) as well as walking distance (+14%) were significantly in-
creased one year and persisting two years after surgery compared to base-
line. Despite a reduction of fat-free mass (−9.8 ± 5.2 kg) absolute VO2max
was maintained (+9%, ns) and significantly increased in non-smokers.
Body mass and fat mass was significantly decreased (−45.4 ± 18.9 kg and
−33.6 ± 13.4 kg respectively). Self-reported physical activity was signifi-
cantly increased and health-related quality of life was improved or un-
changed.
Conclusion: Roux-en-Y surgery in obese adolescents significantly im-
proved relative VO2max, functional capacity, physical activity and body
composition over two years. Absolute VO2max increased in non-smokers
despite a reduction in fat-free mass indicating an improved metabolism and
cardiorespiratory function. This has not been observed in adults and
indicates that it may be better to perform obesity surgery early in life.

T3: O53.5
What is the role of fat-free mass and resting metabolic rate in
the control of food intake?
Hopkins M1, Finlayson GJ1, Duarte C1, Whybrow S1, Horgan GW1,
Blundell JE2, Stubbs B1
1Academy of Sport and Physical Activity, Faculty of Health and Wellbeing,
Sheffield Hallam University, Sheffield, United Kingdom,
2Institute of Psychological Sciences, Faculty of Medicine and Health, University of
Leeds, Leeds, United Kingdom,
3Cognitive and Behavioural Centre for Research and Intervention, University of
Coimbra, Coimbra, Portugal,
4Public Health Nutrition Research Group, Rowett Institute of Nutrition and
Health, University of Aberdeen, Aberdeen, United Kingdom,
5Biometrics and Statistics Scotland, Aberdeen, United Kingdom,
6College of Life and Natural Sciences, University of Derby, Derby, United Kingdom

Background: The relationship between body composition, energy expen-
diture and ad libitum energy intake has rarely been examined under con-
ditions that allow any interplay between these variables to be disclosed.
Objective: The present study examined the relationships between body
composition, energy expenditure and energy intake under controlled lab-
oratory conditions in which the energy density and macronutrient content
of the diet varied freely as a function of food choice. Design: Fifty nine
subjects (30 males: BMI = 26.7 ± 4.0 kg/m²; 29 females: BMI = 25.4 ± 3.5
kg/m²) completed a 14 day stay in a residential feeding behaviour suite.
During days 1 and 2, subjects consumed a fixed diet designed to main-
tain energy balance. On days 3–14, food intake was covertly measured
in subjects who had ad libitum access to a wide variety of foods typical
of their normal diets. Resting metabolic rate (indirect calorimetry), total
daily energy expenditure (doubly labelled water) and body composition
(deuterium dilution) were measured on days 3–14.
Results: Hierarchical multiple regression models indicated that after con-
trolling for age and sex, fat-free mass (p < 0.001) and resting metabolic
rate (p < 0.001) predicted daily energy intake. Importantly however, a me-
diation model using path analysis indicated that the effect of fat-free mass
and fat mass) on energy intake was fully mediated by resting metabolic
rate (p < 0.001). Conclusions: These data indicate that resting metabolic
rate is a strong determinant of energy intake under controlled laboratory
conditions where food choice is allowed to freely vary and subjects are
close to energy balance. Therefore, the conventional adipocentric mod-
el of appetite control should be revised to reflect the influence of resting
metabolic rate.
Acknowledgement: The present study was funded by the Food Standards Agency
UK.

T3: O53.6
Isolation of genomic region involved in nutrigenetic and
pharmacogenetic interactions affecting adipose tissue depots
and metabolic profile in a novel congenic rat strain
Školníková E1, Liška F2, Sedová L1, Klenová D1, Křen V1, Šeda O1
1Institute of Biology and Medical Genetics, Charles University, General Teaching
Hospital, Prague, Czech Republic
2Academy of Sport and Physical Activity, Faculty of Health and Wellbeing,
Sheffield Hallam University, Sheffield, United Kingdom

In a process of positional cloning of metabolic-syndrome related locus we
derived new congenic strain by introgressing a limited rat chromosome 4
(RNO4) region comprising A2m gene from spontaneously hypertensive
rat (SHR) into BN-Lx (Brown Norway) genomic background. In a process of positional cloning of metabolic-syndrome related locus we
derived new congenic strain by introgressing a limited rat chromosome 4
(RNO4) region comprising A2m gene from spontaneously hypertensive
rat (SHR) into BN-Lx (Brown Norway) genomic background.
Methods: We mapped the differential segment by using >140 microsatu-
lite markers on RNO4. Male rats (n =6/strain/diet) of BN-Lx and BN-Lx.
SHR(4 A2m) were fed standard diet for 15 weeks (STD, control groups)
or STD followed by 10 days of high-sucrose diet (HSD) or dexametha-
sone (DEX) for 3 days. We assessed comprehensively the morphometric
and metabolic profiles of all groups. Two-way ANOVA with STRAIN and
DIET as major factors was used.
Results: The differential segment of RNO4 spans about 9Mb between markers D4Mgh30-D4Mit26. The morphometric analysis showed significant nutrigenetic and pharmacogenetic interactions of the differential segment for relative weights of visceral (p = 0.02) and retroperitoneal (p = 0.01) fat depots. The congenic strain was more sensitive to both HSD-induced increase and dexamethasone-induced decrease of the fat mass. Also, the global insulin resistance indices showed more robust deterioration in BN-Lx.SHR4(Azm) (e.g. area under the glycemic curve rose by 88% compared to 13% in BN-Lx in response to DEX). BN-Lx. SHR4(Azm) exhibited significantly lower levels of PP and PYY in serum. The sequence comparison showed several distinct genes with non-synonymous amino acid changes including Akrk26, A2m and Pex3.

Conclusion: We have identified a nutrigenetic and pharmacogenetic interaction involving HSD / DEX and RNO4 segment of spontaneously hypertensive rat origin affecting glucose tolerance and fat deposition.

Acknowledgement: Supported by MSMT LK11217.

T8:OS3 – Bariatric and Metabolic Surgery

T8:OS3.1
Remission rates of diabetes mellitus after gastric bypass surgery for obesity

Backman O1, Jia T2, Marsk R1, Naslund E2, Rasmussen F2
1Department of Clinical Sciences, Danderyd Hospital, Karolinska Institutet, Stockholm, Sweden,
2Department of Public Health, Karolinska Institutet, Stockholm, Sweden

Background: Bariatric surgery has been suggested to cause remission of diabetes mellitus (DM) in up to 80% of patients operated. However, follow-up is often short (2 years) and many patients are treated in specialised surgical centres. This study aims to assess the rate of remission of DM after Roux-en-Y gastric bypass (RYGB) in a nationwide cohort using the Swedish prescription registry with a four-year follow-up.

Methods: From the nationwide inpatient registry 3099 patients who had undergone a RYGB procedure was identified (ICD codes JDF 10, JDF 11). A general population reference cohort, matched on age and gender, was created with 30990 subjects. Linkage was performed to the nationwide Swedish prescription registry with a four-year follow-up.

Results: There were no significant differences between the omentectomy (n=40) and non-omentectomy group (n=41) at baseline in the whole group in any of the measured variables (p = 0.09–0.93). Twenty-six omentectomized and 26 non-omentectomized women completed the examination five years postoperatively. There were no significant differences between the omentectomy and non-omentectomy group regarding HOME-IR (1.42 ± 0.72 mmol/l x mU/l and 1.15 ± 0.55 mmol/l x mU/l respectively), cholesterol (4.28 ± 0.76 mmol/l and 4.20 ± 0.86 mmol/l respectively), HDL-cholesterol (1.64 ± 0.52 mmol/l and 1.56 ± 0.43 mmol/l respectively), triglycerides (0.92 ± 0.32 mmol/l and 0.99 ± 0.61 mmol/l respectively) or BMI (31.4 ± 6.0 kg/m2 and 30.7 ± 5.2 kg/m2 respectively) (p = 0.16–0.73).

Conclusion: In our cohort, removal of the greater omentum in addition to GBP does not result in any enhanced positive effects 5 years post-operatively.

T8:OS3.2
5-year follow-up of omentectomy in addition to bariatric surgery and potential effects on metabolic risk factors

Andersson D.P1, Eriksson-Hogling D1, Rydén M1, Backdahl J1, Thorell A2, Lofgren P1, Arner P1, Hoffstedt J1
1Department of Medicine, Karolinska University Hospital Huddinge, Karolinska Institutet, Stockholm, Sweden,
2Department of Surgery, Ersta Hospital, Karolinska Institutet, Stockholm, Sweden

Background: Visceral obesity is a risk factor for cardiovascular disease. However, removal of a large portion of visceral adipose tissue by omentectomy in addition to gastric bypass operation (GBP) has not shown any additional positive metabolic effects after up to 2 years follow-up. The aim of this study was to investigate the impact of omentectomy on cardiac-metabolic risk factors at a longer follow-up time.

Methods: 81 obese women, that had previously been randomized to GBP in conjunction with omentectomy or GBP alone in a previous double blind controlled trial studying the potential effect of omentectomy, were asked to be re-examined with dual-energy X-ray absorptiometry for body composition, blood pressure, fasting glucose, insulin sensitivity measured by homeostasis model assessment of insulin resistance (HOMA-IR) and blood lipids 5 years after surgery.

Results: There were no significant differences between the omentectomy (n=40) and non-omentectomy group (n=41) at baseline in the whole group in any of the measured variables (p = 0.09–0.93). Twenty-six omentectomized and 26 non-omentectomized women completed the examination five years postoperatively. There were no significant differences between the omentectomy and non-omentectomy group regarding HOME-IR (1.42 ± 0.72 mmol/l x mU/l and 1.15 ± 0.55 mmol/l x mU/l respectively), cholesterol (4.28 ± 0.76 mmol/l and 4.20 ± 0.86 mmol/l respectively), HDL-cholesterol (1.64 ± 0.52 mmol/l and 1.56 ± 0.43 mmol/l respectively), triglycerides (0.92 ± 0.32 mmol/l and 0.99 ± 0.61 mmol/l respectively) or BMI (31.4 ± 6.0 kg/m2 and 30.7 ± 5.2 kg/m2 respectively) (p = 0.16–0.73).

Conclusion: In our cohort, removal of the greater omentum in addition to GBP does not result in any enhanced positive effects 5 years post-operatively.

T8:OS3.3
Bariatric surgery increases the risk of osteoporosis and fractures in women in the Swedish Obese Subjects study

Ahlin S1, Pelltonen M1, Anveden L1, Jacobson P2, Sjöholm K1, Svensson P.A2, Larsson L1, Näslund I2, Sjöstöm L1, Carlsson L.M1
1Department of Molecular and Clinical Medicine, Institute of Medicine at Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden,
2Department of Chronic Disease Prevention, National Institute of Health and Welfare, Helsinki, Finland,
3Department of Medicine, Unit of Clinical Nutrition, Sahlgrenska University Hospital, Gothenburg, Sweden,
4Department of Surgery, Faculty of Medicine and Health, Örebro University Hospital, Örebro, Sweden

Introduction: Bariatric surgery is an effective treatment to achieve long-term weight loss but less is known about the long-term effects of bariatric surgery on bone health. The aim of this study is to report the outcome of osteoporosis and fracture risk in the Swedish Obese Subject (SOS) study.

Methods: The SOS study is a controlled, prospective intervention trial including 2010 patients that have undergone bariatric surgery and 2037 matched controls. Study participants were recruited between 1987 and 2001. Information on osteoporosis and fractures was obtained by cross checking social security numbers from the SOS database with ICD9/ICD10 codes for osteoporosis and fractures in national health registers. Information on smoking, age for menopause and physical activity was received from questionnaires at pre-specified time points.
Results: Women in the surgery group had a significantly higher risk of osteoporosis compared to controls. The incidence rate of osteoporosis was 16.5 per 10000 person-years (95% confidence interval; CI: 12.2–22.4) for women in the surgery group and 6.5 per 10000 person-years (95% CI: 4.0–10.6) for women in the control group (hazard ratio [HR] 2.48; 95% CI: 1.38–4.44; P = 0.002). Women in the surgery group also had a significantly higher risk of fracture. The incidence rate of fracture was 55.1 per 10000 person-years (95% CI: 46.4–65.3) for women in the surgery group and 33.9 per 10000 person-years (95% CI: 27.3–42.1) for women in the control group (HR 1.62; 95% CI 1.23–2.13; p = 0.001). Men in the surgery group had no significantly elevated risks of osteoporosis and fractures compared to controls.

Conclusion: Results from the SOS study indicate that bariatric surgery increases the risk of osteoporosis and fractures in women.

T8:OS3.5

Prevalence and Predictors of Nutritional and Medical Complications after Roux-en-Y Gastric Bypass in the Treatment for Obesity – A Retrospective Cohort Study

Griboptael S.B.1,2, Pedersen A.M.1, Svensson E.1, Thomsen R.W.2, Richelsen B.1

1Department of Endocrinology and Internal Medicine, Aarhus University Hospital, Denmark,
2Department of Clinical Epidemiology, Aarhus University Hospital, Denmark

Introduction: Medical and nutritional complications after Roux-en-Y gastric bypass (RYGB) are an increasing clinical problem. The prevalence of these complications is not fully elucidated and their impact on quality of life (QoL) is unknown. In a population-based cohort of RYGB patients, we aim to estimate the prevalence and possible predictors of these complications, and their association with QoL.

Methods: A questionnaire on medical and nutritional complications and QoL (SF-12) was mailed to all RYGB-operated patients in the Central Denmark Region 2006–2011. By Poisson regression, we calculated risk ratios of complications comparing different predictors. The association between number of complications and QoL was investigated by Spearman rank coefficient.

Results: The response rate was 64% (1429/2242 patients; 80% women, median follow-up 5 years). Complications leading to contact with the health care system were reported by 68%, most commonly fatigue (34%), abdominal pain (36%), and anemia (28%). The risk of complications was higher in women than men (Incidence Rate Ratio (IRR):1.2, 95% confidence interval (CI): 1.1, 1.4), for smokers (IRR:1.1, 95% CI: 1.0, 1.2) and for patients with symptoms before RYGB (IRR:1.3, 95% CI: 1.5, 1.4), while the risk was lower for older patients (>45 years vs <35 years, IRR 0.8, 95% CI: 0.7, 0.9). QoL decreased with amount of complications (0 = median score 44; 5+ = median score 31; r= 0.30). While 8% answered their wellbeing was worse after RYGB, 85% felt better.

Conclusion: Overall, 68% experienced one or more medical or nutritional complications. Risk of complications differed by gender, age and smoking status. The majority reported improved wellbeing after RYGB, but increased number of complications was associated with lower QoL.

The idefics intervention: What can we learn for public policy?

Williams G.1

1Department of Politics, Philosophy & Religion, Lancaster University

Introduction: This presentation considers how far findings from IDEFICS and similar interventions are relevant to the policy process and political decision-making.

Methods: The presentation offers theoretical and normative arguments concerning the evaluation of evidence and its implications for policy. The presentation is divided into three parts. The first considers problems in the nature and applicability of evidence gained from school- and community-level obesity interventions. The second part considers whether such interventions might represent a model that policy-makers could implement. The third part considers how we should think about policy measures given the limited evidence we can obtain and the many different goals that public policy must take account of.

Results: The presentation argues that: (1) there are clear reasons why we are not obtaining very solid evidence for effective school- and community-level interventions; (2) public policy is not in a good position to mandate large-scale, long-term versions of these interventions; and (3) there are clear problems in obtaining ‘evidence’ for most public policy options, but this should not deter us from pursuing options which tackle systemic problems and hold a good likelihood of delivering benefits on several dimensions.

Conclusion: Research on school- and community-level obesity interventions has not produced much evidence that is directly relevant to policy. Instead, it shows how difficult it is to affect obesity rates without changing wider social and economic factors. Public policy should focus on these.
Acknowledgement: I would like to thank all my colleagues in the IDEFICS and I.Family projects. This work was done as part of the IDEFICS Study (www.idefics.eu) and the I.Family Study (http://www.ifamilystudy.eu/). I gratefully acknowledge the financial support of the European Community within the Sixth RTD Framework Programme Contract No. 016181 (FOOD), and the Seventh RTD Framework Programme Contract No. 266044.

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Narciclasine attenuates diet-induced obesity and associated dysfunctions by promoting oxidative metabolism in skeletal muscle and humans

Julien S.G.1, Sinnakannu J.1, Brunmeir R.1, McFarlane C.1, Xu F.1

Introduction: Given that only 20% of individuals with dietary restrictions are able to maintain long-term weight loss, increasing energy expenditure is becoming an attractive approach to combat obesity. Physical exercise is the ideal way to expend extra energy, but physical activity unfortunately continues to decline in the modern lifestyle and is even prevented in some cases. Thus, there is a need for novel pharmacological approaches that enhance energy expenditure by introducing the same beneficial metabolic effects as exercise in humans.

Methods: Herein, we employ diet-induced obesity mouse model and human myotube cells; and various approaches such as Indirect calorimetry, RNAseq, Seahorse, quantitative RT-PCR, Digital Infrared Thermal Imaging to decipher the effects of narciclasine on bioenergetics.

Results: Narciclasine (ncls)-treated mice fed a high-fat diet (HFD) showed significantly increased energy expenditure and voluntary physical activity along with a marked reduction of fat accumulation in liver, skeletal muscle and adipose tissues as compared with vehicle treated control mice. In addition, ncls promoted Pgcl gene expression, oxidative metabolism and a shift from glycolytic to oxidative fibers in the skeletal muscle of diet-induced obese mice. Intriguingly, ncls also enhanced heat production in vivo as well as in vitro in both murine and human primary myotubes, suggesting a role for this compound in muscle thermogenesis.

Conclusion: Here, we report a novel pharmacological strategy that attenuates diet-induced obesity in mice by mimicking the beneficial metabolic effects of endurance training. Our current study demonstrates that narciclasine has promising potential for the prevention and the treatment of obesity in humans.

Acknowledgement: We thank Drs. Vincent Mouly, Gillian Butler-Browne and Ravi Kambadur for providing the human primary myoblasts (C61C15Q).

Longitudinal changes of serum levels of angiopoietin-like protein 6 and selenoprotein P after gastric bypass surgery

Kim S.H.1, Lim J.S.1, Park H.S.1, Lee S.K.1, Jang Y.J.1, Lee Y.J.1, Heo Y.S.1
1Department of Family Medicine, University of Ulsan College of Medicine, 88, Olympic-Ro 43-Gil, Songpa-gu, Seoul 138-736, South Korea.
2Department of Physiology, University of Ulsan College of Medicine, 88, Olympic-Ro 43-Gil, Songpa-gu, Seoul 138-736, South Korea.
3Department of Family Medicine, Inha University, College of Medicine, 7-206, Sinheung-dong 3-Ga, Jung-gu, Incheon 400-711, South Korea.
4Department of General Surgery, Inha University, College of Medicine, 7-206, Sinheung-dong 3-Ga, Jung-gu, Incheon 400-711, South Korea.

Background: Bariatric surgery has proven to have benefit for weight loss and metabolic profiles. Recent evidences suggest that the liver-derived hepatokines play a role in the pathophysiology of metabolic diseases. However, there are few studies on longitudinal changes in hepatokines after gastric bypass. Here, we investigated changes in serum levels of angiopoietin-like protein 6 (Angptl6) and selenoprotein P after gastric bypass.

Methods: We recruited 10 patients who were preformed gastric bypass surgery for weight loss. We measured metabolic parameters and serum levels of Angptl6 and selenoprotein P before and after surgery (1 month and 9 month). We evaluated changes of two hepatokines after surgery and correlation between degree of changes in Angptl6/selenoprotein P level and metabolic parameters.

Results: Body mass index linearly decreased after bariatric surgery. HbA1C, AST, ALT, GGT, total cholesterol, triglyceride, LDL-cholesterol, and Angptl6 significantly decreased at the point of 1 month after surgery and then maintained over 9 months. However, significant reducing effect of fasting insulin and HOMA-IR which is apparent at 1 month after surgery was reversed at 9 months after surgery. Regarding hepatokines, selenoprotein P level linearly increased. Angptl6 showed significant correlation with LDL-cholesterol and fasting insulin. Change in Angptl6 was significantly correlated with changes in total cholesterol and LDL-cholesterol. Selenoprotein P was inversely correlated with GGT and change in selenoprotein P was also inversely correlated with changes in HOMA-IR.

Conclusion: Our results suggest that gastric bypass surgery could alter serum levels of hepatokines independent of weight loss, and that these changes might be related to hepatic metabolic changes.
between studies could be related to the composition of HF diet used in different experiments. The aims of the our study were to (i) characterize the effect of the AMPK α2/-/- in the context of dietary obesity induced by either by corn-oil based (cHF) or lard-based (HSD) diet, and (ii) check possible role of genetic background of the mice.

**Methods:** Adult male AMPK α2/-/- mice (Viollet, et al, J Clin Invest 2003) on either obesity-prone C57BL/6J (B6) or obesity-resistant A/J background, and their wild-type littermates, were fed either cHF or HSD (both 60% energy as fat) for 10 weeks.

**Results:** Both cHF and HSD induced BW gain with a stronger effect in B6 mice and with potent effect of HSD as compared with cHF. In B6 mice, BW gain correlated with adiposity and hepatic accumulation of lipids and the reduction of BW gain was observed only in AMPK α2/-/- mice fed cHF diet. In the A/J mice, with a relatively small induction of dietary obesity, the stronger effect of HSD on BW was observed again, but without impact of AMPK α2/-/-.

**Conclusion:** Only in the B6 mice fed corn-oil based HF diet but not lard-based HF diet, the paradoxical anti-obesity effect of whole-body deletion of AMPK α2-subunit could be detected.

**T1.P0.004**

**Effects of fat distribution on hypertrophic cardiomyopathy phenotype**

**Guglielmi V.1, Marinoni G.M.1, Maresca L.1, Lanziolo C.1, Coppa S.1, D’Adamo M.1, Colangeli L.1, Preziosi P.1, Cafì L.1, Sbraccia P.1**

1Department of Systems Medicine, University of Rome “Tor Vergata”, Italy, 1Department of Diagnostic Imaging, Policlinico Casilino, Rome, Italy, 1Department of Cardiology, Policlinico Casilino, Rome, Italy

**Introduction:** Hypertrophic cardiomyopathy (HCM) is the most common genetic heart disease, characterized by heterogeneous phenotypic expression with extreme diversity in the pattern and extent of left ventricular (LV) hypertrophy. Among extrinsic factors, body mass index (BMI) and male sex were found independently associated with LV mass increase and progression of heart failure symptoms in HCM. The aim of our study was to assess whether adipose tissue distribution may influence cardiac morphology and function in HCM patients with respect to gender.

**Methods:** We studied 24 overweight/obese subjects (age 59.4 ± 12 yrs, 9F/14M, BMI 29.3 ± 3.7 kg/m²) with echocardiography- and cardiovascular magnetic resonance-based diagnosis of HCM, confirmed by genetic analysis. Dual-energy X-ray absorptiometry was used to evaluate body composition and regional (trunk and appendicular) fat distribution.

**Results:** Age- and gender-adjusted analysis revealed that maximum interventricular septum thickness but not LV mass index was positively associated with trunk adipose tissue percentage (β=0.41, \(p<0.05\)). However, septum thickness showed a stronger association with male gender (β=0.61, \(p<0.01\)) compared to abdominal adiposity. In contrast, total and appendicular fat percentages were not related to any measure of LV mass, volume and function. Instead, BMI was associated with left atrium area (β=0.45, \(p<0.05\)), an indirect measure of LV dysfunction, irrespective of both age and gender.

**Conclusion:** In our cohort of HCM patients, septum hypertrophy extent was independently associated with abdominal but not total fat. We also confirmed that male gender represents another important feature associated to the magnitude of hypertrophy.

**T1.P0.005**

**Early differences in metabolic flexibility between obesity-resistant and obesity-prone mice**

**Barbosa K.1, Horakova O.1, Janovska P.1, Kus V.2, van Schothorst E.1, Hoevenaars P.1, Hensler M.1, Keijer J.1, Kopcek J.1**

1Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic, 2Human and Animal Physiology, Wageningen University, Wageningen, The Netherlands

**Introduction:** Decreased metabolic flexibility supports development of adverse consequences of obesity. Metabolic flexibility to glucose is traditionally assessed using indirect calorimetry (INCA), which also allows for measuring energy expenditure. The aims of this study were to (i) characterize metabolic flexibility of obesity-resistant A/J and obesity-prone C57BL/6J mice at weaning, i.e. during the switch from lipid to carbohydrate intake and before the dissociation in body weight; (ii) to compare INCA with glucose tolerance test (GTT) approach.

**Methods:** A/J and C57BL/6J mice were maintained at 20°C and weaned to chow diet at 30 days of age. During the first day after weaning, using separate subgroups of fasted mice (n=8), either GTT (oral, OGTT; and intraperitoneal, iGT; using 1–3 mg glucose/g body weight, BW) or INCA oral gavage with 1–7.5 mg glucose/g BW; or a fasting/refeeding protocol) were performed, either at 20°C or 34°C (to exclude interference of thermogenesis), using mice of both genders.

**Results:** Comparable results were obtained using (i) both OGTT and iGT; with 1 mg glucose/g BW at 20°C; (ii) INCA with 7.5 mg glucose/g BW at 34°C; and (iii) INCA during fasted/re-fed transition at 34°C. Results furthermore indicated lower ability to switch between metabolic substrates associated with low glucose tolerance and relative hyperglycemia in C57BL/6J as compared with A/J mice.

**Conclusion:** We have found lower glucose tolerance using GTT and lower metabolic flexibility using INCA in C57BL/6J versus A/J mice. These differences between strains may be linked to the differential genetically-determined propensity to obesity of the mice.

**T1.P0.006**

**Association between nafld severity and body composition in obese subjects**

**Pobalcz Z.1, Centonze G.1, Terraz S.1, Pichard C.1, Golay A.4, Spahr L.4**

1Service of Therapeutic Education for Chronic Diseases, WHO Collaborating Centre, University Hospital of Geneva and University of Geneva, 2Service of Clinical Nutrition, University Hospital of Geneva and University of Geneva, 3Service of Radiology, University Hospital of Geneva and University of Geneva, 4Service of Gastroenterology and Hepatology, University Hospital of Geneva and University of Geneva

**Introduction:** Nonalcoholic fatty liver disease (NAFLD) is considered the hepatic manifestation of the metabolic syndrome. NAFLD prevalence in obese patients increases with the worldwide epidemic of obesity and could be higher than 70%. The link between overweight or obesity and liver disease is well known, however, little evidence exists on the relationship between body composition and the severity of NAFLD.

**Methods:** Fifteen overweight or obese patients (age=51.4 ± 5.0 kg/m²) were enrolled in the study (NAS=3.5 ± 1.7). Body fat was assessed by bioelectrical impedance analysis (BIA) and liver fat content was measured by magnetic resonance imaging (MRI). Linear relationships among variables were computed by Spearman’s correlations. Multivariable analysis was performed with the linear regression model.

**Results:** A positive association between percent fat mass and NAS score (Spearman’s coefficient=0.72, \(p=0.002\)) was found and persists after addi-
ing BMI to the model in multiple regression analysis (β=0.22, p = 0.002). There was a positive association between serum CRP levels and liver steatosis as evaluated by MRI (Spearman's coefficient=0.63, p = 0.01). We found no association between body fat evaluated by BIA and liver fat content measured by MRI.

**Conclusion:** NAFLD severity is associated with body composition. Increased fat mass is linked to higher NAS in obese patients. Body composition assessed by BIA could be a complementary method of NAFLD assessment before liver biopsy. This approach should be investigated in larger cohorts.

**T1 PO.007**

**Lard vs. Corn-oil feeding in mice: Metabolic effects of obesogenic diets with different composition of fatty acids**

Pavlísova J., Kopeccky J., Rossmesl M.

1 Department of Adipose Tissue Biology, Institute of Physiology, Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic

**Introduction:** Saturated fatty acids (SFA), mainly palmitic acid, could aggravate insulin resistance by triggering proinflammatory responses and endoplasmic reticulum stress. Here we compared long-term metabolic effects of two high-fat diets (35% fat; wt/wt); one with a high content of SFA in a form of pork lard (HL) and the other with a high content of n-6 polyunsaturated fatty acids in a form of corn-oil (HO).

**Methods:** Subgroups (n = 8) of male C57BL/6N mice were fed the experimental diets for 8 weeks. Tissue and plasma samples were collected for the assessment of lipid composition and gene expression analysis by qPCR. Insulin sensitivity was assessed by hyperinsulinaemic-euglycaemic clamp in a separate experiment.

**Results:** No differences in body weight gain and energy intake were observed between the HL and HO group. Neutral lipids accumulated significantly less in plasma of HL mice (HO 64 ± 6 mg/dl; HL 53 ± 4 mg/dl), which was, however, at the expense of severe hepatic steatosis (liver triglycerides: HO 133 ± 6 mg/g; HL 225 ± 15 mg/g). This was accompanied by a substantial increase (1.7-fold) in hepatic expression of stearoyl-CoA desaturase-1 (SCD-1) gene in HL group. Hepatic as well as whole-body insulin sensitivity was impaired to a similar extent in both groups.

**Conclusion:** Our results suggest that high intake of SFA induces adaptive increases in hepatic SCD-1 gene expression in order to transform SFA into less toxic monounsaturated fatty acids, which are more willingly re-esterified to neutral triglycerides in the liver, thus causing hepatic steatosis. Therefore, despite significantly different level of hepatic steatosis, insulin sensitivity of HO- and HL-fed animals remains comparable.

**Acknowledgement:** Research relating to this abstract was funded by Czech Science Foundation (grants 13-00871S and 14-09347S)

**T1 PO.008**

**Rat intestine urea cycle is geared to produce ornithine and citruline in detriment of arginine**

Agrelli S., Ariarán S., Remesar X., Fernández-López J.A., Alemany M.

1 Department of Nutrition and Food Science, Faculty of Biology, University of Barcelona, Barcelona, Barcelona, Spain, 2 Institute of Biomedicine of the University of Barcelona, Barcelona, Spain, 3 CIBERobn, Spain

Male adult lean Zucker rats fed standard chow or a hyperprotein diet for 30 days, were killed, and their small intestine was dissected, cleaned and cut in three equal-length segments. They were weighed and frozen. Later, the samples were used for the measurement of enzyme activities: AMP-deaminase, carbamoyl-P-synthases and Orn transcarbamylase. The samples were also used for the analysis of gene expression of these enzymes, plus glutaminase, Gln synthase, N-acetyl-Glu synthase, arginase 2, argininosuccinate synthase and lyase, and nitric oxide synthase. There were significant differences in activity (Orn transcarbamylase) and gene expression (carbamoyl-P- synthase 1, AMP deaminase, argininosuccinate synthase, arginase 2 and endothelial nitric oxide synthase) along the 3 intestine segments. The level of gene expression for urea cycle enzymes was highest for carbamoyl-P synthases (mainly type 1) and arginase 2. The lowest number of transcript copies per mg protein was for argininosuccinate synthase, probably the cycle controlling enzyme. High expression of glutaminase (vs. Gln synthase) and AMP deaminase, combined with high expression (and total activity) of carbamoyl-P-synthases ensured the smooth generation of carbamoyl-P. The high number of transcript copies (and enzyme activity) of Orn-transcarbamylase and N-acetyl-Glu synthase ensued a rapid flow of both Orn and Cit. On the other side, an active arginase also could, potentially, help increase the levels of Orn (and thus Cit). These changes agree with the known production of urea cycle intermediates in the intestine. There were no changes in the overall panorama described when the rats were fed a hyperprotein diet.

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**T1 PO.009**

**Analysis of npy expression in peripheral blood mononuclear cells as a biomarker of recovery of fasting sensitivity associated to weight loss**

Reynés R., Cifre M., Díaz-Rúa R., Palau A., Oliver P.

1 Laboratory of Molecular Biology, Nutrition and Biotechnology (LBNB), Universitat de les Illes Balears and CIBER de Fisiopatología de la Obesidad y Nutrición (CIBERobn), Palma de Mallorca, Spain

**Introduction:** Peripheral blood mononuclear cells (PBMC) are considered as a good source of biomarkers to define health/disease. We have reported that PBMC can reflect, at transcriptomic level, metabolic alterations related to obesity, as fasting insensitivity, even in early stages of weight gain. We aimed to evaluate if PBMC were also able to reflect metabolic recovery related to weight loss.

**Methods:** Expression of key metabolism genes (Fasn, Srebpl, Pparg, Cpt1a and Npy) was measured by real-time RT-PCR in PBMC samples of normoweight, cafeteria-obese rats and rats fed a control balanced diet after the intake of a cafeteria diet (post-cafeteria model) in fed and fasted conditions. Groups with different periods of diet administration were used.

**Results:** Genes analysed in PBMC followed the expected fasting regulation which disappeared in obese rats and, interestingly, was recovered in post-cafeteria animals, although results were somehow dependent of time of diet administration and age of the animals. The most robust and outstanding results were obtained for the orexigenic Npy gene. As expected, Npy expression increased with fasting; increased expression was of high magnitude and independent of the age of the animals. This fasting regulation was lost in cafeteria-fed animals and recovered in post-cafeteria rats regardless of time of administration of the balanced diet. A similar regulatory behaviour was observed when analysing Npy expression in hypothalamus.

**Conclusion:** Gene expression analysis in PBMC could be useful to determine effectiveness of body weight loss programs. Particularly, Npy expression in PBMC appears especially useful as marker of fasting sensitivity recovery in post-cafeteria animals, correlating with body weight loss and metabolic normalization.
**Introduction:** The epidemiological association between excess adipose tissue and pancreatic cancer has been demonstrated. However the role of adipose tissue in pancreatic cancer microenvironment has not been studied.

**Methods:** 3T3-L1 adipocytes and pancreatic tumor cells (MiaPaCa2) were co-cultured using a transwell culture system. After 5 days from adipocyte induction (post-induction day=PID 5, MiaPaCa2 were seeded in the top chamber and maintained in co-culture for 6 (PID 11) and 9 (PID 14) days. 3T3-L1 adipocytes in co-culture or not were stained with Oil Red O and observed at photomicroscope; electron microscope images were obtained for 3T3-L1 adipocytes in co-culture or not. RT-PCR analyses were performed in 3T3-L1 adipocytes in co-culture and in controls for the main genes of interest. EMSA was used on nuclear protein extraction.

**Results:** After 6 and 9 days of co-culture we observed the appearance of cells with similar-fibroblast aspect, not present in control conditions (Figure 1). Moreover in co-culture, adipocytes were significantly reduced in number, size and lipid droplets content. After 9 days of co-culture, we found a decrease in gene expression of GLUT-4, HSL, adiponectin and leptin, compared with controls, as well as an increase in the expression of MMP11, OCT 3/4, SOX 2, C-MYC, KLF4, suggesting a de-differentiation phenomenon (Figure 2). Moreover glycerol release in culture medium significantly decreased after co-culture. In MiaPaCa2 the expression of Wnt5a increased early in co-culture with 3T3-L1. EMSA of c-JUN and AP1 formed in 3T3-L1 adipocytes in co-culture and in controls for the main genes of interest. EMSA was used on nuclear protein extraction.

**Conclusions:** These data first showed the de-differentiation of adipocytes after co-culture with pancreatic cells toward a fibroblast-like phenotype. The cross talk between adipocytes and cancer cells may profoundly influence tumor microenvironment, growth and invasion.

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**Seipin is necessary for normal brain development and spermatogenesis in addition to adipogenesis**

**Ebihara C.**, **Ebihara K.**<sup>1,2</sup>, **Abe M.A.**<sup>1,2</sup>, **Mashimo T.**<sup>1</sup>, **Tomita T.**<sup>1</sup>, **Zhao M.**<sup>1</sup>, **Gumbilal V.**<sup>1</sup>, **Kusakabe T.**<sup>1,4</sup>, **Yamamoto Y.**<sup>1</sup>, **Aotani D.**<sup>1,4</sup>, **Kataoka S.Y.**<sup>1</sup>, **Sakai T.**<sup>1</sup>, **Hasoda K.**<sup>1,2</sup>, **Serikawa T.**<sup>1</sup>, **Nakao K.**<sup>1,4</sup>

<sup>1</sup>Department of Medicine and Clinical Science, Kyoto University Graduate School of Medicine, Kyoto, JAPAN,  
<sup>2</sup>Institute for Advancement of Clinical and Translational Science, Kyoto University Graduate School of Medicine, Kyoto, JAPAN,  
<sup>3</sup>Institute of Laboratory Animals, Kyoto University Graduate School of Medicine, Kyoto, JAPAN,  
<sup>4</sup>Medical Innovation Center, Kyoto University Graduate School of Medicine, Kyoto, JAPAN

**Seipin, encoded by BSCL2 gene, is a protein whose physiological functions remain unclear. Mutations of BSCL2 cause the most-severe form of congenital generalized lipodystrophy (CGL). BSCL2 mRNA is highly expressed in the brain and testis in addition to the adipose tissue in human, suggesting physiological roles of seipin in non-adipose tissues. Since we found BSCL2 mRNA expression pattern among organs in rat is similar to human while BSCL2 mRNA is not highly expressed in mouse brain, we generated a Bscl2/seipin knockout (SKO) rat using the method with ENU (N-ethyl-N-nitrosourea) mutagenesis. SKO rats showed total lack of white adipose tissues including mechanical fat such as bone marrow and retro-orbital fats, while physiologically functional brown adipose tissue was preserved. Besides the lipodystrophic phenotypes, SKO rats also showed impairment of spatial working memory with brain weight reduction and infertility with azoosperma. We confirmed reduction of brain volume and number of sperm in human patients with BSCL2 mutation. This is the first report demonstrating that seipin is necessary for normal brain development and spermatogenesis in addition to white adipose tissue development.**
Cardiotrophin-1 decreases intestinal sugar absorption

López-Yoldí M.1,2, Barber A.1, Prieto J.1,4, Martínez J.A.1,2,3, Bustos M.1, Moreno-Allaga M.J.1,2,3
1Department of Nutrition, Food Science and Physiology, University of Navarra, Pamplona, Navarra, Spain,
2Centre for Nutrition Research, University of Navarra, Pamplona, Navarra, Spain,
3Department of Gene Therapy and Hepatology, CIMA, University of Navarra, Pamplona, Navarra, Spain,
4CIBERehd. Institute of Health Carlos III, Madrid, Spain,
SCIBERobn, Physiopathology of Obesity and Nutrition, Institute of Health Carlos III, Madrid, Spain

Introduction: Cardiotrophin-1 (CT-1) is a member of the IL-6 family of cytokines with a key role in glucose and lipid metabolism. We have previously reported the anti-obesity properties of chronic CT-1 treatment in genetic and dietary models of obesity. In the present study, we aim to examine the in vitro and in vivo effects of CT-1 on intestinal sugar absorption in mice.

Methods: Small intestine everted rings were used to evaluate the in vitro effects of different concentrations of CT-1 (1–100 ng/ml) on alpha-methylglucoside (alpha-MG) uptake. Rings were preincubated during 1 h with the cytokine and then alpha-MG (1 mM) uptake was measured for 15 min. In addition, the effects of acute (single dose) and chronic (6 days) CT-1 administration (5 µg/mice, i.e.) on alpha-MG uptake were also evaluated in wild type and CT-1 knock-out mice. At the end of the treatment, intestinal everted rings were obtained and the uptake of alpha-MG (1 mM, 15 min) was also measured.

Results: In vitro CT-1 treatment caused a significant decrease on alpha-MG absorption at different doses (1–50 ng/ml). This effect was not observed with CNTF, another cytokine of the same family. Interestingly, both acute and chronic CT-1 administration to mice also induced a significant reduction on alpha-MG uptake in intestinal everted rings.

Conclusion: The present data demonstrate the ability of CT-1 to inhibit intestinal sugar absorption both in vivo and in vitro, which could contribute to the hypoglycemic and anti-obesity properties of this cytokine. Acknowledgement: This study was supported by grants from the Government of Navarra (Department of Health); Mutua Madrileña Foundation; FIS (PI10/01516 and PI13/01851); Línea Especial “Nutrición, Obesidad y Salud Universidad de Navarra”; and by the agreement between FIMA and the “UTE project CIMA”. M.L-Y. was supported by a doctoral grant from Asociación de Amigos University of Navarra.

The role of Plzf (Promyelocytic leukemia zinc finger) gene in regulation of metabolic and hemodynamic traits in the spontaneously hypertensive rat

Praveneč M.1, Silhavý J.1, Landa V.1, Zidek V.1, Mlínek P.1, Strnad H.2, Peterkova R.1, Peterka M.1, Liska E.1, Kazdova L.1, Izsvák Z.1, Mancini M.3
1Institute of Physiology, Academy of Sciences of the Czech Republic, Prague, Czech Republic,
2Institute of Molecular Genetics, Academy of Sciences of the Czech Republic, Prague, Czech Republic,
3Institute of Experimental Medicine, Academy of Sciences of the Czech Republic, Prague, Czech Republic,
4Institute of Biology and Medical Genetics, First Faculty of Medicine, Charles University in Prague, Czech Republic,
5Institute for Experimental Medicine, Prague, Czech Republic,
6Max-Delbrück-Center for Molecular Medicine, Berlin, Germany,
7Sapienza University of Rome, Rome, Italy

Introduction: The spontaneously hypertensive rat (SHR) is the most widely used model of essential hypertension and is predisposed to left ventricular hypertrophy, myocardial fibrosis, and metabolic disturbances. Recently, a quantitative trait locus (QTL) influencing blood pressure, left ventricular mass and heart intestinal fibrosis was genetically isolated within 788 kb on chromosome 8 segment of SHR-PDS congenic strain that contains only 7 genes, including mutant Plzf gene.

Methods: To identify Plzf as a quantitative trait gene (QTG), we targeted Plzf in the SHR using the TALEN technique and obtained SHR line harboring mutant Plzf gene with a premature stop codon at position of amino acid 58.

Results: The Plzf mutant allele is semi-lethal since approximately 95% of newborn homozgous animals die perinatally due to a caudal regression syndrome. Heterozygous rats were grossly normal and were used for metabolic and hemodynamic analyses. SHR-Plzf+/+ versus SHR wild type controls exhibited reduced body weight and relative weight of epididymal fat, lower serum and liver triglycerides, as well as lower serum and liver cholesterol. In addition, SHR-Plzf+/− rats exhibited significantly increased sensitivity of adipose and muscle tissue to insulin action when compared to wild type controls. The SHR-Plzf+/− heterozygous rats vs. wild type controls showed significant amelioration of cardiacmyocyte hypertrophy and fibrosis. Gene expression profiles revealed differential expression of genes with the role in cell cycle.

Conclusion: These results provide evidence for important role of Plzf in regulation of metabolic and hemodynamic traits in the rat and suggest cross-talk between cell cycle regulators, metabolism, cardiac hypertrophy and fibrosis.
T1.P0.015

Biotin (vitamin b7) biology is altered and linked to inflammation in obesity – a study of monozygotic twins

Järvinen E.1, Muniandy M.1, Ismail K.C.2, Bogli L.1, Timmers M.1, Kaprio J.1, Rissanen A.1, Ollikainen M.1, Pietiläinen K.1

1 Obesity Research Unit, Research Programs Unit, University of Helsinki, Finland, 2Department of public health, University of Helsinki, Finland

Introduction: Biotin modifies chromatin structure by biotinylation, and functions as a coenzyme for carboxylases regulating fatty acid metabolism, amino acid catabolism and gluconeogenesis. We investigated if these biotin-dependent functions are altered in obesity. Subjects: Monozygotic (MZ) twins, n=14–26 weight discordant pairs (deltaBMI=3), depending on analysis

Methods: DNA methylation from blood leukocytes and adipose tissue (AT) was analyzed by Infinium Human Methylation 450 Bead Chip Array, gene expression from AT and adipocytes (A) by Affymetrix U133 Plus 2.0 and of leucocytes with RT-qPCR. Serum biotin, CRP and triglycerides (TG) were measured by standard methods. Human adipocytes were cultured in low and high biotin concentrations, and analyzed by Affymetrix U133 Plus 2.0 and imaging methods.

Results: In the leucocytes of the obese co-twins the biotin pathway was less methylated, biotin-dependent carboxylase PCCB and MCCCI gene expressions were upregulated and correlated positively with CRP (PCCB 0.91; p=0.0046 and MCCCI 0.79; p=0.036), serum biotin levels were lower in the obese (274 ng/l) than the lean co-twin (390 ng/l; p=0.034), and the levels correlated negatively with TG (-0.56, p=0.045). In AT and A gene expression arrays, biotin-dependent carboxylases (ACACA, ACACB, PCCB, MCC2) were downregulated (p<0.05) in the obese co-twins. In adipocytes cultured in low biotin, normal differentiation and lipid accumulation, but altered gene expression in lipid metabolism pathways was observed.

Conclusion: Biotin biology is modified by obesity. Systemic inflammation and expansion of adipose tissue may lead to increased need of biotin for normal adipose tissue function.

T1.P0.016

Blocking endothelial expression of megalin results in a novel model system of obesity

Tavares E.1, Antequeru D.2,3, Pascual C.2,3, Maldonado R.1, Dietrich M.4, Carro E.2,3

1 Clinical and Experimental Pharmacology Research Unit, Valme University Hospital, Seville, Spain., 2Neuroscience Group, Instituto de Investigacion Hospital 12 de Octubre (i+12), Madrid, Spain., 3Center for Networked Biomedical Research in Neurodegenerative Diseases (CIBERNED), Madrid, Spain., 4Program in Integrative Cell Signaling and Neurobiology of Metabolism, Section of Comparative Medicine, Department of Neurobiology, Yale University School of Medicine, New Haven, USA; Department of Biochemistry, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil.

Megalin, a low-density lipoprotein receptor-related protein-2, mediates blood brain barrier (BBB) transport of multiple ligands, including leptin or insulin, which are fundamental for brain development, function and protection against injury. We recently generated a mutant mouse strain lacking endothelial megalin, named EMD mice, resulting in an Alzheimer’s-like impaired the behavioral model. Next, we tested the hypothesis that blocking megalin expression at the BBB confers other metabolic alterations associated with BBB-transport. We found that EMD mice result in a mouse model of obesity with elevated body mass, mainly due to an increase in adipose tissue, and associated with higher blood levels of insulin, leptin and triglycerides. Curiously, these findings were observed in male whereas no such difference was observed in female mice. In summary, EMD mice represent a novel model system to determine molecular signaling in inflammatory processes involved in neurodegeneration and metabolic syndrome.

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splicing in differentiated 3T3-L1 adipocytes treated with 2.5 nM tumour necrosis factor alpha (TNF-α) for 24 hrs. Insulin resistance was verified by reduced Akt-Ser473 phosphorylation and reduced 2-deoxyglucose uptake. RNAseq was performed on triplicate cell samples, before and after TNF-α treatment. Reads were mapped by TopHat 2.0 and isoform quantification was performed by cufflinks 2.2 and WemIQ, using the mouse reference genome (mm10 build). Transcript isoforms were classified into 12 categories based on the nature of differential expression in response to TNF-α. Exon skipping and alternative promoter usage were the two most common splicing events observed among genes displaying DAS (each at 27%). The splicing regulators Qkr, Mbn1l, Mbn2l were down-regulated, whereas the Hnrrnp, Srsf and Ribbox family of regulators were up-regulated in TNF-α treated cells (absolute fold-change ≥ 1.5-fold, false discovery rate ≤ 10%). Several of the DAS isoforms corresponded to transcripts with known effects on cellular functions, including subcellular localization (Ing4, Lpin1, Gtf2i), protein-protein interactions (Kif1b, Cxcl12), and enzyme activity levels (Fmr1, Agnr, Sat1). Gene-set enrichment analysis identified over-representation of DAS genes in several biological pathways related to 'acute phase response signaling', 'INOS signaling', 'IL-6 signaling', etc. (Fisher’s p-value < 1e-06). These results allow us to develop new and testable hypotheses on the role of alternative splicing in the development of adipocyte insulin resistance.

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T1-PO.019
Genetic susceptibility factor as a predictor of weight loss after bariatric surgery

Ciuddi A.1, Lacube A.1, Ortiz A.1, Simo-Servat V.1, Guillén K.1, Pich S.1, Casagran O.1, Konstantinoudou V.1, Salas E.2, Hernandez C.3, Fort J.3, Simo R.3, Mesa J.3

1Endocrinology Department, Vall d’Hebron University Hospital, Barcelona, Spain.

Background: Obesity is directly related to an increased risk of diabetes mellitus, hypertension, dyslipidemia, cardiovascular disease, and overall mortality. Weight loss is effective in decreasing these risks and reducing disease severity. Bariatric surgery is an effective therapy for sustained weight loss in most of the morbidly obese patients. But there is also a significant number of individuals with an inappropriate response to bariatric surgery. Two recent retrospective studies assessed the role of genetic load as a predictor of this response, but the results are still unelucidated.

Objectives: To assess whether a selection of genetic variants may allow us to identify individuals who will have an unsatisfactory response after bariatric surgery.

Methods: A retrospective case-control study of 100 women who underwent bariatric surgery (Roux-en-Y laparoscopic gastric bypass): 30 cases with less than 40% of the excess weight loss and 70 controls who showed more than 75% of the excess weight loss after one year. All individuals were analyzed with a genetic score from Nutri inCode. The relevance of each variant was considered (rs7566605, rs9939609, rs2229616, rs17782313, rs6235, rs1801282, rs1800795, rs2241766, rs2867215). The predictive ability was analyzed by discrimination (area under the ROC curve), sensitivity and specificity and a score was calculated.

Results: The panel of genetic variants Nutri inCode showed a significant discrimination ability (0.56, 95% CI 0.46, 0.67) with a good sensitivity (88%) in identifying individuals who have a poor response to bariatric surgery. The specificity of this panel is 26%.

Conclusions: The panel of genetic variants Nutri inCode has a good sensitivity in identifying individuals who have a poor response to bariatric surgery. As the response to surgery is a multifactorial process, the inclusion of other variables in order to improve good sensitivity obtained with genetic variables is necessary.

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T1-PO.020
The Zbtb16 gene affects body weight, insulin sensitivity and lipid levels in a single-gene congenic rat model

Krupkova M.1, Liška F.1, Kazdová L.1, Šedová L.1, Křenová D.1, Křen V.1, Šedová O.1

1Institute of Biology and Medical Genetics of the First Faculty of Medicine, Charles University, Prague and General University Hospital, Prague, Czech Republic.
2Department of Metabolism and Diabetes, Institute for Clinical and Experimental Medicine, Prague, Czech Republic.

We have previously isolated an apparently pleiotropic locus on rat chromosome 8 affecting major features of metabolic syndrome in the congenic SHR.PD-(D8Rat42-D8Arb23)/Cub (SHR-Lx) strain carrying only 7 genes of polydactylous rat strain (PD/Cub) origin on spontaneously hypertensive rat (SHR) genetic background. In this study, we have derived 2 new minimal congenic sublines in order to determine the validate Zbtb16 gene’s role in pathogenesis of metabolic disturbances observed in the SHR-Lx strain. Adult male rats of SHR.PD(Zbtb16) and SHR.PD(Htr3) strains were fed standard diet (STD) and subsequently treated with dexamethasone in drinking water (0.026 mg/ml) for 3 days. We contrasted morphometric and metabolic profiles between the two strains. The differential segment of SHR.PD(Zbtb16) minimal congenic subline contains only Zbtb16 gene and spans 254kb, while the one in SHR.PD(Htr3) subline spans 563kb and contains 6 genes: Htr3a, Htr3b, Usp28, Zw10, Tmprss5, and Dmd1. SHR.PD(Zbtb16) showed significantly higher fasting levels of glucose and triacylglycerols, increased area under the glycemic curve during oral glucose tolerance test in comparison to SHR.PD(Htr3). We also observed blunted free fatty acid suppression during glucose load in SHR.PD(Zbtb16). The insulin sensitivity of skeletal muscle was substantially impaired in SHR.PD(Zbtb16) skeletal muscle (basal glycolysis: 173 ± 8 vs. 49 ± 9 nmol glucose/g/120min in SHR.PD(Htr3), p = 0.0007). The metabolic disturbances including dyslipidemia, impaired glucose tolerance and insulin resistance of skeletal muscle observed in the original SHR-Lx strain are present in the single-gene congenic SHR.PD(Zbtb16) strain, establishing the Zbtb16 as a pleiotropic hub of metabolic syndrome features.

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T1-PO.021
Genomic and transcriptomic analysis of adipose tissue in rat recombinant inbred model of metabolic syndrome

Hodulova M.1, Krupkova M.1, Sedova L.1, Krenova D.1, Kren V.1, Sedov O.1

1Institute of Biology and Medical Genetics of the First Faculty of Medicine, Charles University, Prague and General University Hospital

Background: Central obesity is one of main features of metabolic syndrome. It represents a major risk factor for a number of health problems and chronic diseases. We have previously established a model for functional genomic dissection of metabolic syndrome, the recombinant inbred rat strain panel PXO. In the current study, we contrasted two strains (PXO3-1 and PXO3-2) based on the highest divergence in metabolic syndrome features.

Methods: We compared the adult male rats of PXO3-1 and PXO3-2 strains at the level of genome (>20,000 single nucleotide polymorphisms) and visceral adipose tissue transcriptome (Affymetrix® Rat Gene 2.1 ST Array Stripusing Affymetrix GeneAtlas system) followed by gene set enrichment and network analysis (IPA -Ingenuity Pathway Analysis).
Results: In comparison with PXO3-2, the PXO3-1 strain shows increased amount of both visceral and retroperitoneal fat, lower level of triacylglycerols and total cholesterol. Genomic comparison of strains PXO3-1 and PXO3-2 showed the difference to be limited to distinct areas of chromosomes 1, 3, 5, 8, 12, 16 and 19 with only 3.21% polymorphic loci overall. Network analysis of transcripts with significantly changed expression including up-regulated (e.g. APOLD1, p = 4.39E-05; ADIPOR2, p = 1.27E-03) and down-regulated (e.g. RETN, p = 2.34E-04; AEBP1, p = 1.43E-03) transcripts in PXO3-1 compared to PXO3-2, revealed enrichment in metabolic pathways associated with obesity and key upstream regulators such as PPARD, HGF and VEGF.

Conclusion: Based on combined genomic and transcriptomic analysis, we have identified differentially expressed transcripts between genetically close substrains and dysregulated signaling and metabolic pathways associated with obesity.

T1 – Lipid Metabolism

T1:PO.022
Incretins level may reflect disturbed lipid metabolism

Goralska J.1, Maleczewska-Malec M.1, Kiec-Wilk B.1, Zabieliski P.1, Chabowski A.1, Ranzy U.1, Stancel-Mazwillo J.1, Sliwa A.1, Zdzieciak A.1, Malecki M.1, Solinska B.1, Dembinska-Kiec A.1

1Department of Clinical Biochemistry, Jagiellonian University Medical College, Krakow, Poland,
2Department of Metabolic Diseases, Jagiellonian University Medical College, Krakow, Poland,
3Department of Physiology, Medical University of Białystok, Poland

Introduction: Incretins may be associated with not only glucose metabolism but also with fat metabolism. The aim was to investigate plasma GIP level in relation to plasma concentration of 14 different fatty acids in diabetic and non-diabetic subjects.

Methods: A total of 93 subjects, included patients with diabetes type 1 (n=13), diabetes type 2 (n=33) and non-diabetic subjects (n=45). Fasting plasma GIP level as well as concentrations of fatty acids (LC-MS/MS method) were measured.

Results: Fasting GIP plasma level was significantly increased in diabetes type 2 compared to diabetes type 1 (44.45 vs 20.19pg/ml). The highest saturated to unsaturated (SFA/PUFA) ratio was found in diabetes 2 (0.52), in medium control (0.49) and lowest in diabetes type 1 (0.45). Diabetic type 2 patients presented lipid profile with increased long chain (C20) SFA, MUFA and decreased PUFA. The n-3/n-6 ratio was significantly decreased in diabetes t.1. Relative amount of essential PUFA was decreased in diabetes type 2 and increased in diabetes type 1, compared to controls, as the effect of changes only in C18:2 n–6. All diabetic groups revealed decreased relative n-3 PUFA amount related to decreased DHA, not EPA. GIP level positively correlated with (C<20) SFA and MUFA and negatively with (C>20) FA and PUFA.

Conclusion: The detailed plasma lipid study revealed the associations of GIP secretion with fatty acids profile and suggest, that this gut hormone level may reflect disturbed fatty acids metabolism with ineffective desaturation and elongation action.

T1:PO.023
Development of the uplc-ms/ms method for analysis of acylcarnitines and aminoacids

Cerna M.1, Brabcova I.1, Kopecky J.1, Kuda O.1

1Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic

Introduction: Acylcarnitine (AC) and amino acid (AA) profile analysis is performed for the biochemical screening of metabolic disorders, mainly in newborns. Changes in AC and AA levels in plasma/serum and organs can serve as an important marker of various metabolic diseases as well as markers of activity of metabolic pathways. AC and AA levels are usually analysed by flow injection-tandem mass spectrometry. This approach is fast and cheap, but isn't able to distinguish between isobaric AC species, which come from different metabolic pathways.

Methods: We have developed a method, which allows us to separate and quantify the isobaric species. This method is based on hydrophilic interaction chromatography (HILIC) using high efficiency Kinetic chromatographic column coupled to tandem mass spectrometry. Using this technique, sample amount could be reduced up to 1 ul of plasma, while the panel of detectable AC and AA increased up to 57 AC and 21 AA, respectively. We used mouse strain C57Bl/6 and A/J for validation of the method. Samples of plasma from both strain were divided into triplicates and analyzed separately in three days to assess the inter-assay validation, and as a triplicate within one run to assess the intra-assay validation.

Results: Overall average inter-assay precision was 9.43% for AC in Bl/6 and A/J strain, whereas inter-assay precision for AA was 10.79%. Intra assay precision for AC was 8.65% for both mice strains, while intra assay precision for AA was 5.53%.

Conclusion: In summary, we have developed a method, which is very efficient, reasonably fast and sensitive for metabolomics analysis of small volumes. This method is also validated with good precision and accuracy (up to 12%).

T1:PO.024
Combined polyphenols increase fat oxidation and mitochondrial oxidative capacity but do not improve peripheral and hepatic insulin sensitivity in healthy overweight men and women

Most J.1, Timmers S.1, Jocken J.W.1, Schrauwen P.1, Goossens G.H.1, Blaak E.E.1

1Maastricht University Medical Center+

Obesity and related cardiometabolic disorders are characterized by insulin resistance and reduced mitochondrial capacity. Recent evidence suggests that dietary polyphenols might improve these deteriorations. Indeed, we have shown that 3-day Epigallocatechin-gallate+Resveratrol supplementation (E+R) increased energy expenditure (EE)[1]. Moreover, metabolic flexibility tended to improve after a high-fat mixed meal (HFMM, 2.6MJ, 61%fat) in men. These findings may translate into long-term benefits on insulin sensitivity and lipid metabolism. In this double-blind RCT, 42 healthy overweight subjects (age 38 ± 2y, BMI 29.7 ± 0.5kg/m², HOMAIR 2.05 ± 0.2) received either E+R (300+80mg/d, respectively) or placebo (PLA) for 12 weeks. Before and after intervention, peripheral and hepatic insulin sensitivity was assessed by 2-step-hyperinsulinemic-euglycemic clamp. Fasting and postprandial (HFMM) lipid handling was measured using indirect calorimetry, blood sampling, microdialysis and adipose tissue and skeletal muscle biopsies. Insulin-stimulated glucose rate of disappearance, respectively suppression of endogenous production, were not affected by the intervention (P > 0.70). In contrast to PLA, postprandial TAG-concentrations did not increase after E+R-supplementation compared with week 0 (p < 0.01). Moreover, E+R increased fasting (p = 0.06) and postprandial fat oxidation (p = 0.03) without changes in EE. This was accompanied by increased oxidative capacity in permeabilized muscle fibers (p < 0.05). Finally, E+R tended to decrease visceral fat mass, while whole-body mass and composition, assessed by DEXA-scan, remained unchanged. 12-wk E+R-supplementation improved lipid handling and oxidative capacity, but this did not translate into increased insulin sensitivity in healthy obese men and women.

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**T1.P0.025**

**Alterations by the association of obesity-hypoestrogenism in cardiovascular parameters in female Wistar rats**

Mailloux-Salinas P\(^1\), Colado-Velazquez J\(^1\), Medina-Contreras J\(^1\), Meza-Cuenc A\(^1\), Bravo G\(^2\)

\(^1\)Pharmacobiology department, CINVESTAV-IPN, Mexico City

**Introduction:** Obesity is a public health problem occurring mainly in advanced age individuals. In females, at the end of reproductive age the lack of hormones originates physiological alterations exacerbating problems caused by obesity in the cardiovascular system [2].

**Methods:** Female Wistar rats were randomized in 4 groups (n=6). Intact (C: control), intact with obesity (OB: obese), ovariectomized (HE: hypoestrogenic) and ovariectomized-obesity (HE-OB). The OB groups were given hypercaloric diet (30% sucrose in drinking water) and standard chow ad libitum during 2 weeks at the end of this period, mean arterial pressure (MAP) was measured. It was obtained blood and tissue samples to perform biochemical assays and oxidative stress.

**Results:** Weight was increased significantly in groups with hypercaloric diet in comparison to C group. MAP was significantly higher in the HE-OB in comparison to the other groups. Plasma glucose, total cholesterol, LDLc, and TGs were significantly higher in the HE-OB in comparison with C, OB and HE, while HDLc levels were significantly lower. We found significant increases in oxidative stress parameters in the groups receiving hypercaloric diet.

**Conclusion:** The combination of both conditions, hypoestrogenism and obesity significantly alter biochemical, cardiovascular parameters, and increasing the susceptibility of the animals to develop oxidative stress damage.

**References**


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**T1.P0.026**

**Postprandial regulation of skeletal muscle lipid metabolism by angiopoietin-like protein 4 in overweight subjects with impaired glucose metabolism**

van der Kolk B W\(^1\), Goossens G H\(^1\), Jocken J W\(^1\), Kersten S\(^2\), Blaak E E\(^3\)

\(^1\)Department of Human Biology, NUTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University Medical Center+, The Netherlands,

\(^2\)Nutrition, Metabolism and Genomics Group, Division of Human Nutrition, Wageningen University, The Netherlands

**Introduction:** Angiopoietin-like protein 4 (ANGPTL4) decreases plasma triglyceride clearance via inhibition of lipoprotein lipase (LPL), and may thereby contribute to impairments in lipid metabolism in humans. In this study, modulation of circulating ANGPTL4 after high-fat meals with varying dietary fat quality was studied in overweight subjects. Secondly, we examined whether ANGPTL4 acts as a myokine after a high-saturated fat (SFA) meal.

**Methods:** The effects of a mixed-meal either high in SFA, mono- (MUFA) or polyunsaturated (PUFA) fat on plasma ANGPTL4 levels were studied in ten obese insulin resistant men (BMI 33.8 ± 3.8 kg/m\(^2\)). Skeletal muscle fatty acid handling and ANGPTL4 fluxes across muscle (forearm balance technique) were examined in 35 middle-aged overweight subjects (BMI 30.4 ± 0.7 kg/m\(^2\)) with impaired glucose metabolism before and during a 4-hour high-SFA mixed-meal test.

**Results:** Plasma ANGPTL4 concentrations were decreased after intake of the SFA meal (5.2 ± 0.3 vs. 4.2 ± 0.3 ng/ml; P < 0.01; n=35). This decrease was evident after the SFA and MUFA meal but not after a PUFA meal in the late postprandial phase (P = 0.04, n=10). Under fasting conditions, no release of ANGPTL4 from forearm skeletal muscle was observed (0.1 ± 0.2 ng.100 ml tissue-1.min-1 vs. zero; P = 0.53), while after a high-SFA meal ANGPTL4 was released (–0.3 ± 0.1 ng-100 ml tissue-1 min-1 vs. zero; P = 0.01). At ECO2015, data on the relationship between ANGPTL4 and in vivo muscle LPL activity will be available.

**Conclusion:** A SFA and MUFA but not a PUFA meal decreased plasma ANGPTL4 concentrations, indicating a differential regulation with dietary fat quality in overweight subjects. For the first time, we showed a significant ANGPTL4 release across forearm muscle after a high-SFA meal.

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The role of serum content of cyclopropaneeanoic acid 2-hexyl in obese patients.

Mika A.1,2, Stepnowski P., Chmielewski M.,†, Malgorzewicz S.,†, Kaska L.1, Proczo M.1, Ratnicki-Sklucki K.†, Slezinski M.1, Slezinski T.1
1Department of Environmental Analysis, Faculty of Chemistry, University of Gdansk, Poland, 2Department of Lipid Biochemistry, Institute of Biochemistry and Biophysics, Polish Academy of Sciences, Poland, 3Department of Pharmaceutical Biochemistry, Medical University of Gdansk, Poland, 4Department of Nephrology, Transplantology and Internal Medicine, Medical University of Gdansk, Poland, 5Department of General, Endocrine and Transplant Surgery, Medical University of Gdansk, Poland, 6Department of Clinical Nutrition, Medical University of Gdansk, Poland., 7Departments of Emergency Medicine, Medical University of Gdansk

Introduction: Fatty acids containing cyclopropane group are present in a bacteria, protozoa and plants (1). These fatty acids could display some biological activity (2). Recently we have reported the presence of some of cyclopropane fatty acids in adipose tissue of obese women (3), however, the source of cyclopropane FA in human is not known. Cyclopropaneeanoic acid 2-hexyl, was also detected in serum of obese women (3). The aim of the current study was to verify if the presence of cyclopropaneeanoic acid 2-hexyl in human serum is associated with obesity and to examine the potential association of serum content of this fatty acid with markers of alterations related to obesity.

Methods: Serum content of cyclopropaneeanoic acid 2-hexyl were assayed by GCMS in non-obese subjects, morbidly obese patients, morbidly obese patients that were on low calorie diet for 3 months and in patients with chronic kidney disease, which is associated with some lipid alterations.

Results: Serum content of cyclopropaneeanoic acid 2-hexyl were elevated in morbibly obese patients and patients with chronic kidney disease. Low calorie diet in obese patients resulted in lowering the level of cyclopropaneeanoic acid 2-hexyl to the level observed in control subjects. Serum triglycerides concentrations displayed similar pattern to serum cyclopropaneeanoic acid 2-hexyl, and these variables were significantly correlated. There was no correlation between this fatty acid and BMI. The strongest predictor of serum content of cyclopropaneeanoic acid 2-hexyl was the age of the test subjects.

Conclusion: The serum cyclopropaneeanoic acid 2-hexyl content is elevated in patients with morbid obesity and chronic kidney disease. Since diet caused decrease of cyclopropaneeanoic acid 2-hexyl in serum of obese patients, one can suppose that this fatty acid originate from food. Our results suggests that the level of this fatty acid in serum is not associated with obesity but rather with age.

Afram and lysophosphatidylcholine 18:2, potential markers of type 2 diabetes risk, are opposingly regulated in obesity.

Kurdiova T.1, Ukropcova B., Belan V., Berberich R., Gasperikova D., Schmitz G., Dieplinger H., Ukropc J.1
1Institute of Experimental Endocrinology, Slovak Academy of Sciences, 2Radiodiagnostic Clinic, University Hospital, Bratislava, Slovakia, 3Division of Genetic Epidemiology, Medical University of Innsbruck, Austria, 4University Clinic, Regensburg, Germany

Introduction: Serum afram and lysophosphatidylcholine (LPC) 18:2, two potential markers of increased type 2 diabetes (T2D) risk, were investigatad in middle-aged lean (BMI: 22.3  ±  0.5 kg.m-2), obese/overweight, prediabetic & T2D men (31.7  ±  0.6kg.m-2, n=71). Metabolic phenotyping included eucleremic hyperinsulinemic clamp (EHC), oGTT, MRI (abdominal fat distribution) & H-MRS (hepatic lipid content). Physical activity was monitored by accelerometers. Serum LPC & afram were analyzed by mass spectrometry & ELISA. Subcutaneous abdominal adipose tissue (SAT) was obtained by biopsy and gene expression was quantified by qPCR. Fat cell size was measured morphometrically.

Results: Serum afram was higher in obesity (23%, p < 0.05), increasing progressively with obesity, prediabetes & T2D (38 & 36% respectively, p < 0.001). Circulating LPC18:2 decreased by >30% with obesity, prediabetes & T2D (p < 0.001). LPC18:2 negatively correlated with afram (r=-0.42, p < 0.001). A famin was negatively associated with whole body & adipose tissue insulin sensitivity (r=-0.35, p < 0.001; r=0.31, p < 0.01), ambulatory activity (r=-0.29, p = 0.03) and adiponecminemia (r=-0.48, p < 0.001) and positively with insulinemia (r=0.35, p < 0.001), glycaemia (r=0.29, p = 0.01), TAGs (r=0.35, p = 0.001) & hepatic lipids (r=0.35, p = 0.001). Afram was positively associated with fat cell size (r=0.52, p < 0.001), and negatively with expression of irisin precursor Fndc5 & lipolysis promot- ing zinc-a-2-glycoprotein (both r=-0.48, p < 0.001) in SAT. Association between afram and insulin sensitivity was in part independent on obe- sity. Afram combined with LPC18:2 explained 49% of variability in the whole body insulin sensitivity.

Conclusion: Changes of serum afram and LPC 18:2 might predict diabe- tes risk in obese nondiabetic individuals.


Delayed clearance of Triglyceride rich lipoproteins in Young, Healthy Obese Subjects

Larsen M.A.1, Goll R.1,2, Lekhai S.1, Florholmen J.1,2
1Research Group of Gastroenterology and Nutrition Institute of Clinical Medicine, University of Tromsø, Norway, 2Department of gastroenterology, Clinic of Internal Medicine, University Hospital of North Norway, 3Morbid Obesity Center, Helse Sør-Rat, Childrens department, Trondheim, Norway

Introduction: Obesity is strongly associated to the metabolic syndrome. Detection of early subclinical signs of metabolic disturbances would therefore be of strategic value in the management of obesity. The aims were first to study the postprandial triglyceride (TG) clearance in young and healthy obese subjects; second to investigate if fasting TG can predict delayed postprandial TG clearance.

Methods: Eighteen healthy, obese subjects (BMI >30 kg/m2), with no clinical signs of metabolic disturbances volunteered to participate. In addition, age- and sex-matched, healthy, normal weight subjects con-
Chemerin blood levels are associated with cross-sectional areas of different compartments of adipose tissue at L5 level

Vrselj Z.1,2, Saliba T.1, Marić A.1,2, Radić R.1
1Department of Anatomy and Neuroscience, Faculty of Medicine, University of Osijek, Osijek, Croatia, 2Department of Radiology, University Hospital Osijek, Osijek, Croatia

Introduction: Increasing obesity prevalence is of great importance since it is associated with low-grade chronic inflammation. Adipocytes which constitute adipose tissue, among other cells, produce a large number of adipocytokines which are responsible for immunometabolic modulation. Chemerin is a multifunctional protein which primarily acts as a chemoattractive cytokine. Chemerin is associated with early stages of low-grade chronic inflammation of adipose tissue possibly through regruration of immune cells to the adipose tissue, angiogenesis, osteoblastogenesis etc. We aim to investigate the relationship between chemerin blood levels and abdominal region adipose tissues.

Methods: We included 60 volunteers in the study; all participants underwent magnetic resonance (MR) of abdominal region using 2D FLSAH sequence for optimal detection of adipose tissue. MR data was analyzed using open source ImageJ program in order to obtain the adipose tissue surface area. Blood samples were taken from all participants, chemerin serum levels were determined with commercial ELISA kit.

Results: Average participant had BMI of 24.5 ± 4.7 and was 20 [20–30.75] years old. The average area of adipose tissue at L5 level was 281 ± 119 cm², subcutaneous adipose tissue 215 ± 91 cm² and visceral adipose tissue 65 ± 38 cm². Chemerin positively correlated with overall adipose tissue (r=0.721, p<0.001), subcutaneous (r=0.694, p<0.001) and visceral adipose tissue (r=0.588, p<0.001). After age and gender adjustment, overall adipose tissue was the most important predictor of chemerin levels (R²=0.749, p<0.001, β=0.27).

Conclusion: Chemerin blood levels had a strong and medium positive correlation with different compartments of adipose tissue. Visceral and subcutaneous adipose tissue might contribute equally to the chemerin blood levels.

Mathematical Modelling of Energy Flux with ‘Optimum’ Food Micronutrients in Humans

McGill A.T.1
1School of Population Health, University of Auckland, Auckland, New Zealand

Introduction: Central obesity related metabolic syndrome (MetS) is associated with the degenerative diseases of type II diabetes mellitus, cardiovascular disease and cancer. It is hypothesised that the nuclear factor-erythroid 2-related factor 2 system (NRF2) uses (pho)chemicals for energy efficient cell metabolism & in humans became an antioxidant and antixotoxicant amplifying cell protection system allowing human longevity. Mathematical systems modelling should show that high micronutrient:macronutrient ratio food diets in humans involve highly efficient energy metabolism and tissue repair via the NRF2 system, and this will prevent both excess central fat accumulation and related MetS.

Aim: To formulate a comprehensive multistep mathematical model of the energy-efficient phytochemical-dependant human antioxidant/antixotoxicant cell protection NRF2 system.

Methods: Involve 1) Developing an energy compartment-based equation of energy flux in humans into which a term for micronutrient action can be inserted at a later stage 2) Running metabolomics analysis from tissue/ blood samples of various human models, particularly assessing before and after change from westernised (energy dense) to whole food (micronutrient dense) diets 3) Using mathematio-engineering systems modelling of the actual flux of energy in the NRF2 system, and calculating the energy potentials of (Michael) reactions involving plant chemicals 4) Putting the above models of human-specific energy flux equations into the Dynamic Energy Budget (DEB) framework at the DEB2015 school (Apr 2015, Marseille, France http://debs2015.mio.univ-amu.fr)

Results: Progress & the DEB2015 project will be presented.

Conclusion: The results will be discussed in the light of human dietary evolution

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Change of circulating irisin concentrations in morbidly obese patients after roux-en-y gastric bypass

Lee Y.1, Hur Y.1, Choi J.1
1Department of Family Medicine, Obesity center, University Hospital and Faculty of Medicine in Inha University in Incheon, Republic of Korea

Background: Irisin, a humoral factor secreted from muscle (myokine), has been known to stimulate the program of brown fat development in adipose tissue (“browning”). Recent animal studies suggested that irisin has possibility to enhance energy expenditure in obese patients. However, we have limited clinical data to understand biology of irisin in human, especially in morbidly obese patients taken bariatric surgery.

Methods: This is a pilot, single center, longitudinal, observational study. We recruited twelve morbidly obese subjects (25–56 years, 29.6–45.9 kg/m² of BMI) who underwent Roux-en-Y gastric bypass surgery (RYGBP) and visited the obesity center postoperatively. Fasting serum samples for measuring irisin were collected preoperatively, and one and nine months after RYGBP. We analyzed the association between irisin concentrations and clinical characteristics.

Results: Serum irisin concentrations, 1.0115 ± 0.2282 μg/ml ranging from 0.7347 to 1.4928 pre-operatively, altered bidirectionally on one month after RYGBP. Five out of twelve subjects showed increased irisin levels from 0.9028 ± 0.7387 (range, 0.8393 – 0.9865) μg/ml to 1.6975 ± 0.6593 (range, 1.0439 – 2.5102) μg/ml, while seven of them had decreased irisin levels from 1.0891 ± 0.2738 (range, 0.7347 – 1.4928) μg/ml to 0.8304 ± 0.1855 (range, 0.5353 – 1.1560) μg/ml. Serum irisin concentrations on 9 months were 1.1108 ± 0.1515 μg/ml (range, 0.9158 – 1.3481), and eight had elevated irisin levels by 0.1827 ± 0.1400 μg/ml and four had non-elevated levels by - 0.0675 ± 0.2282 μg/ml ranging from

Conclusions: The alteration of serum irisin level was associated with weight loss effect of Bariatric surgery.

Fig. 1. The phylum compositions of fecal bacteria were compared before treatment in the EWG and IWG. The relative contribution abundance of dominant phyla identified from pyrosequencing data is shown. EWG, effective weight loss group; IWG, ineffective weight loss group.

Gut microbiota is regarded as one of the major factors involved in control of body weight. The anti-obesity effects of ginseng and its main constituents have been demonstrated, however, the effects on gut microbiota are still unknown. To investigate the effect of ginseng on gut microbiota, 10 obese middle-aged Korean women took Panax ginseng extracts for eight weeks and assessment of body composition parameters, metabolic biomarkers, and gut microbiota composition was performed using 16S rRNA gene-based pyrosequencing at baseline and at wk 8. Significant changes were observed in body weight and BMI, however, slight changes were observed in gut microbiota. We divided the subjects into two groups, the effective weight loss group (EWG) and the ineffective weight loss group (IWG), depending on weight loss effect, in order to determine whether the anti-obesity effect was influenced by composition of gut microbiota, and the composition of gut microbiota was compared between the two groups. Before ginseng intake, significant differences of gut microbiota were observed between both at phyla and genera and the gut microbiota of the EWG and IWG was segregated on a principal coordinate analysis plot. Results of this study indicate that ginseng exerted a weight loss effect and slight effects on gut microbiota in all subjects. In addition, its anti-obesity effects differed depending on the composition of gut microbiota before ginseng intake.

Influence of panax ginseng on obesity and gut microbiota in obese middle-aged korean women

Song M., Kim H.1, Choi H.2, Choi Y.3, Chin Y.3, Wang J.1
1Department of Rehabilitation Medicine of Korean Medicine, Dongguk University
2Department of Endocrinology, Dongguk University
3College of pharmacy, Dongguk University

Gut microbiota is regarded as one of the major factors involved in control of body weight. The anti-obesity effects of ginseng and its main constituents have been demonstrated, however, the effects on gut microbiota are still unknown. To investigate the effect of ginseng on gut microbiota, 10 obese middle-aged Korean women took Panax ginseng extracts for eight weeks and assessment of body composition parameters, metabolic biomarkers, and gut microbiota composition was performed using 16S rRNA gene-based pyrosequencing at baseline and at wk 8. Significant changes were observed in body weight and BMI, however, slight changes were observed in gut microbiota. We divided the subjects into two groups, the effective weight loss group (EWG) and the ineffective weight loss group (IWG), depending on weight loss effect, in order to determine whether the anti-obesity effect was influenced by composition of gut microbiota, and the composition of gut microbiota was compared between the two groups. Before ginseng intake, significant differences of gut microbiota were observed between both at phyla and genera and the gut microbiota of the EWG and IWG was segregated on a principal coordinate analysis plot. Results of this study indicate that ginseng exerted a weight loss effect and slight effects on gut microbiota in all subjects. In addition, its anti-obesity effects differed depending on the composition of gut microbiota before ginseng intake.

Fig. 2. Principal coordinate analysis (PCoA) plot. The plot showed the clustering pattern between the EWG and IWG based on weighted pairwise Fast UniFrac analysis. Full line circles indicate grouping of the communities in the before ginseng intake and dotted line circles indicate that in the after ginseng intake.

High-fat diet-induced obesity rat model: A comparison between wistar and sprague-dawley rat

Marques C.1,2, Meireles M.1, Norberto S.1, Leite J.1, Freitas J.1,3, Pestana D.1,2, Faria A.1,4, Calhau C.1,2
1Departamento de Bioquímica, Faculdade de Medicina, Universidade do Porto, Porto, Portugal
2CINTESIS, Centro de Investigação em Tecnologias e Sistemas de Informação em Saúde, Porto, Portugal
3Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal
4Faculdade de Ciências da Nutrição e da Alimentação, Universidade do Porto, Porto, Portugal
5Faculdade de Ciências, Universidade do Porto, Porto, Portugal
Introduction: In the past decades, obesity and associated metabolic complications have reached epidemic proportions. For the study of these pathologies, a number of animal models have been developed. However, a direct comparison between Wistar and SD Rat as models of high-fat (HF) diet-induced obesity has not been adequately evaluated so far.

Methods: Wistar and SD rats were both assigned for two experimental groups for 17 weeks: standard (St) and high-fat (HF) diet groups. To assess some of the features of the metabolic syndrome, oral glucose tolerance tests, systolic blood pressure measurements and blood biochemical analysis were performed throughout the study. The gut microbiota composition of the animals from each group was evaluated at the end of the study by real-time PCR.

Results: HF diet increased weight gain, body fat mass, mesenteric adipocyte’s size, adiponectin and leptin plasma levels and decreased oral glucose tolerance in both Wistar and SD rats. However, the majority of these effects were more pronounced or earlier detected in Wistar rats. The gut microbiota of SD rats was less abundant in Bacteroides and Prevotella but richer in Bifidobacterium and Lactobacillus comparatively to the gut microbiota of Wistar rats. Nevertheless, the modulation of the gut microbiota by HF diet was similar in both strains, except for Clostridium leptum that was only reduced in Wistar rats fed with HF diet.

Conclusion: Both Wistar and SD Rat can be used as models of HF diet-induced obesity although the metabolic effects caused by HF diet seemed to be more pronounced in Wistar Rat. Differences in the gut microbial ecology together with other mechanisms, such as increased gut permeability, may account for the worsened metabolic scenario observed in Wistar Rat.

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T1 – Gut hormones/incretins

T1:PO.037

The relationship between serum amylase and fasting plasma ghrelin, peptide YY3-36 in healthy men

Tak Y.J.1, Lee S.Y.2

1Department of Family Medicine, Pusan National University Hospital, Pusan National University Hospital, Busan, South Korea,
2Obesity, Nutrition and Metabolism Clinic, Department of Family Medicine, Research Institute of Convergence of Biomedical Science and Technology, Pusan National University Yangsan Hospital, Yangsan, South Korea

Objective: Both appetite and carbohydrate metabolism are important in development of obesity. Recently serum amylase has been shown to be associated with obesity as well as metabolic disorder. Here, we investigated the relationship between total amylase, ghrelin and peptide YY (YY) (PYY) in healthy men.

Materials and Methods: In this cross-sectional study, twenty-one men were enrolled and all subjects had no symptoms and no any medical history or diseases. Serum total amylase, fasting serum levels of ghrelin and PYY3-36, anthropometry and caloric intake per day were measured. Partial correlation coefficients adjusting for age and linear regression analysis were computed to examine association between serum amylase and ghrelin, PYY3-36.

Results: The mean age, body mass index and waist circumference (WC) of subjects were 51.5±10.9 years, 24.2±1.7 kg/m2 and 87.0±4.4 cm, respectively. The subjects had no significant difference in serum amylase, ghrelin and PYY3-36 according to presence of obesity. Serum amylase showed significant correlation with WC (r = -0.438, P = 0.054), ghrelin (r = 0.533, P = 0.015) and PYY3-36 (r = -0.511, P = 0.021) after adjusting for age. PYY3-36 showed statistically negatively associated with serum amylase in multivariate linear regression model including age, WC (β = -0.428, P = 0.045). In contrast, positive association between ghrelin and serum amylase became non-significant in multivariate linear regression model including age, WC (β = 0.260, P = 0.146).

Conclusion: Serum amylase levels were related with ghrelin and PYY3-36 in men. Amylase, ghrelin and PYY3-36 together may relate to obesity, although further research is required to find the mechanism behind these associations.

T1:PO.038

Differentially nibbling endogenous cannabinoid cb1 and cb2 receptor subtypes in spontaneous and splice variants of ghrelin-induced feeding in rats

Chen C.1, Ting C.1

1Faculty of Medicine, National Yang-Ming University School of Medicine, Taipei, Taiwan,
2Division of Gastroenterology, Department of Medicine, Taipei Veterans General Hospital, Taipei, Taiwan

Objective: Dysfunction of the endocannabinoid system has been reported leading to the development of obesity and metabolic disorders. Endogenous cannabinoid receptors are present on two cannabinoid receptor subtypes, type 1 (CB1) and type 2 (CB2), to exert their biological actions. However, comprehensive information regarding CB1 and CB2 receptors in modulating feeding behavior is important, but remains less understood.

Methods: We investigated the differential roles of CB1 and CB2 receptors in spontaneous and centrally-administered splice variants of ghrelin, O-n-octanoylated ghrelin and des-Gln14-ghrelin, stimulation of food intake in conscious rats.

Results: Intraperitoneal (IP) injection of different doses of selective CB2 receptor antagonist, AM-630 (0.3, 1.0, and 3.0 mg/kg), enhanced cumulative food intake during the first 12 hours with a dome-shaped dose-response relationship in freely-fed rats, with the most effective dose of 1.0 mg/kg. In contrast, the selective CB1 receptor antagonist, AM-251 (0.3, 1.0, and 3.0 mg/kg, IP) dose-dependently suppressed the cumulative food intake in 16-h food-deprived rats. Centrally-administered O-n-octanoylated ghrelin and des-Gln14-ghrelin, stimulation of food intake in conscious rats.

Conclusions: We showed that endogenous CB2 receptor plays a role in inhibiting food intake in satiated state, whereas CB1 receptor promotes food intake in fasted condition. Central acyl ghrelin induces feeding is somehow inhibited by the inhibition of CB2 receptor.
a CB1 receptor-dependent mechanism. Differentially nibbling CB1 and CB2 receptor subtypes may provide a new avenue to treat eating and metabolic disorders.

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**T1.PO.039**

**A case of anorexia with extreme weight loss after a sleeve gastrectomy due to excessive pyy secretion. Improvement of symptoms with octreotide therapy.**

**Pucci A.1, Cheung W.H.1, Jones J.1, Kinget H.1, Doyle J.1, Adamo M.1, Jenkinson A.1, Elkalawy M.1, Finer N.2, Hashemi M.2, Batterham R.L.2**

1 University College London Hospitals, London, UK,
2 University College London, London, UK

**Background:** A 22 yr old lady underwent an uneventful sleeve gastrectomy (SG) [weight (w) 136 kg, BMI 47 kg/m²]. Her post-operative course was normal until 6 months post-surgery when she developed severe nausea, and reduced caloric intake. This resulted in excessive weight loss (2 yr post-SG w 56 kg, BMI 19.4 kg/m²). She underwent multiple investigations and organic and psychological causes of her weight loss were excluded. A random plasma gut hormone assessment revealed high circulating PYY levels (1200 pg/ml).

**Methods:** A 3-hour oral mixed test meal study after an overnight fast was performed to assess circulating PYY levels and subjective appetite at baseline and after 14 days treatment with octreotide 100 mcg subcutaneously three times a day. PYY levels were compared to samples from 10 post-SG ‘control’ patients.

**Results:** The patient had abnormally high fasted and nutrient-stimulated ‘control’ patients. Three times a day. PYY levels were compared to samples from 10 post-SG ‘control’ patients.

**Conclusion:** PYY is implicated in mediating appetite changes post-SG. Our case highlights that patients may develop an exaggerated PYY response following SG leading to nausea, and excessive weight loss. Moreover, octreotide therapy offers an effective treatment.

**T1.PO.040**

**Changes in appetite, food intake, and appetite regulating hormones during acute weight loss induced by roux-en-y gastric bypass and low-calorie diet**

**Bottin J.H.1, Thomas E.L.1, Balogun B.1, Bech P.R.1, Ghatei M.A.1, Moorothy K.1, Leeds A.R.2, Bell J.D.1, Frost G.S.1**

1 Imperial College London, UK,
2 University of Copenhagen, Denmark

**Introduction:** Roux-en-Y gastric bypass (RYGB) reduces appetite by increasing appetite regulating hormones such as PYY and GLP-1 (1). Although previous studies have compared the effects of RYGB on appetite with energy restriction alone using low-calorie diets (LCD), few studies have been able to match the weight loss induced by RYGB.

**Aim:** To compare the effect of comparable weight loss achieved by RYGB and LCD on appetite and energy expenditure.

**Methods:** Morbidly obese volunteers (n=20, BMI:40–55kg/m²) awaiting RYGB followed a liquid formula 810kcal/day LCD (Cambridge Weight Plan®, Northants, UK) for 2 weeks. After, they were randomly assigned to RYGB and standard post-operative diet (RYGB) or continuing the LCD (LCD) for another 4 weeks. Fasting and post-prandial ratings of appetite and blood samples were collected at baseline and at 6 weeks. PYY and GLP-1 concentrations were measured by RIA. Food intake was assessed during an ad-libitum meal.

**Results:** Weight loss at 6 weeks was similar in both groups (RYGB: 14.7 ± 0.6 kg; LCD: 13.5 ± 0.8 kg; NS; n=15). The RYGB group exhibited significant changes in appetite ratings at 6 weeks (table 1, figure 1). This was not observed in the LCD group. At 6 weeks, PYY and GLP-1 concentrations were significantly increased (figure 2) and food intake significantly decreased in the RYGB group only (RYGB baseline: 335± 46; RYGB 6 weeks: 57± 8, p = 0.0002; LCD baseline: 273± 48; LCD 6 weeks: 185± 21, p = 0.11).

**Conclusion:** Despite similar weight loss with LCD and RYGB, only the latter led to significant changes in appetite, in part through changes in GLP-1 and PYY levels. These changes in circulating gut hormones may favour weight loss sustainability in RYGB compared with LCD over the long-term.

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![Fig. 1. Appetite ratings and gut hormones concentrations (area under the curve) at baseline and at 6 weeks](image1)

![Fig. 2. Appetite ratings at baseline and at 6 weeks](image2)

![Fig. 3. GLP-1 and PYY concentrations at baseline and at 6 weeks](image3)

**T1.PO.041**

**Steviol glycosides from the sweetener stevia induce glp-1 secretion in intestinal organoids and stc-1 cells**

**van der Wielen N.1,2, ten Klooster J.P.1, Boekshoten M.1,2, Witkamp R.F.1,2, Meijerink J.2**

1 TF Food and Nutrition, Wageningen, The Netherlands,
2 Division of Human Nutrition, Wageningen University and, Wageningen, The Netherlands,
3 Department of Life Sciences, HU University of Applied Sciences, Utrecht, The Netherlands

**Introduction:** Since their approval by EFSA and FDA, steviol glycosides are increasingly used as sweetener in food products (EFSA, 2010). Howev-
er, despite extensive use in their effects, their effects on gastrointestinal hormone release have not been investigated in much detail. Here, we studied the effect of steviol glycosides on GLP-1, a key hormone in food intake regulation and insulin secretion.

**Methods:** Effects of steviol glycosides on gut hormone secretion were first measured in the murine enterocellur line cell, STC-1. Next, we used epithelial organoids, prepared from mouse stem cells, which give a better reflection of the normal cellular environment. To reveal the underlying mechanism behind the effect of steviol glycosides on GLP-1 secretion, transcriptomic changes and secondary messengers including intracellular calcium were measured.

**Results:** Steviol glycosides induced GLP-1 secretion in both ileal organoids and STC-1 cells. Data suggested the involvement of signalling pathways other than the classical sweet taste receptor signalling pathway as rebaudioside A did not increase intracellular calcium levels and G-protein alpha gustducin was absent in these cells. Transcriptomic analysis may give rise to new leads for alternative signalling routes.

**Conclusion:** Steviol glycosides induce secretion of the gut hormone GLP-1 in STC-1 cells and in murine ileum-derived organoids, suggesting that stevia products might influence intestinal food intake regulation and glucose homeostasis.

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**T1 – Bone & Muscle**

**T1.P0.042**

**Is undercarboxylated osteocalcin related with obesity measurements?**

**Erteş Y.**, **Gezen-Karadağ M.**

Gazi University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara, Turkey

**Introduction:** Undercarboxylated osteocalcin (ucOC) is one of a bone formation measure which found in circulating system higher than its fully carboxylated form. In recent years, a few studies found that plasma ucOC levels may be related with body mass index and body fat mass in type 2 diabetes. The aim of this study was to investigate the relationship between plasma ucOC levels and some obesity measurements in healthy subjects.

**Methods:** The study was carried out on 80 healthy male and female participants aged 25–50 years. Body weight (kg), body fat mass (kg) and body fat percentage (%) were taken with a bioelectric impedance analyzer and plasma ucOC levels (ng/mL) were determined with ELISA method. Body mass index (BMI) scores were divided into two groups as normal and overweight according to the WHO classification.

**Results:** According to BMI, 47.5% of all participants were overweight. Plasma ucOC levels were found lower in overweight participants than normal BMI participants (p < 0.05). In all participants, a poor negative correlation was observed between plasma ucOC levels and BMI, body fat mass and body fat percentage (p < 0.05). Whereas poor negative correlation was found between plasma ucOC levels and BMI, body fat percentage in female participants (p < 0.05); there was not any significant correlation in male participants (p > 0.05).

**Conclusion:** With this study, relationship between ucOC and BMI, body fat mass was shown for the first time in healthy normal and overweight people. Current study will be lead to plan further investigations about underlying mechanisms of these relationships and ucOC may be a potential therapeutic agent for obesity treatment.

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**T1.P0.043**

**Effects of body fat mass on bone in normal weight men and women: The Fourth Korean National Health and Nutrition Examination Survey (KNHANES IV).**

**Choi M.**, **Kwon Y.**, **Roh Y.**

1Department of Family Medicine, Kangnam Sacred Heart Hospital, College of Medicine, Hallym University, 948-1 Daerim 1-dong, Yeongdeungpo-gu, Seoul, Korea

**Background:** Osteoporosis & osteopenia are disorders characterized by reduced bone quality and increased fracture risk. In traditional paradigm, incidence rates of femoral neck and long-bone fractures in the underweight group were higher than the overweight or obese group. But the accumulation of fat (sp, abdominal depot) was found to be a risk factor of bone loss. This study was aimed to evaluate the association between bone health and body fat in normal-weight adult Korean.

**Methods:** Totally, 5515 adult (mean age 50.3) from the fifth Korean National Health and Nutrition Examination Survey (KNHANES V) were included in this study. Bone mineral densities (BMD) and body fat were measured using dual energy X-ray absorptiometry. Correlation analysis and regression analysis was used to evaluate relationship of body fat %, BMI and BMD. Cut off points of normal weight obesity is male 20.6, female 33.4 for body fat (%).

**Results:** Correlation analysis showed that BMDs of total femur, trochanter, intertrochanter, femoral neck, and lumbar spine were negatively associated with fat mass and positively associated with BMI in normal weight obesity. There was no statistically significant association between body fat % and BMD in normal weight non-obese men in total femur, intertrochanter, femoral neck, and lumbar spine. Regression analysis has similar results.

**Conclusion:** Body fat mass have a detrimental effect on BMD in normal weight obesity. But in normal weight non obese man, body fat mass is unclear effect about BMD.
Introduction: Dopamine receptor was down regulated in obese brain (Nummenmaa et al, 2012). Data are conflicting about the density of dopamine transporter in obese striatum. Furthermore, while striatal D2R availability is negatively associated with frontocortical glucose metabolism in obese patient (Volkow et al, 2004), the impact of obesity on striatal dopamine metabolism is unknown.

Methods: Fourteen adults mini-pigs were imaged for dopamine transporter and glucose metabolism in lean and obese conditions. Obesity was induced by high fat, high glucose diet supplied at 200% metabolic requirement (measured by indirect calorimetry) during 3 months. Brain glucose metabolism was obtained using PET imaging (HR+ Siemens) after the IV injection of 250 MBq FDG (IBA). The density of dopamine transporter was evaluated using SPECT imaging (Millenium, GE) after the IV injection of 180 MBq DatScan (GE). Sinograms were corrected for attenuation using STIR software. The amount of radioactivity was obtained using Pmod software adapted to our pig brain atlas.

Results: The animals almost doubled their weight during the three months high calorie, high fat/glucose diet (87 ± 4.4 versus 36 ± 3.9 kg). Striatal dopamine transporter density expressed as the ratio between striatum vs cerebellum was significantly less in the obese than in lean situation (1.8 ± 0.04 vs 1.6 ± 0.02, p < 0.01). Inversely, the striatal glucose metabolism expressed as the ratio between striatum vs cerebellum was significantly greater in the obese than in the lean condition (1.4 ± 0.02 vs 2.3 ± 0.02, p < 0.01). Identical figures were obtained with statistical parameter mapping analyses.

Conclusions: Our results demonstrated clearly a reduced density of striatal dopamine transporter in morbid obese animal. This was associated with an increased striatal metabolism that might compensate for changes in synaptic dopamine availability. This uncoupling might a critical mechanism to explain overeating in obesity.

Table 2: Association between FAT (%) and BMI

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T1 – Imaging

T1:PO.044

Uncoupling between striatal dopamine transporter and glucose metabolism in diet induced obesity

Malbert C.H.1, Coquery N.1

1Ani-Scans Unit, Dept of Human Nutrition, INRA, 59500 Saint-Gilles, France

Introduction: Dopamine receptor was down regulated in obese brain (Nummenmaa et al, 2012). Data are conflicting about the density of dopamine transporter in obese striatum. Furthermore, while striatal D2R availability is negatively associated with frontocortical glucose metabolism in obese patient (Volkow et al, 2004), the impact of obesity on striatal metabolism is unknown.

Methods: Fourteen adults mini-pigs were imaged for dopamine transporter and glucose metabolism in lean and obese conditions. Obesity was induced by high fat, high glucose diet supplied at 200% metabolic requirement (measured by indirect calorimetry) during 3 months. Brain glucose metabolism was obtained using PET imaging (HR+ Siemens) after the IV injection of 250 MBq FDG (IBA). The density of dopamine transporter was evaluated using SPECT imaging (Millenium, GE) after the IV injection of 180 MBq DatScan (GE). Sinograms were corrected for attenuation using STIR software. The amount of radioactivity was obtained using Pmod software adapted to our pig brain atlas.

Results: The animals almost doubled their weight during the three months high calorie, high fat/glucose diet (87 ± 4.4 versus 36 ± 3.9 kg). Striatal dopamine transporter density expressed as the ratio between striatum vs cerebellum was significantly less in the obese than in lean situation (1.8 ± 0.04 vs 1.6 ± 0.02, p < 0.01). Inversely, the striatal glucose metabolism expressed as the ratio between striatum vs cerebellum was significantly greater in the obese than in the lean condition (1.4 ± 0.02 vs 2.3 ± 0.02, p < 0.01). Identical figures were obtained with statistical parameter mapping analyses.

Conclusions: Our results demonstrated clearly a reduced density of striatal dopamine transporter in morbid obese animal. This was associated with an increased striatal metabolism that might compensate for changes in synaptic dopamine availability. This uncoupling might a critical mechanism to explain overeating in obesity.

Fig. 2. BMDs of total femur, trochanter, intertrochanter, femoral neck, and lumbar spine were negatively associated with fat mass and positively associated with BMI in normal weight obesity.

Fig. 3. There was no statistically significant association between body fat % and BMD in normal weight non-obese men in total femur, intertrochanter, femoral neck, and lumbar spine.
T1 – Immunometabolism

T1:PO.046
Acute hyperglycemia increases monocyte and T-lymphocyte content in subcutaneous adipose tissue of healthy obese women

Kračmerová J.1,2, Tencerová M.1,2, Krauzová E.1,2, Mayerová V.1,2, Koc M.1,2, Šiklová M.1,2, Šich V.1,2, Rossmeisslová L.1,2
1Franco-Czech Laboratory for Clinical Research on Obesity, Third Faculty of Medicine, Charles University in Prague, Prague 10, CZ-100 00 Czech Republic, 2Department of Sport Medicine, Third Faculty of Medicine, Charles University in Prague, Prague, Cz-100 00 Czech Republic

Background/Objectives: Hyperglycemia represents one of possible mediators for activation of immune system. It might contribute to worsening of inflammatory state of adipose tissue associated with obesity and thus accelerate the development of metabolic syndrome. The aim of our study was to investigate the effect of a short-term hyperglycemia (HG) on the phenotype and relative content of immune cells in subcutaneous abdominal adipose tissue (SAAT) in obese women without metabolic complications.

Subjects/Methods: Three-hour HG clamp combined with infusion of octreotide (to block insulin secretion) and control investigations with infusion of either octreotide or saline were performed in three groups of obese women (n=10 per group). Before and at the end of the interventions, samples of SAAT were obtained by needle biopsy. The relative content of immune cells in SAAT was determined by flow cytometry. Gene expression analysis of immunity-related markers (chemokines/cytokines, markers of macrophages and lymphocytes, Toll like receptors) in SAAT was performed by quantitative real-time PCR.

Results: In SAAT, HG induced an increase in the content of CD206 negative monocytes/macrophages (4.9 ± 0.5% vs. 5.6 ± 0.5%, p < 0.05) and T lymphocytes (T helper and T cytotoxic lymphocytes; 3.4 ± 0.3% vs. 5.6 ± 0.5% and 1.9 ± 0.2% vs. 3.1 ± 0.2% respectively, p < 0.001). Further, HG promoted an increase of mRNA levels of immune response markers (CCL2, TLR4, TNFα) and lymphocyte markers (CD3g, CD4, CD8a, TBBX1, GATA3, FoxP3) in SAAT (p < 0.05). Under both control infusions, none of these changes were observed.

Conclusions: Acute HG increased the content of monocytes and lymphocytes in SAAT of healthy obese women. This result suggests that the short-term HG can modulate an immune status of AT in obese subjects.

Acknowledgement: This work was supported by grant IGA NT 144 86 of Ministry of Health, Collaborative Project ADAPT (www.adapt-eu.net) Contract No. HEALTH-F2-2008-2011 00, UNCE 204015 of Charles University and by grant GAP301/11/0748 of the Grant Agency of the Czech Republic.

T1:PO.047
Role of interleukin 15 in liver fat accumulation in patients with concomitant obesity

Fodieienko G.D.1, Babak O.Y.1, Kolesnikova O.V.1, Solomentseva T.A.1, Kuring O.G.1, Sytnyk K.O.1
1Department of liver and gut diseases, GI

Background: non-alcoholic fatty liver disease (NAFLD) and obesity are associated with low grade inflammation. Experimental data suggest crucial role of interleukin 15 (IL-15) in NAFLD development. Y. Cepero-Donates et al. showed that exceeded secretion of IL-15 promotes fat accumulation in mice. The aim was to investigate IL-15 concentration in patients with NAFLD associated with obesity depending on steatosis degree. The study included 32 patients with NAFLD associated with obesity, 31 normal weight patients with NAFLD and 26 healthy volunteers.

Methods: NAFLD was diagnosed by abdominal ultrasound examination. Steatosis degree was assessed using hepaticoreal index (HRI). Obesity was measured using body mass index (BMI) and waist circumference (WC).

Concentration of IL-15 were measured using enzyme-linked immunosorbent assay kit. The results showed that IL-15 concentration was significantly increased in patients with NAFLD comparing to control group. Concentrations of IL-15 observed in NAFLD patients with concomitant obesity were significantly higher than those in NAFLD patients with normal weight (p < 0.05). In all NAFLD patients IL-15 correlated with HRI supporting its role in hepatic fat accumulation. Furthermore, in patients with NAFLD there was significant correlations of IL-15 concentration with BMI (p < 0.05) and WC (p < 0.05).

Conclusions: patients with NAFLD and concomitant obesity might have more significant proinflammatory status that could be caused by adipose tissue dysfunction and abnormal adipocytokines synthesis. Exceeded IL-15 observed in NAFLD patients with obesity supports its role in liver lipid accumulation found in experimental studies. Further investigations are needed to explore correlations of IL-15 with histological findings in NAFLD obese patients.

T1:PO.048
Effect of diet and cd36 deficiency on murine mesenteric lymph nodes

Geys L.1, Linen H.R.1, Scroyen L.1
1Center of Molecular and Vascular Biology, KU Leuven, Leuven, Belgium

Introduction: Mesenteric lymph nodes (MLN) of diet-induced obese mice are smaller than those of lean mice because of atrophy of lymphocytic cells. Cluster of differentiation (CD)36 contributes to high fat diet induced obesity (DIO) and is expressed on lymphocytes.

Methods: Five weeks old male wild-type (WT) and CD36 deficient (CD36⁻/⁻) mice were kept on standard fat diet (SFD, lean) or on high fat diet (HFD, obese) for 15 weeks. Macrophage content and lymphocyte populations of MLN were analyzed by FACS.

Results: DIO, as compared to SFD feeding, was associated with significantly smaller MLN in WT mice, but not in CD36⁻/⁻/ mice. MLN of obese versus lean mice showed lower prevalence of cytotoxic T cells (Tc; CD8⁺), helper T cells (TH; CD4⁺), activated T cells (Tact; CD4⁺CD25⁺) and regulatory T cells (Treg; CD4⁺FoxP3⁺CD25⁺). These differences were not observed between MLN of obese and lean CD36⁻/⁻ mice. Treg cell content in MLN of WT, but not CD36⁻/⁻ mice correlated positively with MLN size. MLN macrophage content was lower for lean than obese WT mice, but was significantly higher for lean as compared to obese CD36⁻/⁻ mice. Overall, MLN of obese CD36⁻/⁻ mice contained significantly fewer macrophages as compared to obese WT mice. Analysis of apoptotic markers in MLN revealed lower expression of annexin V and caspase 3 (pro-apoptotic) in MLN of obese CD36⁻/⁻ versus WT mice, and higher expression of annexin V and FasL for lean CD36⁻/⁻ versus lean WT mice. Caspase 8, Caspase 9, Bax, AIF, Bid2 and XIAP were not affected by neither diet or genotype, thus not supporting differences in apoptosis.

Conclusion: DIO in WT mice, as compared to lean mice, is associated with smaller MLN, lower prevalence of TC, TH, Tact and Treg cells. CD36⁻/⁻ mice appear to be protected against these changes.

Acknowledgement: Skilled technical assistance by J. Creemer (Clinical Immunology, KU Leuven, Leuven, Belgium) and C. Vranckx is gratefully acknowledged.

T1:PO.049
Nesfatin-1 levels are significantly increased after weight loss induced by bariatric surgery

Krzizek E.C.1, Brix J.M.1, Hoebaus C.1, Kopp H.P.1, Feder A.1, Ludvik B.1, Schernthaner G.1, Schernthaner G. H.1
1Department of Medicine II, Medical University of Vienna, Vienna, Austria, 2Department of Medicine I, Rudolfstiftung Hospital, Vienna, Austria

Background and aims: Nesfatin-1 was recognized as a central novel anorexigenic modulator of food intake and body weight. Thus, nesfatin-1 might be a target to influence hunger and satiety. The peripheral mode

Abstracts

Concentration of IL-15 were measured using enzyme-linked immunosorbent assay kit. The results showed that IL-15 concentration was significantly increased in patients with NAFLD comparing to control group. Concentrations of IL-15 observed in NAFLD patients with concomitant obesity were significantly higher than those in NAFLD patients with normal weight (p < 0.05). In all NAFLD patients IL-15 correlated with HRI supporting its role in hepatic fat accumulation. Furthermore, in patients with NAFLD there was significant correlations of IL-15 concentration with BMI (p < 0.05) and WC (p < 0.05).

Conclusions: patients with NAFLD and concomitant obesity might have more significant proinflammatory status that could be caused by adipose tissue dysfunction and abnormal adipocytokines synthesis. Exceeded IL-15 observed in NAFLD patients with obesity supports its role in liver lipid accumulation found in experimental studies. Further investigations are needed to explore correlations of IL-15 with histological findings in NAFLD obese patients.
of action of nesfatin-1 is less clear, however, it might have an impact on glucose homeostasis. Therefore, it was of interest to investigate nesfatin-1 levels in patients before and after weight loss induced by bariatric surgery (BS) and their respective relation to glucose homeostasis.

Materials and methods: We included 63 non-diabetic patients (mean age: 42 ± 11 years, mean±SEM; mean BMI: 46.7 ± 7.0 kg/m²) with morbid obesity (MO), who were investigated before and 2 years after BS. Glucose tolerance was assessed by an oral glucose tolerance test (75gms). Nesfatin-1 levels were assessed by a commercial ELISA.

Results: BMI was reduced from 46.5 ± 7.7 to 31.9 ± 6.0 (p < 0.001). Nesfatin-1 levels increased (3.49 ± 1.26 vs 7.96 ± 2.18 ng/ml; p < 0.001) and 2h post challenge blood glucose (BG) levels decreased (110 ± 36 vs 60 ± 19, p < 0.0001) 2 years after bariatric surgery. Preoperative no correlation could be found. Postoperative fasting nesfatin-1 levels correlated significantly with 2h post challenge BG (r = –0.289; p = 0.049). The change in fasting nesfatin-1 levels correlated with the change in 2h BG levels (r = –0.502; p = 0.001). The change in nesfatin-1 levels was not correlated with the change in body weight.

Conclusion: This is the first study demonstrating increased nesfatin-1 levels in morbidly obese patients after weight loss induced by BS. The correlation of nesfatin-1 levels with 2h BG, however not with bodyweight, suggests a role of nesfatin-1 in improved glucose tolerance following BS.

T3 – Nutrients and diet patterns

T3.PO.001

Systematic Review on the determinants of Fruit and Vegetable consumption in young children (aged 0–6)

O’Malley C.1,2, Mazzarello Pao V.1, Hesketh K.3, Moore H.J.1,4, Ong K.3, van Sluijs E.1,5, Lakshman R.6,7, Summerbell C.D.1,2

1School of Medicine, Pharmacy and Health, Durham University, UK.
2FUSE – UKCRC Centre for Translational Research in Public Health, UK.
3Institute of Child Health, Public, Policy and Practice, University College London, UK.
4CEDAR- UKCRC Centre for Diet & Activity Research, University of Cambridge, UK.
5MRC Epidemiology Unit, University of Cambridge School of Clinical Medicine, Cambridge, UK.

Introduction: A diet rich in fruit and vegetables (F&V) in young children can reduce the risk of obesity. Identifying determinants, including barriers and facilitators, of F&V consumption in young children, is needed to design effective and sustainable interventions.

Methods: A systematic review of both quantitative (prospective cohort and intervention studies) and qualitative evidence was conducted. Eight electronic databases were searched in June 2012.

Results: 49 papers were included (29 intervention, 7 prospective cohort, 13 qualitative). Increased parental knowledge, education, higher socioeconomic status (SES), and children’s liking/preference for specific F&V, were all positively associated with an increase in F&V consumption. Maternal feeding practices, particularly modelling of healthful dietary behaviours, were positively associated with a higher F&V consumption. In contrast, parental pressure to eating healthy foods, or restricting the consumption of unhealthy foods, was found to have a detrimental effect on child F&V consumption. A number of barriers and facilitators to F&V consumption in young children were identified; accessibility, cost of food, temperament behaviours of the child, lack of transport, convenience of unhealthy food, and time constraints.

Conclusion: Interventions for the prevention of obesity in young children should include should include a focus on maternal modelling of healthful dietary behaviours, and address the barriers and facilitators to F&V consumption identified in this review. The protocol for this systematic review has been registered with PROSPERO (registration no. CRD42012002881) and published (Lakshman et al. Systematic Reviews 2013; 2:28).

T3.PO.002

Comparing effects of a partial meal replacement diet plan with conventional diet on weight loss, fat mass, chemerin, insulin and peptide yy levels, and inflammation in obese men

Khoo L.1, Ling PS.2, Yap S.Y.1, Chen D.D.1, Dhamodaran S.4

1Department of Endocrinology, Changi General Hospital, Singapore.
2Department of Dietetics and Nutrition, Changi General Hospital, Singapore.
3Clinical Trials and Research Unit, Changi General Hospital, Singapore.
4Department of Gastroenterology, Changi General Hospital, Singapore.

Background: Meal replacements (MR) reduce energy density (ED). Levels of the anorectic gut hormone peptide YY (PYY) increase with high-protein low-ED diets and facilitate weight loss. The adipokine chemerin, which promotes insulin resistance and inflammation, increases in obesity and decreases with weight loss. We compared effects of an MR-based diet and a reduced-fat (< 30% of calories) conventional diet (CD) on weight loss, waist circumference (WC), body fat mass, chemerin, fasting PYY and insulin levels, and inflammation in obese men.

Methods: Obese (mean body mass index index 32.9 kg/m², range 30.5–42.3) men (mean age 40.2 years, range 30–61) were randomized to a CD (n= 23) or an isocaloric plan including 1–2 MR/day (MR group, n= 23), to reduce intake by 500 kilocalories/day for 12 weeks.

Results: At 12 weeks, weight, WC, fat mass, serum chemerin, insulin and high-sensitivity C-reactive protein (marker of systemic inflammation) reduced more in the MR group (–4.1 ± 3.7 kg; –4.79 ± 3.33 cm; –2.47 ± 3.63 kg; –11.2 ± 12.1 mg/ml; –5.5 ± 1.04 mU/L; –2.20 ± 3.46 mg/L) than in the CD group (–2.63 ± 1.86 kg; –5.22 ± 2.27 cm; –1.59 ± 2.32 kg; –7.6 ± 1.37 mg/L; –3.4 ± 5.7 mU/L; –1.22 ± 3.60 mg/L). In the MR but not the CD group, serum PYY increased (11.4 ± 19.4 versus –4.6 ± 10.3 pg/ml), and was associated (r = 0.35, p = 0.03) with a significant increase in proportion of energy intake from protein (3.2 ± 0.9%) which did not occur with CD (0.6 ± 1.0%).

Conclusions: MR-based diets are more effective for inducing reductions in weight, fat mass, chemerin, insulin and systemic inflammation. The use of MR was associated with higher proportion of energy intake from protein, which may increase PYY level and promote weight loss.

Acknowledgement: We thank all the men who participated in the study.

T3.PO.003

Assessment of dietary sodium intake by spot urine and by a food frequency questionnaire: Validation against 24 hour urine collection

Chourcarr S.1, Naja F.1, Aki C.1, Helou R.1, Ismael H.2,3, Nasredeine L.1,3

1Department of Nutrition and Food Science, Faculty of Agricultural and Food Sciences, American University of Beirut, P.O.Box: 11-0236 Riad El Solh 1107-2020, Beirut, Lebanon.
2Division of Cardiology, Department of Internal Medicine, American University of Beirut, P.O.Box: 11-0236 Riad El Solh 1107-2020, Beirut, Lebanon.
3Vascular Medicine Program, American University of Beirut Medical Center, P.O.Box: 11-0236 Riad El Solh 1107-2020, Beirut, Lebanon.

Background: Recent evidence suggests a link between salt intake and increased risk of obesity, but the assessment of dietary salt intake may be limited by several methodological factors. This study aims at evaluating the validity of spot urine sodium (Kawasaki equation) and a short FFQ in assessing sodium intake in Lebanese adults. The 24 hour urine sodium excretion is used as the gold standard.

Methods: A convenience sample of 88 subjects provided a 24 hour urine collection and a food frequency questionnaire: Validation against 24 hour urine collection.

Results: The intra class correlation coefficient to evaluate the reliability of the FFQ was of 0.87. A significant correlation was found between Na
Abstracts

24h (mean= 3632.29 ± 1765.13 mg/day) and Na FFQ (4131.13 ± 1566.52 mg/day) (r=0.568), and the mean difference (498.83 ± 1732.06 mg/d) was not significantly different from zero. Classification agreement was of 51% and the weighted kappa value was of 0.416, indicating moderate agreement. Spearman correlation coefficient between Na spot and Na 24h was high and significant (r= 0.647), but the mean difference (736.54 mg/d) was significantly different from zero. Classification agreement was of 57%, weighted kappa value of 0.481, indicating moderate agreement.

Conclusion: These results suggest that there is moderate agreement between the FFQ, spot urine and 24 hour urine collection in estimating sodium intake, but the results may be limited by the small sample size.

Acknowledgement: The authors would like to acknowledge all study subjects for participating in the study. The authors would also like to acknowledge the support of Mr. Mohamad El Medawar and Ms. Maya El Mokdad for their help during data collection.

T3.P.O.004
Paternal occupation: A socioeconomic factor influence the association between protein intake and body composition among children and adolescents in south china

Yang M., Xu H., Duan R., Liu Y., Cheng G.
1Department of nutrition, food safety and toxicology, West China School of Public Health, Sichuan University, Chengdu, China

Introduction: Paternal occupation is a socioeconomic factor both related to childhood diet and body composition. Our aim was to examine whether protein intake is associated with body composition among children with different paternal occupation in South China.

Methods: 1716 participants (46% girls) aged 6–16 years were cross-sectionally recruited. Daily intakes of protein were obtained by 3-d 24h dietary recalls. Height, weight and skinfold thickness were measured to calculate body mass index SD score (BMI SDS), percentage of body fatness (%BF), fat mass index (FMI) and fat-free mass index (FFMI). Information on socioeconomic status was collected by questionnaire. The associations between total/animal/vegetable protein intake and BMI SDS, %BF, FMI and FFMI were investigated using multiple linear regression analysis for girls and boys with different paternal occupation, respectively.

Results: Girls with higher total/animal protein intake had higher %BF and FMI in paternal occupation group of temporal employment after adjusted for breast-feeding, maternal overweight, carbohydrate intake and physical activity level (p < 0.05). Among girls whose fathers were blue-collar workers, animal protein intake was negatively associated with BMI SDS, %BF, FMI and FFMI, while girls with higher vegetable protein intake had higher FMI and FFMI (p < 0.05). In addition, animal and vegetable protein intake were positively associated with BMI SDS in girls with paternal occupation of white-collar worker and liberal profession, respectively (p < 0.05). There was no relation of protein intake with body composition in boys with different paternal occupation.

Conclusion: Protein intake might be related to body composition among girls in South China, which is largely dependent on paternal occupation. Corresponding author: Cheng G.

T3.P.O.005
To investigate the relationship between body mass index and serum vitamin d levels in healthy adults

Geng F N., Gezmen-Karadag M., Ertaş Y.
1Ankara Kecioren Eğitim Arastirma Hastanesi, Ankara, Turkey,
2Gazi University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara, Turkey

Introduction: This study was conducted on 102 female and 40 male participants between 19–50 ages. The participants have not any chronic disease. The aim of the study is to investigate the relationship between body mass index and serum vitamin D levels in adults.

Methods: A questionnaire was administered to the participants in order to determine the general characteristics and physical activity status of them. The energy and nutrient intakes within one day was recorded with 24-hour dietary intake form in a period of three days. Anthropometric measures were taken with a bioelectric impedance analyser. Serum vitamin D levels (ng/mL) were determined.

Results: According to the study result, none of the participants has sufficient (≥30 ng/mL) serum vitamin D level. There is no statistically significant difference (p > 0.05) between the groups of the participants with respect to the relationship between serum vitamin D levels and body mass index (kg/m²), height (cm), body weight (kg), waist circumference (cm), hip circumference (cm), total body water (kg), body muscle mass (kg). The only statistically meaningful (p < 0.05) result is that; the ratio of body fat decreases with an increase of serum vitamin D level in female participants. However, this is not the case for male participants (p > 0.05).

Conclusion: Vitamin D deficiency and insufficiency is common in participants, especially in females. Due to vitamin D has an important physiological effect for the body, serum vitamin D levels should be within the recommended level.

T3.P.O.006
Effect of an acute high carbohydrate diet on body composition using DXA in young men

David-Riel S., Rouillier M.A., Brazeau A.S., St-Pierre D.H., Karelis A.D.
1Department of kinanthropology, Université du Québec à Montréal, Montreal, Canada,
2Department of Medicine, McGill University, Montreal, Canada

Introduction: The use of dual-energy X-ray absorptiometry (DXA) for the measurement of body composition is common in both clinical practice and in research protocols. However, a limitation of the DXA is that it cannot measure total body water content, which could affect the results of lean body mass (LBM) due to a significant change in muscle water content (e.g. changes in glycogen levels). To our knowledge, no study has been conducted to validate or not the need to standardize a diet before using the DXA.

Objective: To investigate the effect of an acute high carbohydrate diet (≥75% of total calories) on body composition using DXA.

Methods: Ten young healthy men (age: 23.4 ± 2.8 years; BMI 23.6 ± 2.3 kg/m²) completed the study. Three DXA (day 0, 3 and 6) were performed for the measurements of fat mass and LBM. Between day 0 and 3, the subjects followed a normal diet. Thereafter, between day 3 and 6, participants were prescribed a high carbohydrate diet for 3 days and completed a food diary to determine the percentage of carbohydrates consumed.

Results: Mean percentage of carbohydrate intake over 3 days was 88.3 ± 13.4%. Mean LBM values for the 3 measurements (day 0 vs. 3 vs. 6) were: 59.4 ± 7.2 vs. 60.0 ± 8.0 vs. 60.4 ± 7.4 kg. Our results show a significant increase in LBM between the first and third DXA measure. In addition, we observed a significant difference in total body weight between the first and third DXA measure. No significant difference was observed between the 3 measures for body fat percentage (13.0 ± 5.4 vs. 12.6 ± 5.4 vs. 12.8 ± 5.5%).

Conclusion: These preliminary results indicate that the effect of an acute high carbohydrate diet seems to affect LBM values using DXA. This study may lead to the need of standardizing a diet prior to using the DXA.
T3.P0.007
Diet quality is associated with obesity risk among adults: A cross-sectional study in South China
Duan R., Liu Y., Xue H., Yang M., Su X., Cheng G.1,2
1Department of nutrition, food safety and toxicology, West China School of Public Health, Sichuan University, Chengdu, P.R. China,
2West China School of Public Health, Sichuan University, Chengdu, P.R. China.

Introduction: The association of overall diet quality with obesity risk has been investigated widely in western countries. However, literature is quite limited among adults in China. Our aim was to identify whether diet quality, characterized by a predefined score, was associated with obesity risk in Chinese adults.

Methods: 572 adults aged 25–65 years were randomly selected in South China. Dietary data from 3-d 24h dietary recalls were used to calculate Chinese Dietary Index for Preventing Non-communicable Chronic Diseases (CDI-NCD), which was developed based on energy requirement level of adults. CDI-NCD comprised 18 components (7 food groups, 7 nutrients and 4 behaviour indicators), with higher score indicating better diet quality. Height, weight, waist and hip circumference were measured to calculate body mass index (BMI) and waist-to-hip ratio (WHR). Multiple linear regression models were used to examine associations between diet quality and BMI, WHR.

Results: Subjects with normal weight had better diet quality than those with excess weight (p = 0.004). Higher diet quality was significantly associated with lower obesity prevalence (3.1% for the highest diet quality tertile vs 17.9% for the lowest diet quality tertile, p = 0.03). Subjects whose diet quality was in the highest tertile had lower BMI and lower WHR than those diet quality was in the lowest tertile [BMI, median (95% CI): 23.11 (21.42, 24.79) vs 24.61 (22.98, 26.24), respectively; p for trend=0.02; WHR: 0.85 (0.82, 0.88) vs 0.88 (0.85, 0.91), respectively; p for trend=0.04; adjusted for gender, age, physical activity and income level].

Conclusion: A high-quality diet is associated with reduced obesity risk among Chinese adults. This relation should be investigated in further data with longitudinal study design.

T3.P0.008
Do Mexican Parent Preferences of Foods have any effect on their weight status?
De Lira-García C., Jiménez-Cruz A., Bacardí-Gascón M.,1
1Universidad Autónoma de Baja California, Escuela de Enología y Gastronomía, 2Universidad Autónoma de Baja California, Facultad de Medicina y Psicología

Introduction: Parents food preference (PFP) can determine children food preferences and they have been related to childhood overweight and obesity of both parents and children. The aim of the study was to identify PFP and to examine their associations with family characteristics, and parents overweight (OW) and obesity (OB).

Methodology: 1103 Mexican parents participated in this study. PFP, level of education, income and body mass index were assessed. A list of 53 foods usually consumed by Mexican families was applied at baseline and a year later. The association between baseline PFP and a year later, level of education, income and BMI was assessed with the Chi-square and Fisher correction.

Results: Most parents were female (87%), their average age was 35 ± 7y, and 62% were OW/OB. A year later, people with obesity at baseline were more likely to prefer sweetened beverages (p = 0.01) than normal weight and were less likely to prefer vegetable soup (p = 0.01). Parents that preferred pears, cucumbers and yogurt at baseline were less likely to have obesity one year later (OR=0.26, IC 95%, 0.12–0.58, p = 0.001), and those who preferred coffee were more likely to have obesity (OR=3.72, IC 95%, 1.25–11.04, p = 0.018). No association with level of income or years of education was found.

Conclusion: Preference of pears, cucumbers and yogurt decrease the odds of being obese and preference of coffee increase the odds for obesity a year later.

T3.P0.009
Comparison of Diet Quality According to Body Mass Index and Conicity Index in Adults
Koksal E., Yılmaz H., Karacil M.S.1
1Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara, Turkey

Introduction: It is known that adequacy and diversity of nutrients and food groups are important for promoting health. Prevalence of obesity is increasing due to the inadequate and imbalanced or excessive nutrition. In this study, it is aim to compare the diet quality of individuals according to BMI classification and conicity index.

Methods: This study was carried out with 494 individuals including 183 female and 311 male adults mean age 32.9 ± 10.80 years. Anthropometric measurements (body weight, height, waist circumference) and 24-hour dietary recall of the individuals were obtained. Dietary qualities of the individuals were evaluated using the Healthy Eating Index 2010 and Mean Adequacy Ratio. The dietary qualities were evaluated according to BMI classifications and conicity index score.

Results: It is found that 54.6% of individuals are normal weight, 30.2% are overweight and 15.4% are obese. It was not determined significant difference mean MAR values between groups (p < 0.05). There was positive correlation between conicity index value with MAR value (r: 0.132; p: 0.003) and between BMI with HEI 2010 values (r: 0.121; p: 0.007).

Conclusion: Diet quality of individuals are associated with obesity and chronic disease risk in several studies. Evaluating diet by different perspective and developing suggestions for personal is provided to prevent obesity.

T3.P0.010
Regular consumption of pistachio modulates plasma lipoprotein subclasses in pre-diabetic subjects
Hernández-Alonso P.,1 Salas-Salvadó J.,1,2,3 Baldrich-Mora M.,1,2,3 Mallol R.,1 Correig X.,1 Bulló M.1,2
1Human Nutrition Unit-URV-IISPV, Reus, Spain, 2CIBERObn-ISCIII, Spain, 3Metabolomic Platform, CIBERdem-ISCIII, URV-IISPV, Reus, Spain

Introduction: The beneficial effect of nut consumption on cardiovascular risk factors is widely known. However, analysis of conventional lipid profiles does not completely explain the atherogenic risk associated with pre-diabetes. We investigated whether chronic consumption of pistachios changes the lipoprotein subclasses to a healthier profile in pre-diabetic subjects.

Methods: A randomized cross-over clinical trial in 54 subjects with pre-diabetes was conducted. Subjects consumed a pistachio-supplement-diet (PD, 50% carbohydrates, 33% fat, including 57g of pistachios daily) and a control diet (CD, 55% carbohydrates, 30% fat) for 4 months each, separated by a 2-week wash-out. Diets were isocaloric and matched for protein, fiber and saturated fatty acids. Nuclear magnetic resonance was performed to determine changes in particle composition and size of plasma lipoproteins through the intervention periods.

Results: Small low-density lipoprotein particles (sLDL-P) significantly decreased under the PD compared to CD (P = 0.041). The percentage of sHDL-P increased by 2.23% after the PD compared with a reduction of 0.08% after the CD (P = 0.014). Consequently, the overall size of HDL-P significantly decreased in the PD (P = 0.007).
Conclusion: These data suggest that regular pistachio intake modifies the lipoprotein particle size and subclass concentrations independently of changes in the total plasma lipid profile. These findings support the need of elucidating alternative mechanisms whereby a pistachio-rich diet could decrease the risk of cardiovascular disease and mortality.

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T3:PO.011
Satietiy-promoting green-plant membranes promote weight-loss and decrease risk factors for metabolic diseases
Montelius C.1, Stenblom E.L.1, Egecioglu E.1, Erlanson-Albertsson C.1
1Dept. of Experimental Medical Science, Appetite Regulation Unit, Lund University, Sölvegatan 19,
2184 Lund, Sweden

T3:PO.012
Specific dietary patterns associated with metabolic syndrome in korean adults
Kang Y.1, Kim J.1,2
1Department of Medical Nutrition, Graduate School of East-West Medical Science, Kyung Hee University, Yongin 446-701, South Korea,
2Research Institute of Medical Nutrition, Kyung Hee University, Seoul 130-701, South Korea
Introduction: Dietary patterns are found to be associated with metabolic risk factors. We explored the association between dietary patterns and the risk of metabolic syndrome in the general Korean population using the most recent nationally representative survey data.

Methods: A total of 13,410 Korean adults (aged ≥19 years) who participated in the fifth Korean National Health and Nutrition Examination Survey were studied. Dietary intake was assessed by the 24-hour recall method. Food items were categorized into 24 food groups based on common food groups classified in the Korean Nutrient Database. Metabolic syndrome was defined by the joint interim statement of the International Diabetes Federation and the American Heart Association/National Heart, Lung, and Blood Institute. Data were analysed using SAS software version 9.3.

Results: Three dietary patterns were derived using factor analysis: traditional, westernized, and healthy. The traditional pattern was positively associated with hypertriglyceridemia (P = 0.0169), low high-density lipoprotein-cholesterol (P = 0.0179) and metabolic syndrome (P = 0.0138)

T3:PO.014
Effect of meal frequency on glucose levels in women with polycystic ovary syndrome: A randomized trial
Papakonstantinou E.1, Kechnirari I.2, Mitrou P.1, Trakakis E.1,2, Vassiliadi D.1, Georgoussonopoulou E.1, Zampelas A.1, Kontogianni M.D.1, Dimitriadis G.1
1Department of Food Science and Human Nutrition, Agricultural University of Athens, Greece,
2Department of Nutrition and Dietetics, Harokopio University, Athens, Greece,
3Hellenic National Center for Research, Prevention and Treatment of Diabetes Mellitus and its Complications (H.N.D.C.), Athens, Greece,
43rd Department of Obstetrics and Gynecology, University of Athens, Attikon University Hospital, Hadari, Greece,
52nd Department of Internal Medicine, Research Institute and Diabetes Center, Athens University Medical School, Attikon University Hospital, Hadari, Greece
Aims/Hypothesis: The aim of the study was to compare the effect of two meal patterns (threesix meals per day) on glucose levels in women with polycystic ovary syndrome (PCOS).

Abstracts
Obesity Facts 2015;8(suppl 1):1–247
73
T3:PO.013
E to the healthy Nordic diet promotes normal body composition in Finnish men
Kanerva N.1, Baroudulin K.1, Jouissiahi P.1, Kaartinen N.E.1, MAukonen M.1, Mannisto S.1
1Department of Health, National Institute for health and Welfare, Helsinki, Finland
Introduction: It has been shown that a healthy diet can be constructed of Nordic foods. We assessed whether the healthy Nordic diet, measured using the Baltic Sea Diet Score (BSDS), is associated with obesity measures (body mass index (BMI), waist circumference (WC) and body fat percentage (BF%)).

Methods: This study included 4812 Finns (25–74 y) from the National FINRISK 2012 Study who filled in a validated food frequency questionnaire. Participants’ weight, height, WC, and BF% (TANITA TBF-300MA) were measured. The BSDS was calculated giving higher points for high consumption of Nordic fruits and berries, vegetables, cereals, ratio of polysaturated to saturated and trans fatty acids, low-fat milk, and fish, and for low consumption of red and processed meat, total fat (E%), and alcohol. The BSDS ranged from 0–25, higher points indicating higher adherence. Linear regression was used to analyse cross-sectional associations between the BSDS and obesity measures. Logistic regression was used to analyse the risk for having excess BMI (≥25 kg/m²), WC (men ≥100 cm, women ≥90 cm) or BF% (men >20%, women >30%).

Results: The BSDS had an inverse linear association with WC and BF% in men (P <0.05), but not in women. Furthermore, men and women in the top versus lowest BSDS quintile had lower risk of excess BMI, WC and BF% when age and energy intake were adjusted for. After adjusting for educational level, smoking status, and leisure-time physical activity, only the risk of excess BF% remained significantly lower in men (OR 0.80; 95% CI 0.54-1.00; P <0.05).

Conclusion: These results support the earlier findings that the healthy Nordic diet is associated with lower obesity measures in men and can be promoted as a healthy-weight diet in Finnish population.
Methods: In a randomized, crossover, 24 weeks study, 40 women with PCOS, aged 27 ± 6 years, body mass index (BMI) 27 ± 6 kg/m², followed a weight maintenance diet (%carbohydrates:protein:fat, 40:25:35), consumed either as a three- or a six-meal pattern, with each intervention lasting for 12 weeks. Anthropometric measurements, diet compliance and subjective hunger, satiety and desire to eat were assessed biweekly. All women underwent an oral glucose tolerance test with 75g glucose for measurement of plasma glucose and insulin at the beginning and end of each intervention. HaemoglobinA1c(HbA1c), blood lipids and hepatic enzymes were measured at the beginning and end of each intervention.

Results: Body weight remained stable throughout the study. Six- meals decreased significantly fasting insulin (p = 0.014), fasting insulin resistance (HOMA-IR, p = 0.026) and post-OGTT insulin sensitivity (Matsuda index, p = 0.039) vs three-meals. After incorporation of individual changes over time, with adjustment for potential confounders, the only variable that remained significant was the Matsuda index, which was then used in multivariate analysis and general linear models. Six-meals improved post-OGTT insulin sensitivity, independently of age and body weight vs. three-meals (p = 0.012). No significant differences were found between six- or three-meals for glucose, HbA1c, blood lipids, hepatic enzymes, subjective desire to eat and satiety.

Acknowledgement: The authors are grateful to Vasso Fragaki, head nurse of the Diabetes Center of Atikom University Hospital, for conducting the participants' oral glucose tolerance test procedure. The authors are also grateful to Maria-Assimina Gerama, clinical dietitian, for her valuable help with patient nutrition education and for conducting anthropometric measurements.

T3.PO.016
Investigation of the effect of calcium consumption by diet on the body composition and blood values in women with and without metabolic syndrome
G Aziz Ayhan 1, Bas M 1, Işildak M 2
1Health Science Faculty, Department of Nutrition and Dietetics, Acibadem University, Istanbul,
2Endocrinology Department, Gazi University, Ankara, Turkey

Introduction: This study is executed by totally premenopausal 146 women between 19 and 52 years old who have applied to Başkent University Ankara Hospital Endocrinology Polyclinics between August and December 2012.

Methods: In this study, it is intended to investigate the effect of calcium consumption by diet on the body composition and blood values in women with and without metabolic syndrome. Metabolic syndrome diagnosis is made according to ATP III criteria. A questionnaire form is applied in order to specify the general properties, nutrition habits and physical activity status of the patients. Calcium consumption is determined by using food consumption frequency form.

Results: 82.5% of the women in the case group has <800 mg calcium intake per day and 78.3% in the control group has <800 mg calcium intake. A negative correlation is found between the abdominal fat ( r= −0.175, p = 0.034), diastolic (r= −0.251, p = 0.002) and systolic (r= −0.279, p < 0.001) blood pressures via the calcium intake. The difference is statistically found significant. Case and control groups are compared in terms of body fat %, abdominal fat kg, muscle kg, water kg and the differences are found as statistically significant (p < 0.001). The serum calcium (p < 0.001), parathyroid (p = 0.244), phosphosph (p = 0.729) and vitamin D (p = 0.222) levels of case and control groups are examined. The serum calcium level difference between the groups are found statistically significant (p < 0.001), but on the other hand the differences in parathyroid, phosphos and vitamin D are statistically found insignificant (p > 0.05).

Conclusions: As a result of this study; it is observed that there is an inverse relationship between abdominal fat, tension and HDL cholesterol via calcium intake.

T3.PO.017
Nutritional intervention to improve the quality of lunchboxes in school age children in méxico
Díaz Ramirez G 1, Bacardi Gascón M 2, Jiménez Cruz A 2
1CISALUD, UABC, Tijuana, México,
2Facultad de Medicina y Psicología. UABC. Tijuana, México

Introduction: In Mexico, it has been shown that most children take unhealthy lunchbox (LB) to schools. The objective of this study was to evaluate a nutritional intervention addressed to improve the nutritional quality of foods contained in the LB of elementary school children.

Methods: Two schools with 522 children were randomly assigned to the intervention group (IG), and two schools with 421 children to the control group (CG). The intervention consisted in the displayed at the schools of posters with healthy food, handout pamphlets with healthy recipes, and letters aimed to parents with nutritional information. In both groups, the LBs content were recorded during three nonconsecutive days before and after the intervention. An adequate LB (ALB) for elementary school children should contained ≤ 270kcal, water and fruit or vegetables and a prepared meal (sandwich, taco); in addition, a healthy LB (HLB) must not contained any soft drink, high fat, sugar, and salt containing snacks or prepared meals.

Results: After the intervention it was shown less content of fat in the LB in the IG (p = 0.003), and 19% of children in the IG meet the criteria of ALB compared to 10% from the CG (p = 0.002). There was not difference between groups with the HLP criteria. In the IG, the LB of boys and girls increased the content of fruit from 25 to 46% (p = 0.03) and vegetables from 19% to 44% (p = 0.001). In the CG, the LB of boys decreased the content...
of fruit and vegetable from 46% to 45% (p = 0.025). No changes were seen in the food content of LB among girls in the CG.

**Conclusion:** A short and feasible intervention improved the quality of the food content of the LBs.

**T3.P0.018**

**Effects of acute native banana starch ingestion on appetite and food intake in healthy subjects.**

Ble-Castillo J.L.1, Juarez-Rojoto LE.1, Tovilla-Zarate C.A.2, Garcia-Vazquez C.1, Servin-Cruz M. Z.1, Boldo-León X.M.1, Aguilar-Mariscal H.1, Olvera-Hernandez V.1, Aguilar-Barajas S.1, Diaz-Zagoya J. C.1

1Laboratorio de Bioquímica de Enfermedades Metabólicas, Centro de Investigación, DACS, Universidad Juárez Autónoma de Tabasco, Villahermosa, Tabasco, Mexico,

2Division Académica Multidisciplinaria de Comalcalco, Universidad Juárez Autónoma de Tabasco, Villahermosa, Tabasco, Mexico,

**Introduction:** Previous studies have shown benefits from native banana starch (NBS) supplementation in improving glucose metabolism in experimental models and diabetic patients. Whether this substance could affect appetite regulation is, however, unknown. The aim of this study was to examine the effects of NBS, rich in resistant starch on the subjective measures of appetite and energy intake in healthy subjects. Postprandial glucose and insulin responses were also assessed.

**Methods:** In a randomized, single-blind, crossover study, 28 young healthy subjects were divided to receive either a beverage containing 40 g of NBS or digestible corn starch (DCS). Effects on appetite were estimated, using visual analogue scales (VAS) for subjective measures and an ad libitum test meal. Blood samples were obtained at 0, 30, 60, 90, 120, 150 and 180 min after beverages and VAS questionnaire was also applied at these times. After a washout period of 6 days subjects received the alternative treatment.

**Results:** A reduction on energy intake at the ad libitum test meal was observed after NBS supplement compared to DCS. However, there were no significant differences in subjective appetite measures between groups. There was a significant reduction in glucose AUC-180 min and insulin AUC-180 min following the NBS supplement compared to DCS.

**Conclusions:** NBS supplementation decreased energy food intake and glycemic response in healthy subjects and may have beneficial effects in helping to reduce body weight. Further research to elucidate the mechanism behind these changes is required.

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**T3.P0.019**

**Effect of regular magnesium supplementation on Insulin Resistance in obese patients.**

Wulfsohn R.1, Tiis Baria M.1, Olkies A.1, Ravenna M.4

1Therapeutic Center Maximo Ravenna MD,

2Austral University Hospital

**Introduction:** Insulin resistance (IR) is one of the most important metabolic disorders associated with obesity. Magnesium supplementation is frequent in use in very low-calorie diets (VLCD) and has shown to be related to the decrease in IR.

**Methods:** Retrospective review of medical records. Sixty patients were selected (30 female) with BMI > 30, mean age 46 years, with glycemía 100 - 125 mg/dl, insulinemia > 15 mcU / ml and HOMA > 3, without taking antidiabetic drugs, who underwent a VLCD treatment plan alternating with LCD, with multivitamin and potassium. Half of patients received regular supplements of magnesium citrate. All attended cognitive behavioral therapeutic groups oriented to lose weight with physical activity and monthly medical-nutritional monitoring which was reassessed at 6 months.

**Results:** Both groups had significant decreases in weight and insulin resistance index at 6 months. Patients who regularly took magnesium showed higher statistically decreases than those who did not (weight –21.37 kg vs. –8.43kg HOMA –2.58 vs. –0.7). In a multivariate model, the initial HOMA, the weight loss and the regular supplementation with Mg ++ were independently associated with lower rates of insulin resistance at 6 months.

**Conclusions:** Regular magnesium supplementation reduces insulin resistance in obese patients regardless of weight loss and the insulin resistance base level.

**T3.P0.020**

**A comparison of the nutrient composition of 11 different commercially available formula-based very low calorie diet (fb-vlcd) foods for use as total dietary replacement during weight loss.**

Clariozio C.A.1, Cox J.1, Hewlett B.1, Johnston K.L.1

1LighterLife, Cavendish House, Parkway, Harlow Business Park, Harlow, Essex, CM19 SQF

Very low calorie diets (VLCD) (<800kcal/d) have been available for use in the UK for 30 years. Developed to create a near-fasting metabolic response without nutrient depletion, there are compositional criteria that should be met so neither the nutritional status nor general health of those on a VLCD is compromised. There is currently no published data comparing the nutritional composition of the different VLCDs available within the UK. As such, we obtained data on the compositional make-up of 11 different commercial VLCDs from information provided either on pack or on individual company websites. A variety of packs from each provider was used to reflect a realistic day's intake and included where possible a shake, a textured meal and a soup. The daily nutrient intake for each VLCD was then compared with that described in Codex Stan 203-1995. 3 providers (27%) failed to meet the minimum daily requirements (MDR) for protein, 6 providers (55%) failed to meet the MDR for Copper and Vitamin B6 with 3 of these additionally failing to meet the MDR for magnesium. Detailed nutrition information from several providers was neither on the packaging nor easily obtained elsewhere (e.g. company website) and was often neither complete nor very clear. Provision of adequate nutrition whilst on a VLCD is vital to ensure good health during weight loss. This cross-sectional analysis of nutrition information provided by commercially produced VLCDs within the UK market shows that not all commercial providers meet either the total MDR required whilst on a VLCD, nor provide appropriate nutritional information for consumers either on the packaging or on their websites. LighterLife complies fully with CODEX Standard 203-1995 and also provides complete transparency of compositional information. This is an important consideration for individuals or Health Care professionals who are considering the use of VLCDs for weight loss.

**T3.P0.021**

**Dairy biomarker response to dairy fat overfeeding.**

Jenkins B.1, Seysel K 2,3,4, Summerhill K.1, Alligier M.2,4, Laville M.2,4, Koulman A.1

1Medical Research Council Human Nutrition Research, Elsie Widdowson Laboratory, Fulbourn Road, Cambridge, United Kingdom,

2Centre de Recherche en Nutrition Humaine Rhône-Alpes (CRNHN-RA), Centre Hospitalier Lyon Sud, Pierre-Bénite, France,

3Centre européen pour la Nutrition et la Santé (CENS), Pierre-Bénite, France,

4Université Lyon 1, INSEM UMR1060, Laboratoire CarMeN, Oullins, France

**Introduction:** Tetradecanoic acid (C14:0), pentadecanoic acid (C15:0), trans-palmatic acid (C16:1) and heptadecanoic acid (C17:0) are suggested to be biomarkers of dairy consumption. If the four above mentioned fatty acids are true intake markers of dairy fat, the concentration
should increase significantly during dietary supplementation of diary fat the period of the study.

Methods: 26 subjects were submitted to fifty-six days of overfeeding, where they were expected to eat in excess of their usual diet of 760 kcal/d. The additional energy intake was derived from high fat sources, which included 100 grams of Emmental cheese, 20 grams of butter and 40 grams of almonds representing an increase of 70 grams. Plasma phospholipid fraction was obtained by solid phase extraction (SPE) followed by phospholipid fatty acid derivatisation by 14% Boron trifluoride methanol solution, with gas chromatography flame ionisation detection.

Results: The plasma phospholipid fatty acids did not directly correlate with the estimated increase of these in fatty acid in the diet. A significant increase of 17% was found for the trans-palmitoleic acid (C16:1; p = 0.004) and a significant increase of 10% for the pentadecanoic acid (C15:0; p = 0.02) after overfeeding. Nevertheless no differences were found after overfeeding for tetradecanoic acid (C14:0; p = 0.48) and heptadecanoic acid (C17:0; p = 0.32).

Conclusions: That trans-palmitoleic acid (C16:1) and pentadecanoic acid (C15:0) have a good correlation with dietary dairy fat intake, whereas tetradecanoic acid (C14:0) and heptadecanoic acid (C17:0) do not, therefore hinting at either a possible endogenous productions or other dietary sources. Therefore odd chain fatty acids do not exclusively come from ruminate sources.

T3.PO.022

Effect of isoenergetic and ad libitum meals varying in fat and carbohydrate composition on satiation, satiety quotient and suppression of food hedonics

Finlayson G.1, Gibbons C.H.1, Caudwell P.1, Hopkins M.1, Blundell J.E.1

1Appetite Control & Energy balance Research, School of Psychology, Faculty of Medicine & Health, University of Leeds, Leeds, UK, 2Academy of Sport and Physical Activity, Sheffield Hallam University, Sheffield, UK

Introduction: Dietary fat is often regarded as having a weaker action on satiation than carbohydrate. The aim of the present study was to clarify the action of ad libitum and isoenergetic meals varying in fat and carbohydrate content (i.e. HFLC or LFHC) on parameters of appetite and food hedonics.

Methods: Forty-five overweight and obese males (n=15) and females (n=30) were recruited into this cross-over study. Subjects were studied on 2 separate probe days in which they were given access to either HFLC (n=15:0) or LFHC (n=14:0) meals. Satiety was measured using appetite ratings adjusted for energy intake from isoenergetic meals to calculate the satiety quotient (SQ). Satiation was assessed by intake of ad libitum meals. Hedonic measures of explicit liking (subjective rating) and implicit wanting (speed of forced-choice) for an array of HFLC and LFHC foods were tested before and after an isoenergetic meal.

Results: There was a large effect of isoenergetic HFLC/LFHC meals on satiation with a greater SQ after LFHC (p<0.001, η2=0.71). There was an interaction between nutrient content of the test meals and hunger state on explicit liking (p = 0.049, η2=0.11) and implicit wanting (p = 0.029, η2=0.14); with consumption of the LFHC, but not HFLC meal effectively reducing the hedonic bias for HFLC foods.

Conclusion: When consumed ad libitum, these data confirm that HFLC meals have a weaker action on satiation than LFHC. When examined calorie for calorie, consumption of LFHC meals induce a greater satiety (SQ) compared to isoenergetic HFLC meals. Furthermore, HFLC meals do not dampen the subsequent appeal bias for HFLC foods compared to energy, weight and palatability matched LFHC meals.
The estimate of overweight students’ diet: The imbalance lipid and fat-soluble vitamins

Valerio E., Korolev A., Nikitenko E., Stepanova N., Makarova V.

1Kazan Federal University, Russia,
2I.M. Sechenov First Moscow State Medical University, Russia

Abstract: The study aimed to assess and analyze the fat component (including fat-soluble vitamins) of diet students from Kazan Federal University with overweight and obese.

Methods: Participants were 151 students aged 19–23. The method of 24-hour recall was used and the nutrient content was further estimated using standard data base.

Results: 32 students were estimated as overweight and obese (21.2% of the target group); 23 people were overweight and 9 people were estimated as obese. In this group the percentage of energy from total fat was higher than RDA: 40.7% and 39.9% in men and women respectively. The sum of essential fatty acids (linoleic and α-linolenic) composed 7.8% and 5.6% of total energy. The consumption of n-3 longer chain polyunsaturated fatty acids (EPA and DHA) was extremely low: 32.4 ± 22.3 mg and 140.2 ± 112.8 mg of respectively for males; 27.7 ± 12.7 mg and 74.9 ± 21.3 mg for females. Cholesterol and plant sterols intake as well as their ratio have not been found as negative. As far as fat-soluble vitamins are concerned, the significant deficiency has been shown: an average content of vitamin A is 0.68 ± 0.17 mg, vitamin D – 2.7 ± 0.19 μg, vitamin E – 6.7 ± 4.9 mg and vitamin K – 74 ± 18 μg which is equal to 50–58% of these substances’ RDA respectively.

Conclusion: The results have shown that there is significant imbalance within fat component of students’ diet. The imbalance revealed within fat component along with deficiency of fat-soluble vitamins may contribute to further weight gain and result in metabolic syndrome development in the future. It is essential to decrease the proportion of total fat as well as to optimize the ratio of different food sources of fatty acids and vitamins by taking some measures including functional products use.

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Prevalence of micronutrient deficiency in patients with morbid obesity before bariatric surgery


1Department of Medicine II, Medical University Vienna, Vienna, Austria,
2Department of Medicine I, Rudolfstiftung Hospital, Vienna, Austria

Abstract: The prevalence of micronutrient deficiency in patients with morbid obesity (M0) preoperatively. Materials and methods: 1541 patients with MO wishing to undergo bariatric surgery (age: 40 ± 12 years, mean BMI: 44 ± 9 kg/m², mean±SEM, 77.3% female) were analyzed in this cross sectional examination. Iron, state, vitamin B12, folic acid, 25hydroxy(OH)-vitamin D, vitamin A and vitamin E levels were determined. Subsequently, patients underwent nutritional counseling and were substituted accordingly.

Results: 63.2% (n=974) of the patients had a deficit in folic acid (<3.5ng/ml), 97.5% (n=1502) in 25OHvitamin D (<75 nmol/l), 5.1% (n=80) in vitamin B12 (<188 pg/ml) and 6.2% (n=96) in vitamin A (<1.05 μmol/l). 9.6% (n=148) exhibited iron deficiency (ferritin<15 μg/l). None of the patients had a deficit in vitamin E.

Conclusion: Our data show a high prevalence of micronutrient deficiency in patients with morbid obesity preoperatively and emphasize the importance of exact preoperative evaluation and adequate substitution as well as postoperative surveillance.

Evaluation of body fat ratio according to the mediterranean diet quality index

Kabaran S., Yurt M., Öztürk B.

1Eastern Mediterranean University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Famagusta, North Cyprus via Mersin on Turkey

Objective: Mediterranean diet is a sample nutrition model that help to prevent risk of obesity. This research was planned to identify the body fat ratio according to the Mediterranean diet quality index.

Methods: In this study, a total of 313 university students (41.5% of males, 58.5% of females), between the ages of 18–26 (mean 21.7 ± 1.90) years were included. Body fat ratio was determined by Tanita MC-980MA Body Composition Analyzer. A questionnaire form was applied to determine general nutrition habits. University students’ adherence to the Mediterranean diet was assessed by the 16 item questionnaire Mediterranean Diet Quality Index (KIDMED index). KIDMED index (range 0–12) classified as ≥8 score as optimal diet (high), 4–7 score as improvement need (intermediate) or ≤3 score as very low diet quality (low) according to the total score.
Results: It was determined that only 48.6% of students took 3 main meals. It was found that 34.4% of the students were skipping breakfast and 18.2% of them skipping lunch. It was found that 43.1% of the students had low KIDMED index, 53.0% of them had intermediate KIDMED index, and only 3.8% of them had high KIDMED index. According to the low, intermediate and high KIDMED index body fat ratio were found to be 23.6 ± 7.28%, 24.1 ± 8.93%, 19.3 ± 6.23%, respectively. Difference of body fat ratio between low and high KIDMED index and between intermediate and high KIDMED index were found to be statistically significant (p < 0.05).

Conclusion: In conclusion, there is a need for national plans to encourage university students’ adherence to the Mediterranean Diet, also reducing the risk of high body fat ratio.

T3.P0.028
Trace elements deficiency after gastric bypass surgery: An underestimated complication
Ashby H.L.1, Abeyesekera A.1, Labib M.H.1
1Department of Clinical Biochemistry, Dudley Group NHS Foundation Trust, Russells Hall Hospital, Pensnett Road, Dudley

Introduction: Trace elements deficiency is a recognised complication following Roux-en-Y gastric bypass (RYGB) surgery. However, the true prevalence of micronutrient deficiencies is not known as these may go either unrecognised or underreported. Moreover, micronutrients requirements or supplementation following RYGB has not been standardised.

Methods: We audited serum levels of selenium, zinc and copper at 1-year in a cohort of patients who underwent RYGB and who were advised to take multivitamins and trace elements supplementation.

Results: Low serum selenium concentration was detected in 18 out of 33 patients (54.5%), low serum zinc in 26 of 124 patients (21.0%) and none of 28 patients (0%) had low serum copper. In the patients who were deficient in selenium, the mean percentage excess body weight (%EBW) loss at 1-year was 70.6% compared to %EBW loss of 59.2% with those who were not deficient (p = 0.03).

Conclusion: Our audit showed that selenium and zinc deficiencies are relatively common following RYGB, despite patients being advised to take a multivitamins with trace elements preparation. Selenium deficiency has been reported in 14 to 22% after RYGB yet no recommendations currently exist for supplementation in these patients. Zinc deficiency has been reported in 6–57% of patients following RYGB and, apart from a few case reports, the prevalence of copper deficiency is unknown in this population. Predisposing factors following RYGB may include an imbalanced diet, insufficient supplementation and non-compliance with supplements as these are not usually prescribed but patients are advised to get them over the counter. We conclude that trace elements deficiency is relatively common following RYGB and that supplementation is probably underestimated and often inadequate.

T3.P0.029
Assessment of the children’s adherence to the mediterranean diet who study in primary school at Famagusta area
Kabaran S.1, Ozturk B.1
1Eastern Mediterranean University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Famagusta, North Cyprus via Mersin 10 Turkey

Objective: Children’s nutritional status can be changed according to regional differences. This research was planned to identify the children’s adherence to the Mediterranean diet, anthropometric measurements, and nutritional status who study in primary schools at Famagusta area in North Cyprus.

Method: In this study, a total of 843 children (47.3% of males, 52.7% of females), between the ages of 8–11 years were included. Dietary intakes of children were determined by a 24-hour dietary recall. Body weight, height and waist circumferences, body fat ratio were performed and body mass index (BMI) was calculated. Children’s adherence to the Mediterranean diet was assessed by the 16 item questionnaire Mediterranean Diet Quality Index (KIDMED index).

Results: It was found that mean energy intake of children were 1598.7 ± 468.08 kcal, and that 49.4 ± 9.39% of this total energy intake were from carbohydrates, 15.5 ± 4.17% were from proteins, and 34.9 ± 8.10% were from fats. It was determined that, 46.9% of males and 47.5% of females were normal weight, 17.3% of males and 17.1% of females were overweight, 18.8% of males and 14.0% of females were obese according to the BMI for age and gender. It was found that only 34.4% of children showed high KIDMED index results, 56.7% had intermediate values and 8.9% had low index results. Children with high KIDMED index have higher calcium intake than those of intermediate and low KIDMED index and that difference was statistical significant (p < 0.05).

Conclusion: There is a need for national plans and policies to increase children’s adherence to the Mediterranean diet, and daily calcium intake in primary schools at Famagusta area.

T3.P0.030
The effect of resistant starch on satiety and weight control
Yassbabeg E., Çelebi F., Bolluk S., Deniz B.
1Department of Nutrition and Dietetics, Faculty of Health Science, Gazi University in Ankara, Ankara, Turkey.

Food intake is determined by internal and external factors creating different saturation effects (hunger, satiety, desire to eat, satisfaction, etc.). It has been stated that resistant starch (RS) increases postprandial satiety and satisfaction and decreases following food intake and appetite [1, 2, 3, 4]. Resistant starch affects the satiety condition and body weight control through various mechanisms. Upon consuming resistant starch, the first mechanism delays the decrease of blood glucose which creates hunger signals and increase appetite through fixed oscillation of postprandial blood glucose. In the second mechanism, short chain fatty acids formed after the fermentation of RS in large intestine reduce the storage of fatty acids from visceral adipose tissue and increase oscillation of fatty acids from hepatic, portal and venous blood. Therefore, satiety increases and affects food intake. Decreasing food intake by increasing RS saturation can take a role in body weight control as resistant starch contains less energy than normal starch. In addition, the contribution of taken RS to energy can be between 0–100% and 70% of RS can be metabolized in large intestine depending on the type and products of RS and its process in colon [5]. Further studies are required so that these effects of RS are supported and specific suggestions about RS supplementation can be determined.

References:

T3.P0.031
Resistant starch: Can it be used for the treatment of diabetic patients?
Şahin G., Bolluk S., Çelebi F., Deniz B.
University in Ankara, Ankara, Turkey

It is important to determine the type of carbohydrate used in medical nutrition treatment of diabetes which has increasing prevalence worldwide [1]. It is considered that the amount and quality of carbohydrate is related with postprandial glycaemia and the modification of carbohydrate type of a diet may affect the health of patient in the long run. In addition, glucose and insulin levels can be controlled and the progression of disease can be halted by consuming resistant starch(RS) and low glycemic indexed and highly fibrous food. RS affects postprandial glucose levels by ensur-
ing the inhibition of α-amylase, increasing the viscosity of chyme in small intestine, reducing glucose intake rate, linking glucose and preventing it from diffusing cells [2]. These effects have been found out in slightly overweight, hyperinsulinemic and diabetic adults besides healthy individuals [3]. In addition, it is indicated that RS reduces appetite by skipping from digestion and being fermented in large intestine, and ensures weight control and improves intestine health [4]. Additionally, RS can be used in many foods because it is a natural origin, sweet and white food stuff which contains normal size particles affecting the texture of product at a minimum. RS makes a positive contribution to foods in terms of its appearance, texture and taste in mouth that cannot be found in highly fibrous foods. In this respect, using this type of starch in the products produced for diabetic individuals can increase the life quality of diabetic people.

References:

T3:PO.032
Interactions between Vitamin D, Magnesium and adipose tissue: A mechanism review and some clinical considerations
Kjeldbjerg C.1, Taylor M.1, Mastrostefano M.2
1 Student at CNELM (Centre for Nutrition Education & Lifestyle Management),
2 Research Supervisor at CNELM

Vitamin D deficiency and obesity are growing public health issues. Evidence suggests that vitamin D deficiency - obesity correlation. Literature also suggests that level of Magnesium is low in Western diet and this may correlate with obesity. Main aims of this mechanism review: • assesses the association between plasma 25(OH)D and fat mass and the potential effects of vitamin D on energy regulation • investigate possible mechanisms linking subclinical Magnesium deficiency and obesity • consider the interaction of vitamin D, Magnesium and adipose tissue, • evaluate Magnesium and Vitamin D supplementation as a possible clinical intervention for obesity.

Methods: Systematic literature review.

Results:
• A robust correlation is confirmed between obesity, reduced 25(OH)D and Magnesium deficiency; but the existence/direction of a causal link is debatable.
• Research is not conclusive if vitamin D and magnesium supplementation may reduce body fat mass.
• The synergistic action hypothesis is supported e.g. via adipose tissue suboptimal methylation of the vitamin D metabolising enzyme CYP24A1 which may be associated with differing concentrations of serum 25(OH)D.
• Research is partially hampered by the lack accurate of measurements of Magnesium and Vitamin D deficiency. A useful human biomarkers for the latter may be receptors target gene (DUSP10, CYP24A1).

Acknowledgement: Our sincere gratitude to those who have made the completion of this project possible and in particular to Dr. James Neil, Research Director at the CNELM, for his inspiring lectures and research guidance.

T3:PO.033
Differences in peptide response to high fat and high carbohydrate foods between obese and lean adults
Gibbons C.1, Caudwell P.1, Finlayson G.1, Blundell J.1
1 School of Psychology, University of Leeds

Introduction: Exogenous administration of appetite-related peptides has measurable effects on appetite and food intake. However, the relationship between postprandial peptides at circulating physiological levels and short-term appetite control is not well understood. In addition, differences between obese (OG) and lean (LG) postprandial peptide response is not well researched.

Methods: We have compared postprandial profiles of peptides and metabolites in response to fat and CHO in lean (n=12) and obese (n=16) adults (age 45.6 ± 6.2 years). Plasma was collected before and then periodically for 180 minutes after consuming high fat or high CHO meals of equal energy and weight (590kcal; 685g; 50% or 4% energy from fat).

Results: OG had significantly higher BMI (29.8 vs 21.8 kg/m2), body mass, fat mass and waist circum. compared to the LG (p < 0.05). Fast-ing peptides levels for glucose, insulin, triglycerides and leptin were also higher in OG (all p < 0.05), but no difference was seen for GLP-1 or PYY. The response to fat and carbohydrate loads were similar in OG and LG for
glucose, triglycerides, GLP-1 and PYY; only insulin response was different between the groups. Insulin responded more strongly to carbohydrate compared to fat in both groups, and there were no interactions. There was however a main effect of group with the OG showing a greater change from baseline in insulin after both food types compared to the LG (F(1,26) 4.597, p < 0.05). No differences in hunger, fullness or ad libitum energy intake were revealed (p > 0.05).

Conclusion: Whilst body composition was associated with a number of fasting peptide levels (particularly tonic peptides), the response to food was similar in OG and LG; with the exception of insulin. This supports the notion of insulin sensitivity being a main contributor to poor appetite control.

T3.PO.034
Vitamin D status and its association with cardiometabolic risk in a random sample of Lebanese adults

Nasreddine L1, Naja F1, El-Hajj Fuleihan G2, Hariri D1, Hwalla N1
1Department of Nutrition and Food Science, Faculty of Agricultural and Food Sciences, American University of Beirut, P.O.Box: 11-0236 Riad El Solh 1107-2020, Beirut, Lebanon,
2Department of Internal Medicine, Faculty of Medicine, American University of Beirut, P.O.Box: 11-0236 Riad El Solh 1107-2020, Beirut, Lebanon

Background: A link between vitamin D deficiency, obesity and increased cardiometabolic risk has been suggested in the literature. This study aims at investigating the association between vitamin D, adiposity markers (BMI, waist circumference WC, percent body fat %BF) and selected cardiometabolic risk factors including lipid profile (TG, TC, HDL, LDL), fasting plasma glucose, hyperinsulinemia, metabolic syndrome (MS) and the inflammatory marker CRP in a random sample of the adult Lebanese population.

Methods: The study sample included 296 subjects aged 20 years and older drawn from the nationwide Nutrition and Non-Communicable Diseases Risk factors survey. Weight, height, and WC were measured and BMI calculated. MS was defined based on IDF criteria. Body fat was estimated based on multiple skinfold measurements.

Results: Vitamin D deficiency (serum 25-OHD<10 ng/ml) was higher in women compared to men (35.7% and 7.9% respectively) while vitamin D insufficiency (serum 25-OHD between 10–20ng/ml) was higher in men compared to women (59.7% and 49% respectively). Correlation analysis revealed significant negative associations between serum 25OHD and %BF (r=-0.318), BMI (r=-0.217), WC (r=-0.398, p < 0.05), insulin (r=-0.202), HOMA (r=-0.200) and MS (r=-0.202) among women. Multi-variate logistic regression showed that, across vitamin D tertiles, higher vitamin D levels were associated with lower odds of adiposity as assessed by %BF (p for trend <0.05) and lower odds of the MS (p for trend<0.05) among women.

Conclusion: The high prevalence of low vitamin D status coupled with the suggested association between vitamin D, adiposity and MS highlight an issue of public health concern. The findings of this study should be further investigated in larger population studies.

Acknowledgement: We acknowledge Ms. Nada Adra for her help in statistical analyses and we acknowledge all study subjects for participating in the study.

T3.PO.035
Risk of gaining weight due to eating in the absence of hunger among mexican health sciences college students

Santillana-Marín E1, Bacardi-Gascón M2, Pérez-Morales M3, Jiménez-Cruz A2
1Cisalud, 2Facultad Medicina Psicología, 3Facultad Ciencias Químicas e Ingeniería

Introduction: Eating in absence of hunger (EAH), is defined as eating in response to the presence of palatable food in the absence of physiological hunger, and is considered a risk factor for overeating during childhood and adolescence.

Objective: To assess the risk of increasing BMI, obesity (O), and abdominal obesity (AO) because of EAH, among college students over a year of follow-up.

Methods: A prospective study was conducted from October 2013 to October 2014. Participants were second year medical, dentistry, psychology and nursing students. A previously validated EAH questionnaire was applied at baseline. Factorial analysis was conducted to assess the main components of the EAH score. To assess the risk of increasing weight a binomial logistic regression was conducted.

Results: The study population was 697 college students, and after a year 638 (91.5%) students were assessed. Mean age was 20.3y. At baseline the prevalence of O and AO was 12% and 35% respectively. External stimuli (8.6%), negative feelings (41%), fatigue (12%), and boredom (7.4%) contributed to 69% of the variability for EAH. Normal weight men had higher EAH by external stimuli, fatigue and boredom (p < 0.05) than O. Normal weight women had higher EAH by boredom (p = 0.012) than O. After a year, the prevalence of O and AO was 15% and 42%, respectively. Participants with an external stimuli score >12 were 1.9 times more likely to increase two or more kg (OR=1.9, CI 95% 1.3-2.9; p = 0.004).

Conclusion: O and AO increased over a year period. Due to external stimuli, fatigue and boredom, normal weight men had more EAH than O men. Due to boredom normal weight women had more EAH than O. High external stimuli score increases the risk for weight gain.

T3.PO.036
A retrospective analysis of reported alcohol consumption and correlation to BMI in patients attending the Rotherham Institute for Obesity (RIO)

Reale S1, Walker L1, Capehorn M1
1Rotherham Institute for Obesity (RIO)

Introduction: Alcohol consumption has been reported to significantly increase Body Mass Index (BMI) and waist circumference due to being the second most energy dense macronutrient. However, there is a lack of evidence to support a clear interaction between alcohol consumption and BMI, and this study aimed to establish whether there is a clear correlation between reported alcohol intake and BMI in patients attending the Rotherham Institute for Obesity (RIO).

Methods: A retrospective analysis of self-reported alcohol consumption by patients attending RIO during 2012–13 (n=2251, age=50.9 +/- 19.0 yrs, BMI=41.4 +/- 9.6 kg/m²) was performed. Descriptive statistics were produced including normality tests and Spearman’s Rank-Order Correlation was completed.

Results: 54% of patients (n=1236) reported to consume alcohol weekly with the mean female and male drinker consuming 8.0 +/- 10.6 w/ wk and 13.7 +/- 16.6 w/ wk respectively, both of which fall below national guidelines. However, further analysis demonstrated that 126 (8.1%) female and 92 (13.3%) male patients were consuming up to 6 times the recommended levels, increasing their risk of liver disease. No significant correlation was established between age and units consumed (r=0.002, one-tailed p > 0.05) whereas a negative correlation was observed between BMI and units consumed (r=0.84, one tailed p < 0.001).

Conclusions: The results are in aligned with previous research that has found an inverse relationship between alcohol consumption and BMI. Some findings suggest that frequent heavy “binge” drinking is more positively associated with BMI, rather than consumption over multiple days. Frequency of alcohol intake was not recorded nor analysed in this study and therefore adds to the study limitations. The relationship between alcohol consumption and BMI remains unclear due to its complexity and the number of associated factors.
Clinical inertia in following the rules of diabetic diet in patients with type 2 diabetes mellitus

Mikołajczyk M.1, Kosmalski M.1

1Department of Internal Medicine, Diabetology and Clinical Pharmacology, Medical University of Lodz, Lodz, Poland

Introduction: The aim of the study was to assess the knowledge about the principles of diabetic diet in patients with type 2 diabetes mellitus (T2DM) hospitalized for various reasons and to correlate the results with the type of medical care, anthropometric measurements and mean A1c value (HbA1c).

Methods: The study included 100 patients (58 women, 42 men) with T2DM hospitalized in 2014 in the Department of Internal Medicine, Diabetology and Clinical Pharmacology, Medical University of Lodz. Patients were asked to fill the questionnaire concerning knowledge about diabetic diet and to indicate the type of medical care, under they reside: Diabetic Outpatient Clinic and/or GP Clinic. In each patient following data were collected: anthropometric measurements (BMI, waist and hip circumference, WHR) and HbA1c test was performed.

Results: Patients were in mean age 63.52 ± 12.64 years, mean duration of diabetes 11.89 ± 11.03 years, mean BMI 30.68 ± 6.93 kg / m², mean HbA1c value 8.87 ± 1.76%. Patients gave 74.6% correct answers in the test of knowledge about diabetic diet. In the study group, 53 patients were under the care of Diabetic Outpatient Clinic and GP Clinic (A), 47 patients only under GP Clinic (B). Patients in group A had mean BMI 30.57 ± 6.7 kg / m² (vs. group B 30.8 ± 7.26 kg / m²), mean HbA1c value 8.36 ± 1.75% (vs. group B 9.46 ± 1.5%) and gave 76.6% correct answers in the test of knowledge about diabetic diet (vs. group B 72.3%).

Conclusion:
1. The majority of patients with T2DM are overweight or obese.
2. Despite the good results of the test of knowledge about diabetic diet, patients did not follow rules of diabetic lifestyle (clinical inertia).
3. Patients under care of GP Clinic and Outpatient Diabetes Clinic had higher knowledge of the diabetic diet and achieved better therapeutic targets than patients only under care of GP Clinic.
4. Patients need permanent education on every medical visit.

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Obesity and health-related lifestyle factors in romania – “oro” study

Roman G.1, Bala C.G.1

1Iuliu Hatieganu University of Medicine and Pharmacy, Department of Diabetes, Nutrition, Metabolic diseases, Cluj-Napoca, Romania

Introduction: Regional studies have shown around 50% prevalence of adult overweight/obesity in Romania, with limited data on lifestyle patterns. The cross-sectional ORO-Study aimed to evaluate prevalence of obesity and related lifestyle risk factors at national level.

Methods: The study included 8 regional centers. Collected data were: anthropometric, social status, family/personal medical history, lifestyle and eating habits. A 24h food recall diary and two questionnaires were used: Global Physical Activity (WH0) and food frequency Nurses Health Questionnaire, translated and validated.

Results: Representative sample of 2103 individuals were enrolled, mean age 41.5 years, mean BMI 29.9 kg/m²; 61.9% women, 72.8% from urban area. Prevalence of overweight / obesity was 31.1% / 21.3%; obesity 9.9% in 18–39 years, 30.1% in 40–59 years, 41.6% in 60–79 years age groups (p <0.001). Overweight / obesity in men was 41.6% / 23.0%, in women 24.7% / 20.3% (p <0.001) and higher in rural area: 33.0% vs 30.3% and 25.7% vs 19.7% (p = 0.004). Overweight and obese people had ≥ 3 meals/day (36.0% and 38.8% vs 29.8% (p = 0.002), most consistent meal after 9 pm (22.8% vs15.4%), large food quantities eaten less than 2h following another meal, less physical activity, less night sleep. Eating while watching TV was more frequent in normal BMI (51.8% vs 41.5%, p < 0.001), same for drinking water (56.1% vs 40.8%, p < 0.001) and sugar-sweetened carbonated drinks (6.6% vs 6.2%, p < 0.006).

Conclusions: High prevalence of overweight and obesity increasing with age was found. Irregular meals, eating while watching TV were the most frequent unhealthy eating habits, although not always related to obesity. Despite some study limitations, the results suggest the complexity of the obesity-related risk factors.

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The effect of weight loss on body composition and serum lipid profiles in obese women

Akbulut G.1, Celebi F.1

1Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara, Turkey

Introduction: Obesity is one of the most important health problems among the advanced and developing countries in recent years. An imbalance of energy intake and energy expenditure leads to obesity which is associated with increased morbidity and mortality. In contrast, persistent weight loss significantly reduces overall mortality. This study was planned to investigate the effects of weight loss on body composition and serum lipid profiles in obese women.

Methods: Obese women with body mass index (BMI) >30 kg/m² (n:25) and aged 20–43 years were included in this study. According to the needs of each individual, dietary program was maintained to provide a weight loss 0.5–1 kg/week. The body composition was measured using bioelectrical impedance analyzer (BIA). All of the measurements (BIA, serum lipid profiles, and anthropometric measurements) were taken before initial diet and after 12 weeks.

Results: The mean age of women was 31.56 ± 7.3 years. There were significant differences in body composition between initial and at the end of the diet programme. Body weight (kg), BMI, fat mass (kg), fat percentage (%), fat free mass, waist circumference (cm) and waist/hip ratio decreased significantly at the end of the diet programme. (p = 0.00). Also, decreasing in the level of serum total cholesterol (TC) and low-density lipoprotein cholesterol (LCL-C) were found significant (p = 0.001).

Conclusion: As a result of this study, the diet has positive effects on body composition and serum lipid profiles. And this findings help to decrease mortality and morbidity.

Evaluation of iodine deficiency in kazan city studentsthe problem of iodine deficiency in the environment and deterioration of health status associated with it is vital for the tatarstan.

Stepanova N.V.1, Valeeva E.R.1, Korolev A.A.1

1Kazan Federal University, Russia,
2I.M. Sechenov First Moscow State Medical University, Russia

Introduction: The problem of iodine deficiency in the environment and deterioration of health status associated with it is vital for the Republic of Tatarstan with its geochemical peculiarities of nature and soil structure. The incidence of endocrine diseases, eating disorders, metabolic and immune disorders (ED) under 14 years of age increased 1.6 fold for the period from 1996 to 2012 in the city of Kazan, and the 2.1– 2.7 fold increase was registered for the period from 2007–2009. All these years, iodine deficiency disorders (IDD) made 23.5–28.0% of ED.

Methods: 220 children aged 12–14 living in Kazan and studying in gymnasiums No.3 and No.7 were examined. Prevention of iodine deficiency is carried out in gymnasium No.7 on a regular basis. Study included clinical

81
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Obesity is a health problem that worsens and surgical treatment is indicated when nonsurgical treatment is ineffective and there is high risk of life to the patient. To be successful is important to have a nutritional monitoring in pre and post-surgical as well as awareness of the patient self-care education.

Objective: to formulate nutritional orientation for a group of obese patients and their caregivers; to assess the dietary habits and anthropometric measurements.

Methodology: workshops conducted each 15 days, during 6 months, when were covered: Ideal Menu, Fractionation, Food Variety, Sodium, Fats, Fiber and satiety, Nutritional Labeling, Importance of Calcium, Anxiety and foods; besides tasting and delivering healthy recipe every meeting. The adults morbid obese was the inclusion criterion. The dietetic data were obtained by 24h recall in the beginning of the study. Anthropometric measurements were evaluated. A test about quality from Brazilian Health Minister to evaluated dietary habits, and the software NUTWIN® to nutritional composition were used.

Results: the mean energy intake was 1771 ± 787 kcal (n=15). Fiber (15.5±9.8g), calcium (424.5 ± 187.8mg) or iron (11.2 ± 4.7mg) were below the recommended amount. The average of Body Mass Index is 46 ± 4. No changes were observed in the patient’s weight in the end of the study. But after strategic to orientation, the score to Health Minister test improved. The initial was 33 and 46 points at the end, characterizing them in the group of care to food and subsequently in adequate food.

Conclusions: the habits were characterized by low fiber and minerals. This feed pattern of risk is worsening their nutritional status and need educational preparatory actions for surgery. The workshop is a strategy to improve the diets in obesity.

**T3.P0.043**

**Morbid obesity: Study of dietetic and anthropometric profile of patients and a strategy in food education**

Dias L.D.1, Ferrari F.Z.1, Regis J.M.1, Souza A.P.1, CINTRA R.G.1, OLIVEIRA M.R.2

1 Center for Studies and Practices in Nutrition, Institute of Biosciences of Botucatu, University of Sao Paulo State, Botucatu, Sao Paulo, Brazil

2 Department of Nutrition and Food Science, American University of Beirut, Beirut, Lebanon

Obesity is a health problem that worsens and surgical treatment is indicated when nonsurgical treatment is ineffective and there is high risk of life to the patient. To be successful is important to have a nutritional monitoring in pre and post-surgical as well as awareness of the patient self-care education.

Objective: to formulate nutritional orientation for a group of obese patients and their caregivers; to assess the dietary habits and anthropometric measurements.

Methodology: workshops conducted each 15 days, during 6 months, when were covered: Ideal Menu, Fractionation, Food Variety, Sodium, Fats, Fiber and satiety, Nutritional Labeling, Importance of Calcium, Anxiety and foods; besides tasting and delivering healthy recipe every meeting. The adults morbid obese was the inclusion criterion. The dietetic data were obtained by 24h recall in the beginning of the study. Anthropometric measurements were evaluated. A test about quality from Brazilian Health Minister to evaluated dietary habits, and the software NUTWIN® to nutritional composition were used.

Results: the mean energy intake was 1771 ± 787 kcal (n=15). Fiber (15.5±9.8g), calcium (424.5 ± 187.8mg) or iron (11.2 ± 4.7mg) were below the recommended amount. The average of Body Mass Index is 46 ± 4. No changes were observed in the patient’s weight in the end of the study. But after strategic to orientation, the score to Health Minister test improved. The initial was 33 and 46 points at the end, characterizing them in the group of care to food and subsequently in adequate food.

Conclusions: the habits were characterized by low fiber and minerals. This feed pattern of risk is worsening their nutritional status and need educational preparatory actions for surgery. The workshop is a strategy to improve the diets in obesity.

**T3.P0.041**

**Effect of phosphorus supplementation on subjective appetite scores**

Ayoub J.1, Abou Samra M.1, Hlais S.1, Bassil M.2, Obeid O.1

1 Department of Nutrition and Food Science, American University of Beirut, Beirut, Lebanon

2 Natural Sciences, Lebanese American University, Beirut, Lebanon

Introduction: We have previously reported that phosphorus preload was able to reduce energy intake at subsequent meal by about 30%. A study was conducted to investigate the effect of 12 week phosphorus supplementation on subjective appetite scores.

Methods: A double blind randomised placebo controlled study was conducted on 47 overweight and obese subjects. Subjects were asked to ingest 3 tablets [placebo and phosphorus (125mg/tablet)] with each 3 main meals (breakfast, lunch and dinner) for 12 weeks. Subjective appetite scores were taken at baseline, 6 and 12 weeks.

Results: Baseline subjective appetite scores were similar between the groups. Several parameters of subjective appetite scores were found to decrease as the experiment progressed (time) including that of appetite, quantity of food to reach fullness, hunger, and number of snacks. However, changes in appetite, quantity of food to reach fullness (indicator of satiation), taste of food and numbers of snacks were significantly reduced in the phosphorus group as compared to the placebo. While that of hunger (indicator of satiety) was not affected.

Conclusion: Phosphorus supplementation seems to affect food or energy intake through a reduction in satiation rather than satiety.

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**T3 – Changing behaviors**

**T3.P0.042**

The effect of food offered by grandparents on eating habits of their grandchildren

Papamichael M.M.1, Gavrielis A.1, Chantziareliou M.1, Panou I.1, Fappa E.1

1 Department of Dietetics, IST College, Athens, Greece

Introduction: Parents and care-takers play an important role in the development of childhood obesity. In many cultures, grandparents are also involved in child care process. However, studies investigating the effect of grandparents, involved in child care, on the dietary habits of grandchildren are limited. Thus, aim of this study was to investigate whether there was a relationship between the type of foods offered by grandparents and children’s consumption of these foods.

Methods: Data from 114 children (aged 8 – 12 years) were included in this study. From all available data, those regarding the provision of specific foods by grandparents to children and the frequency of consumption of these foods by children were used for the present analysis. For analytic purposes children were split into two group, different for each analysis based on the type of food grandparents brought: a) group “yes” my grandparents offer me “this type of food” and b) group “no” my grandparents do not offer me “this type of food”. The types of food children were asked whether they were offered by their grandparents were: salty snacks, sweets, fruits, sodas.

Results: Using Kolmogorov-Smirnoff, test data were found to be not normally distributed; therefore non-parametric statistics were used for all the analysis. Mann-Whitney test revealed that group a consumed more often the food offered by grandparents compared to group b, when the food was fruits (p = 0.052), sweets (p = 0.016), or salty snacks (p = 0.015). No statistically significant difference was found for the frequency of drinking sodas between the two groups (p = 0.346).

Conclusion: Findings of this study showed that children offered a food by their grandparents consumed more frequently this food, compared to those not offered this food.
Do social norm based messages increase fruit and vegetable intake in children?

Shapps M.1, Halford J.1, Boyland E.1, Field M.1, Robinson E.1

1Institute of Psychology, Health and Society, University of Liverpool, Eleanor Rathbone Building, Liverpool, L69 72A, UK

Introduction: Children are influenced by the eating behaviour of their peers. Social norm messages suggesting that others eat healthily are effective at increasing fruit and vegetable intake in adults, but this hasn't been tested in children. The present study tested whether exposure to social norm messages in a board game increased fruit and vegetable intake, relative to health or control messages.

Methods: 164 children (84 males, 80 females) played a game which contained either social norm messages about the fruit and vegetable consumption of their peers, health messages about the benefits of fruit and vegetable consumption, control messages related to fruit and vegetables, or control messages unrelated to food. After exposure to messages in a game, participants consumed snacks from a selection of foods, including fruit and vegetables. The choice and amount of snack food consumed was examined. We examined whether BMI moderated the effect of message type.

Results: There was no significant effect of message type on the amount of fruit and vegetables eaten. There was a significant interaction between condition and BMI; normal weight children ate significantly more fruit and vegetables after seeing health messages than after seeing control messages (unrelated to food). There were no significant differences between the social norm and other conditions.

Conclusions: In this study, health-based messages increased fruit and vegetable consumption in normal weight children relative to control messages (unrelated to food). Social norm messages did not result in a statistically significant increase in fruit and vegetable consumption.

Smartphone Usage, Obesity, and Lifestyle Habits of Children and Adolescents in South Korea

Han S.1, Choi J.2, Park Y.1, Park J.1

1Department of Family Medicine, College of Medicine, Dong-A University,
2Department of Family Medicine, College of Medicine, Kang University

Due to its highly addictive characteristic, smartphone use can reduce physical activities and cause unhealthy lifestyle habits, which leads to obesity. This study aimed to investigate the correlation between smartphone usage and obesity related factors. We visited four primary schools in south Korea for the completion of questionnaires for 10 ~ 11 years old students. Of 667 students, 240 underweight students were excluded, while 427 students were analyzed. T-test was conducted based on the hours of smartphone group. The hours of smartphone use, relationship between Smartphone usage and obesity related factors. We visited four primary schools in south Korea for the completion of questionnaires for 10 ~ 11 years old students.

Conclusion: Obesity is one of the primary risk factors for cardiovascular disease and type 2 diabetes. We sought to measure the long term changes in anthropometric measures and lifestyle habits in an obese cohort after participation in a preventive cardiology programme.

Methods: High risk patients (Heart SCORE ≥ 5%a) and their family members were enrolled on a 16-week intensive lifestyle programme, Croi MyAction, delivered by a multidisciplinary team. Body mass index (BMI), waist circumference, physical activity levels and dietary habits were assessed at initial assessment (IA) and at 1 year (1-yr). To calculate the Mediterranean diet score a food habit questionnaire was administered, with the use of a photographic food atlas to estimate portion sizes. Individuals also completed a Chester Step Test, a sub-maximal exercise assessment which determined an estimate of their maximal aerobic capacity.

Results: Of 741 patients enrolled, 390 completed the 1-yr assessment. The mean age of participants was 58 years, with 52.3% being male. Results demonstrated that there was a significant mean improvement in BMI, waist circumference, Mediterranean diet score and functional capacity at 1-yr.

Conclusion: Obesity is a growing epidemic in Ireland and these results demonstrate that long-term weight loss and lifestyle goals can be achieved and sustained as part of a comprehensive community-based cardiovascular disease prevention programme.


An adapted cognitive behavioral approach to addressing overweight and obesity among Qatari youth

Aleneama J.M.1, Ahmedna M.2, Al-Kuwari M.G.3

1Qatar University, Doha, Qatar,
2Aspetar- Orthopedic and Sports Medicine Hospital, Qatar

An Adapted Cognitive Behavioral Approach to Addressing Overweight and Obesity among Qatari Youth

Introduction: The levels of overweight and obesity have reached epidemic proportions in Qatar which stress the need for prevention programs. I can program is designed to manage the weight of overweight/obese Qatari school children at the vulnerable age of 9-12 years

Methods: Integrate behavioral economics and cognitive behavioral therapy for 83 overweight/obese Qatari children in a multi-cohort prevention/intervention study which involves three phases: (1) intensive lifestyle and weight loss camp, (2) 12-week after-school clubs as supplement/consolidation of knowledge, skills, and habits learned during the camp while engaging parents for long term sustainability of lifestyle changes, and (3) maintenance for knowledge, skills, habits, and behaviors gained in camp and afterschool clubs through web and social/family support

Results: 100% of participating children lost weight at an average of 2 kg with girls losing more weight than boys. Data from surveys conducted...
on dietary habit and physical activity revealed that over 60% did not take enough to fulfill their daily requirements of fruits, vegetables and milk. They predominantly consumed calorie-dense fast foods, soft-drink, and sweets. Furthermore, Over half (53%) did not engage in physical activity in their spare time.

**Conclusion:** the pilot phase succeeded in accomplishing the Adapt and pilot a school-based intervention that combines behavioral and cognitive approaches to promote healthy lifestyle among 9–12 year old children in select Qatari schools in the first year and laying a strong foundation for the start of the intervention cohorts in Qatari schools in years 2 through 5.

**Conclusions:**

Adding accountability to interventions that include other intervention is effective. Adding self-weighing to a behavioral intervention is effective. It is inconclusive whether advising self-weighing without goal setting or not. Trials with accountability had significances between trials that asked participants to weigh daily or weekly and mean differences of –3.7 kg (95% CI –4.6 to –2.9). There were no differences between trials that asked participants to weigh daily or weekly and those that had goal setting or not. Trials with accountability had significantly (p = 0.007) greater weight loss than trials that did not include this component.

**Results:**

One study examined self-weighing as a single strategy and it was ineffective (~0.5 kg 95% CI ~1.3 to 0.3). Adding self-weighing/self-regulation techniques to programmes resulted in a significant difference of ~1.7 kg (95% CI ~2.6 to ~0.8). Multi-component interventions including self-weighing compared to no/minimal control resulted in significant mean differences of ~3.7 kg (95% CI ~4.6 to ~2.9). There were no differences between trials that asked participants to weigh daily or weekly and those that had goal setting or not. Trials with accountability had significantly (p = 0.007) greater weight loss than trials that did not include this component.

**Purpose:** To examine the effectiveness of self-weighing for weight management.

**Background:** Finding simple, yet effective, ways in which individuals can be helped to lose weight and sustain weight loss could improve public health. One strategy that has shown promise is self-weighing.

**Methods:**

A systematic review and meta-analysis of 19 randomised controlled trials that included self-weighing as an isolated intervention or as a component within an intervention. We also conducted sub group analysis of trials to examine whether there were differences between daily and weekly weighing frequency and trials that included goal setting and accountability versus those that did not.

**Results:**

One study examined self-weighing as a single strategy and it was ineffective (~0.5 kg 95% CI ~1.3 to 0.3). Adding self-weighing/self-regulation techniques to programmes resulted in a significant difference of ~1.7 kg (95% CI ~2.6 to ~0.8). Multi-component interventions including self-weighing compared to no/minimal control resulted in significant mean differences of ~3.7 kg (95% CI ~4.6 to ~2.9). There were no differences between trials that asked participants to weigh daily or weekly and those that had goal setting or not. Trials with accountability had significantly (p = 0.007) greater weight loss than trials that did not include this component.

**Conclusions:**

It is inconclusive whether advising self-weighing without other intervention is effective. Adding self-weighing to a behavioural weight loss programme may improve weight loss. Behavioural weight loss programmes that include self-weighing are more effective than minimal interventions. Adding accountability to interventions that include self-weighing may improve effectiveness.

## T3.PO.050

**Eating behaviours are strong determinants of obesity risk, independently from socio-economic position**

**Purpose:** Associations between eating behaviours and body weight are well known. The aim of this study was to assess the influence of socio-economic position (SEP) on this relation.

**Methods:** We conducted a case-control study with 605 obese patients (78% women, age=41 yrs, BMI=42 kg/m²) and 403 non-obese controls (77% women, age=40 yrs, BMI=22 kg/m²) recruited in a preventive health center. Eating behaviour was assessed both by TFEQ-R21 and questionnaire about eating circumstances. SEP was established with a score constructed using occupation, education, income and divided in three groups (low/medium/high). Obese and non-obese subjects were compared using multivariate linear and logistic regression analyses.

**Results:** Compared with a medium SEP, a low or a high SEP were associated respectively, with a higher or a lower risk of obesity (OR=2, p = 0.0002 and OR=0.7, p = 0.014). Concerning TFEQ, cognitive restraint (p = 8×10−9), uncontrolled eating (p = 9×10−20) and emotional eating (p = 5×10−35) were positively associated with obesity, with no interaction with SEP. For eating circumstances, eating at night (p = 3×10−11), in front of TV (p = 1×10−6) or in a large size plate (p = 1×10−108) were associated with obesity. Eating in a large plate was more frequent in low SEP, even in absence of obesity (p = 0.02). Only the association between the plate size and obesity was different according to SEP (inter p = 0.011); the risk of obesity associated with this behaviour was more pronounced in high SEP than in low SEP (OR=71, p = 1×10−35 vs OR=15, p = 10×10−13, respectively).

**Conclusion:**

1) Eating behaviours are strong determinants of the risk of obesity, mostly independently of SEP. 2) Some obesogenic behaviours such as plate size are more prevalent in low social class.

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Abstracts

T3.PO.051

Associations between habit formation and weight loss in the 10 top tips (10TT) trial: A randomised controlled trial of habit-based advice for weight control in general practice


1Department of Epidemiology & Public Health, University College London
2Department of Primary Care & Population Health, University College London
3Department of Statistical Science, University College London

Introduction: According to habit-formation theory, habits are automatically-triggered actions, learned through repetition of the action in a consistent context. The 10TT trial tested a novel weight management intervention based explicitly on this theory. Previously presented data showed that patients allocated to 10TT lost significantly more weight over 3 months than those allocated to usual care. The present analysis tested the hypothesis that change in patient-reported frequency and automaticity of target behaviours would be associated with weight loss.

Methods: A two-arm, individually-randomised, controlled trial in obese adults (n=537) in primary care, compared 10TT with usual care. At baseline and 3 months patients were weighed and reported the frequency and automaticity of target behaviours using items from the self-report habit index. Results: Frequency and automaticity scores for each target behaviour were summed to create total scores. Frequency increased in both groups, but more in the 10TT group (10TT mean Δ=25.5; usual care mean Δ=17.7). There was also a larger increase in automaticity within the 10TT group (10TT mean Δ=26.9; usual care mean Δ=19.5). The amount of change was associated with weight loss for both frequency (r=−0.09, 95%CI= [−0.11, −0.06]) and automaticity (r=−0.08, 95%CI= [−0.11, −0.06]).

Conclusion: As hypothesised, weight loss was related to change in the automaticity and frequency of target behaviours. This provides some support for the theoretical basis of 10TT; although the size of the associations was small. Formation of targeted habits may not be the only process through which weight loss occurred. Longer term outcomes will indicate if habit formation has a stronger role to play the effectiveness of 10TT for weight loss maintenance.

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T3.PO.052

A longitudinal study of food craving and dieting in adults engaged in weight management

Smithson E.F., Hill A.J.

1Academic Unit of Psychiatry & Behavioural Sciences, Leeds University School of Medicine, 101 Clarendon Road, Leeds LS2 9LJ, UK

Background: Research evidence on the relationship between dieting and food cravings is conflicting, and there is little longitudinal research. The present study investigated the frequency and nature of cravings over time in adults engaged in weight management.

Methods: A large national sample of individuals (N=2932; 97% female; BMI=31.6) enrolled with a commercial weight loss organisation completed on-line assessments of craving experiences (Control of Eating Questionnaire), depression/anxiety, and dietary restraint on 2 occasions, 7 weeks apart. These data were analysed by dieting status (controlling for BMI, sex, age) and related to body weight measured at group meetings.

Results: Cross-sectional analysis showed those ‘dieting to lose weight’ (35%) were more likely to eat in response to food cravings than those ‘watching their weight’ (16%). There was no group difference in the types of foods craved, but those less likely to eat in response to food cravings lost more weight. There was also a significant positive relationship between participants’ sense of control over their food cravings and weight loss.

Conclusion: This is one of the first intentional studies of these relationships. Clinically, these findings are important, showing that dieting (and increased restraint) does not lead to weight gain via increased food cravings. Psychological strategies are available for dieters who do struggle to cope with food cravings.

T3.PO.053

Eating behaviour was associated with prevention of weight gain in varenicline treated overweight or obese smokers during smoking cessation

Svensden M., Heggen E., Klemsdal T.O., Tonstad S.

1Section for Preventive Cardiology, Department of Endocrinology, Obesity and Preventive Medicine, Oslo University Hospital, Norway.

Aim: To study the relation between eating behaviour (restraint, disinhibition, hunger, binge eating) and weight change in overweight/obese smokers treated with varenicline for smoking cessation. Subjects and methods: In a randomized clinical trial 122 smokers (≥10 cigarettes/day) with BMI 25–40 kg/m² were randomized to moderately energy reduced diets reduced in carbohydrate or fat. The subjects received dietary and motivational counselling at 10 visits over 3 months. Treatment with varenicline was started one week after randomization. At randomization, 4 and 12 weeks after target quit day (TQD), the TFEQ and the BES were used to assess eating behaviour. Food records were used to assess compliance with diet. Subjects with complete assessments of eating behaviour 12 weeks after TQD were included in the current analysis (N=88).

Results: Protein intake in the low-carbohydrate vs fat-reduced diets was 26 E% vs 20 E%, fat was 39 E% vs 31 E% and carbohydrates were 29 E% vs 41 E% (all p < 0.0001). No differences in weight changes (-0.1 ± 3.6 kg vs 0.4 ± 2.6 kg, p > 0.8) or in eating behaviour scores (all p > 0.2) between the dietary groups were seen 12 weeks post-TQD. The groups were combined and a one-way repeated measures ANOVA showed increased restraint (p < 0.0001) and decreased disinhibition, hunger and binge eating (all p < 0.03) between randomization and 12 weeks. In a general linear model, with change in weight as the dependent factor, change in restraint, disinhibition, hunger and binge eating as cofactors and dietary intervention groups as the fixed factor, increase in dietary restraint (p = 0.014) and decrease in binge eating (p = 0.029) were associated with lower weight gain (model R² = 0.14).

Conclusion: In the context of smoking cessation, dietary restraint and decreased binge eating may be useful in preventing early weight gain independent of the macronutrient composition of the diet.

Acknowledgement: The authors thank Liahld M. Lode, Edith B. Hesselberg and Thea A.M. Bergraven for assistance with the dietary counseling and dietary calculations, Ragnhild Kleve and Lise Bergengen for motivational counseling and administrative help and Nicole Warmbrodt for dietary counseling, and establishing the calorimetric method and database.

T3.PO.054

Association between appetite traits and weight in adults in britain

Hunot C., Beeken R.J., Croker H., Klieman N., Wardle J.

1Health Behaviour Research Centre, Department of Epidemiology and Public Health, University College London, London, United Kingdom (UK)

Background: Appetitive traits such as Food Responsiveness (FR), Enjoyment of Food (EF), Satiety Responsiveness (SR) and Slowness in Eating (SE) have been shown to be risk factors for excess weight in children, but there have been few studies in adults. Using the newly developed Adult Eating Behaviour Questionnaire (AEBQ), we assessed FR, EF, SR, and SE, as well as Emotional Over and Under-eating (EOE, EU), Hunger (H) and Food Fussiness (FF) and examined associations with Body Mass Index
A child's home food environment (HFE) supports or inhibits healthy eating, but its influence on childhood obesity is unclear due to poor understanding of underlying dimensions and mechanisms. This study aimed to investigate the relationship between the HFE and childhood obesity as mediated by a child diet. Baseline data collected by questionnaire from parents of children (9–11 years old) participating in the Obesity Prevention and Lifestyle (OPAL) Program were used (n=3323). Exploratory factor analysis using polychoric correlation explored 21 underlying components of the HFE. These components were used to define the overall HFE and linked to child diet (defined as meeting guidelines for fruit, vegetable and non-core food intake, based on parent report of child intake of defined food groups the previous day) and measured child BMI in structural equation modelling, adjusting for confounders. Five components incorporating 10 items were retained to describe HFE. After adjusting for age, gender, socioeconomic status and physical activity, all associations in the model were significant (p < 0.05) and explained 9.3% and 4.5% of variance in child diet and BMI respectively. Our model was a good fit and showed that a more positive HFE was directly associated, and indirectly associated through child diet, with a lower BMI in children. Parents are important facilitators of primary school children's healthy eating at home. The robust statistical methodology used provides support for a model of the direct and indirect dynamics between the HFE and childhood obesity. The model can be tested in future longitudinal and intervention studies to identify the most effective HFE component that should be targeted in childhood obesity prevention efforts.

Acknowledgement: Child and parent participants and all staff involved in data collection

A nutrition education programme for Saudi adolescents involving interactive activities with mothers is more effective for improvement of food intake and nutritional knowledge.

Alamri E.S., de Looy A.E., Collinson A.
1School of Health Professions, University of Plymouth, Plymouth PL6 8BH UK

Introduction: Poor food choice and obesity in Saudi Arabia are of growing concern. This study aims to examine whether interactive activities at home between mother and daughter, additional to school based nutrition education for daughters, leads to improvement in nutritional knowledge and food intake in homes of Saudi adolescent girls (17–18 yrs).

Methods: Adolescent girls and mothers were recruited from 3 matched high schools. Using a 4 week cluster randomised design adolescents in school A received nutrition education and interactive activities (cooking/recipe modifications to reduce fat intake) to complete with their mothers, adolescents in school B received education only and school C acted as control. Questionnaires on nutrition knowledge and food frequency questionnaires were administered pre and post intervention.

Results: 207 girls and their mothers were recruited (72, 69 and 66 schools A, B and C respectively). There was no significant difference in pre-intervention nutritional knowledge scores for mothers and adolescents between schools. Post intervention adolescents’ scores in A and B were significantly higher than school C (p < 0.05). Post intervention mothers’ scores in school A were significantly higher than schools B and C (p < 0.05). Fruit, vegetables, milk and wholemeal bread consumption were positively correlated with nutritional knowledge scores of mother and adolescent in school A only (p < 0.05).

Conclusion: Interactive activities effectively support nutritional knowledge transfer from school to home resulting in improvement in adolescent and mothers’ nutritional knowledge and food intake.

Acknowledgement: We are grateful to Tabouk University (Saudi Arabia) Schools and families for support.

Characteristics of successful weight loss maintainers after very low calorie diet-induced weight loss

Hart K.1, Jones C.1, Johnston K.L.2
1Department of Nutritional Sciences, Faculty of Health and Medical Sciences, University of Surrey, Guildford, UK;
2LighterLife UK Ltd, Cavendish House, Parkway, Harlow Business Park, Harlow, Essex, CM19 5QF

Very low calorie diets (VLCD) induce substantial initial weight loss and continued use of formula-based products may promote improved weight loss maintenance (WLM) thereafter(1). Tackling weight regain remains a key issue for obesity treatment. This study aimed to investigate the factors associated with successful weight loss maintenance after VLCD weight loss, to better support individuals and optimise this crucial stage of the weight loss ‘journey’. Individuals registered with Lighterlife (LL) (n=1100), a weight-loss programme comprising a VLCD, behavioural modification and group support, who had lost at least 10% of their starting weight and had spent at least 6 months on the LL maintenance programme, were invited to complete an online questionnaire, assessing diet and activity behaviours, along with an optional food frequency questionnaire (FFQ). Data analysis (n=104) is ongoing and although no one particular approach was associated with greater WLM success, results suggest that participants most commonly employed healthier eating (95%), smaller portions (90%), lower energy drinks (87%) and continued use of meal replacement products (76%) to assist with WLM. However greater WLM was associated with more LL foodpack use and group attendance, with a significantly more frequent attendance when corrected for duration of maintenance (Q1 WLM: 1.03±0.9, Q4 WLM: 1.66±1.2 groups per month; p = 0.04). Psychologically, greater WLM was associated with less external and emotional eating and greater dietary restraint (see Figure 1). Following initial weight loss on a very low calorie programme individuals report employing a range of techniques to maintain their weight loss, most importantly continued group support. Further analysis will address any associations between reported dietary intakes and WLM success.

Acknowledgement: The authors would like to thank Shangari Raviraj for her help with data collection.

References:

Fig. 1. Figure caption: Eating behaviors as assessed by the Dutch Eating Behavior Questionnaire(3) in high (Q4) and low (Q1) weight loss maintainers who have previously lost weight on a Very Low Calorie Diet. (p = 0.04, duration corrected)

T3.PO.061
Ambulatory health information system for obesity prevention and treatment (pathmate) tailored for teenagers: A preliminary longitudinal study

Durrer D.1, Kowatsch T.1, /Allemand-Jander D.1, Büchter D.1, Plettkaos Cvijikj J.1, Maass W.1, Schutz Y.1,6
1Eurobesitas Center (COMs), Vevey, Switzerland

Introduction: Multi-professional programs for the management of obesity in teenagers, which combine physical activity, nutritional and psychological components, are well established today. However, due to restricted resources available, only limited number of patients can be included in these programs, considering the low medical coverage and high needs consequent to the generally high prevalence of obesity. The objective was to develop a technical platform with a number of innovative tailored applications allowing an access to interactive interventions via a tablet PC.

Methods: Six adolescents (13–17 years, BMI Percentile 97 for age & gender) participated in a longitudinal field study. Following a baseline measurement, one month, 3 month and 4 month evaluations were organized. The following measurements were made: 1. Well-being, mental health, mood, eating disorders, motivational interview all by validated questionnaires; 2. changes in body weight and BMI, SDS, blood pressure, speed of eating (by sequential photogrammetry), daily physical activity (PA by accelerometer, Fitbit), degree of relaxation (by skin conductance and heart rate), all by objective measurements.

Results: Body weight loss at 4 months averaged as much as 6.2 kg (range: 3.8 to 8.0 kg). Although the applications were developed together with the teenagers, a large inter-individual variability of the platform usage (inconspicuously measured) was observed. The applications judged the most useful were mood test, relaxing exercise and PA tracking.

Conclusion: For the MDs, this new tool can provide a useful aid to work and communicate with (pre)obese teenagers during the consultation. A “Tamagoshy like” approach could stimulate the adherence to Pathmate.

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T3.PO.062
Readiness to change body weight and lifestyle factors according to the transtheoretical model in an overweight/obese upper-austrian population

Haider S.1, Lufer E.1, Schrotter K.1, Rieder A.1, Dorner T.E.1
1Centre for Public Health, Institute of Social Medicine, Medical University of Vienna

Introduction: Overweight and obesity is a global public health threat. The willingness to change body weight, nutritional and physical activity behaviour can be assessed with the transtheoretical model (TTM). Willingness is divided in 5 stages of change (SOC): precontemplation, contemplation, preparation, action and maintenance. The aim of this study was to assess the readiness for changing lifestyle and body weight in an Upper-Austrian population.

Methods: A computer assisted telephone interview survey was conducted in subjects ≥18 years. SOC were asked and analysed dependent on BMI. For assessing gender specific differences chi-square test was performed.

Results: 453 persons [47 (18) years, 51% women (w), BMI: 24.9 (3.9) kg/m²] were included in the analysis. According to the WHO criteria 3% were underweight, 53% normal weight, 34% overweight and 10% obese. In subjects who were overweight/obese, 23% were in the precontemplation, 7% in the contemplation, 47% in the action and 23% in the maintenance stage concerning body weight. However, only 6% of overweight/obese subjects were changing their nutritional and 7% their physical activity behaviour at the moment (action stage), whereas 72% claimed to maintain nutritional and 54% physical activity changes (maintenance stage), respectively. Compared to obese women, men were more likely to be in the precontemplation stage concerning nutritional (p = 0.000) physical activity (p = 0.037) changes.

Conclusion: A majority of overweight/obese persons indicate that they are actively changing their body weight. However, most of them are not in the action stage regarding changing nutrition and physical activity habits. Obese men are less ready to perform lifestyle modifications.

Reference:

T3.PO.063
Images help obese women to memorize nutritional guidance

Micali F.G.1, Diez-Garcia R.W.1
1Department of Internal Medicine, Ribeirão Preto Medical School, University of São Paulo

Introduction: The association of images with written or oral information facilitates cognitive processes like attention and memory, favoring compliance with information. This study aimed to compare the memorization of eutrophic (n = 18) and obese (n = 15) women about nutritional guidance associated with images.

Methods: Nutritional guidelines were presented during two workshops that dealt with the following themes: sugar content in food and drinks, food with equivalent energy content but distinct nutritional quality, fat content in food and preparations, and healthy food. Five messages were conveyed, accompanied by five images; a total of 20 images were employed. Immediately (T0), 30 days (T30), and 60 days (T60) after the workshops, the participants answered a structured questionnaire with Likert scales to evaluate the degree at which they recalled the messages. The Wilcoxon–Mann–Whitney and McNemar tests were used and the level of significance was set at 5%.

Results: Obese women memorized the messages more than eutrophic women (all p values < 0.03). Only eutrophic women presented diminished recall along time (p = 0.0004 between T0 and T30). Memorization was higher than 63.3%, and the average memorization was 86.7% when all the themes, groups, and times were taken into account. The best memorized themes were about the sugar content of foods and drinks (from 85.6 to 97.3%) and healthy food (from 81.1 to 100.0%).

Conclusion: Pictorial instruments can aid obesity treatment and prevention, since it favors memorization that could be accessed before food choices.

Acknowledgement: Funding: Research relating to this abstract was funded by Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq (protocol number 473848/2011-2).

T3.PO.064
Losing weight and maintaining healthy life style with help of cbt and internet

Máliková L.1, Máliková H.1, Fraisová A.1
1STOB, Prague, Czech Republic

Introduction: The rate of obesity in population worldwide is rising; therefore we must seek and try new methods. Recently, one of new tools used is internet due to its ability to reach many users of the web with minimal costs. The majority of internet weightloss programs offer only education. That impersonal approach is not successful in installing longterm change of behaviour. Current research is aimed on combining internet with CBT.

Methods: STOB (Stop Obesity), established in 1990, has influenced many hundreds of thousands of people. Its methods are based on CBT. In order to provide longterm support in an individual weight reduction, in 2011 STOB set up a community website www.stobklub.cz, which has 140,000 registered members. STOBklub offers, among other activities, a whole...
weightloss program for 4 up to 12 weeks, which has been used by 20,400 members so far (10% of them were men) with an average BMI of 28. Users reduced their weight by 60,000 kgs. STOB prepared a new application, STOBkolo (STOBwheel) that works with an individual measure of readiness and motivation of a given user.

**Results:** STOBkolo works with patients’ readiness to change their habits. According to the degree of patients’ motivation and other individual needs, the individual stages of STOBkolo offer various materials (e-books, videocourses, self-coaching consisting of food-coaching, fit-coaching and psycho-coaching, the system of „traffic lights“ offering an immediate feedback, and back- and other tools). Members of STOBklook form motivational groups with longterm personal support.

**Conclusion:** STOB combined with its STOBkolo two major approaches: proven methods of CBT with newer medium of internet. This model in accordance with plans of Patients Organization of EASO works with individuality of every patient.

**Acknowledgement:** This work was supported by the grant N. DOT/04/03/004277/2014 of Prague City Hall

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**T3.PO.065**

**Loops - Lund overweight and obesity preschool study: An intervention involving parents of preschool children with obesity has a long-term effect on the weight development of targeted children.**

**Önnerfält J.1,2, Erlanson L.2,3, Orban K.2,3, Helgason C.4, Thorngren Jerneck K.4,2**

1Department of Paediatrics, Clinical Sciences Lund, Lund University, Sweden., 2Vårdsinstitutet, Swedish Institute for Health Sciences, Lund University, Sweden., 3Department of Health Sciences, Faculty of medicine, Lund University, Sweden., 4Department of Psychology, Lund University, Sweden.

**Introduction:** There is still lack of evidence of what are the best interventional strategies to combat childhood obesity for preschool children. Interventions have shown to be more effective, the younger a child is. There is also a positive effect of involving parents of an obese child. Aim To evaluate if a family-based intervention involving exclusively the parents of obese preschool children, had a long-term positive effect on the weight development of targeted children. A secondary aim was to compare two different interventional strategies.

**Methods:** 80 children with obesity (BMI-SD 3.26 ± 0.71) aged 4–6 years were included. All parents were offered a 2-hour lecture and got access to a website with information about diet and exercise. They were also invited to attend group meetings with the purpose of giving support to actual and weight management of the children. The parents were randomized into two groups, either to one led by a psychologist or by an occupational therapist. The interventions had in common that they aimed to support parents to make interventions had in common that they aimed to support parents to make their lifestyle of obese patients who have undergone Gastric Bypass Roux-en-Y (RYGB) and Sleeve Gastroctomy (SG).

**Results:** ANOVA analysis, age/gender adjusted:

- A and B scores improved significantly at T6 (RYGB and SG: p < 0.001),
- C score did not reach the significance,
- D score did not change at T6 neither in RYGB nor in SG. Multilevel models:
  - A and C scores did not correlate with independent variables (age, gender, weight, BMI, ideal and relative weight) neither in RYGB nor in SG,
  - B score was negatively correlated both with weight (BYPGR: p = 0.002) and with BMI (SG: p = 0.003),
  - D score positively correlated with age, only in SG (p = 0.002), being the correlation stronger in females than in males (p = 0.004).

**Conclusion:** Although dietary habits slightly improved, overall patients did not change their physical activity levels and smoking habits at T6. This was probably due to an incorrect perception about bariatric surgery procedures that reduce drastically weight in the short-term but need to be supported by an adequate lifestyle intervention program over the long term.

*Soares FL et al. (2014)*

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**T3.PO.066**

**Evaluation of eating habits and lifestyle in obese patients before and after bariatric surgery**

**De Giuseppe R.1, Bino G.2, Persico F.3, Ciliberto A.1, Giovannelli A.1, Cena H.3**

1Institute of Human Nutrition and Dietetics, Department of Public Health, Experimental and Forensic Medicine, University of Pavia; Italy, 2Institute of Molecular Genetics, National Research Council of Italy, Pavia; Italy, 3Department of General Surgery, Istituto Clinico S. Ambrogio, Milano, Italy

**Introduction:** The lack of improvement in eating habits and lifestyle in bariatric patients might predict the unsuccessful maintenance of body weight reduction at long term*. We aimed to evaluate eating habits and lifestyle of obese patients who have undergone Gastric Bypass Roux-en-Y (RYGB) and Sleeve Gastroctomy (SG).

**Methods:** We retrospectively analyzed dietary habits (A), food frequencies (B), physical activity (C) and smoking habits (D) in 50 RYGB (25M; aged: 24–64; BMI: 44.8 ± 6.8 kg/m²) and 50 SG patients (25M; aged: 22–63; BMI: 44.5 ± 7.4 kg/m²) by means of a validated questionnaire, before (T0) and after 6 months (T1) from bariatric surgery. A score for each section (A, B, C, D) was calculated. The score assigned to each item ranged 0–3 points; maximum score corresponding to the best response.

**Results:** ANOVA analysis, age/gender adjusted:

- A and B scores improved significantly at T6 (RYGB and SG: p < 0.001),
- C score did not reach the significance,
- D score did not change at T6 neither in RYGB nor in SG. Multilevel models:
  - A and C scores did not correlate with independent variables (age, gender, weight, BMI, ideal and relative weight) neither in RYGB nor in SG,
  - B score was negatively correlated both with weight (BYPGR: p = 0.002) and with BMI (SG: p = 0.003),
  - D score positively correlated with age, only in SG (p = 0.002), being the correlation stronger in females than in males (p = 0.004).

**Conclusion:** Although dietary habits slightly improved, overall patients did not change their physical activity levels and smoking habits at T6. This was probably due to an incorrect perception about bariatric surgery procedures that reduce drastically weight in the short-term but need to be supported by an adequate lifestyle intervention program over the long term.

*Soares FL et al. (2014)*

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**T3.PO.067**

**Development of the ‘adult eating behaviour questionnaire’ for appetitive trait measurement.**

**Hunot C.1, Beeken R.J.1, Croker H.1, Wardle J.1**

1Health Behaviour Research Centre, Department of Epidemiology and Public Health, University College London, London, United Kingdom (UK)

**Introduction:** Appetitive traits such as Food Responsiveness (FR) and Satiety Responsiveness (SR), are stable predispositions towards food, genetically linked to determined phenotypes, which could contribute to an individual’s susceptibility to gain weight in the obesogenic environment. In children these traits have been measured using the ‘Child Eating Behaviour Questionnaire’ (CEBQ) and low ‘food avoidance’ (SR) and high ‘food approach’ (FR) traits have been consistently associated with obesity and weight gain. Adult appetite questionnaires tend to incorporate restraint and disinhibition, but no reliable measure of SR exists for use in adult populations.

**Methods:** We developed a self-report questionnaire, the ‘Adult Eating Behaviour Questionnaire’ (AEBQ) from the parent report CEBQ. Items for inclusion were derived from the CEBQ and expanded based on a literature review to include items on Hunger. Piloting led to the deletion of some items, including the the Desire to Drink scale, due to difficulties in comprehension and an altered response format from ‘often/never’ to ‘agree/disagree’. Responses to items from 708 adults (18 to 81 years, 336 men, 372 women) were analysed to determine the final factor structure of the AEBQ, and its internal and external reliability.
Results: Principal Component Analysis revealed a 35 item scale with eight factors similar to the CEBQ. The factors were internally valid and had good test-retest reliability (all Cronbach alphas >.7).

Conclusions: The AEBQ is a robust measure of four ‘food approach’ and four ‘food avoidant’ traits, which is internally and externally reliable. This instrument will enable us to track associations between appetitive traits and weight into adulthood and could potentially identify individuals at risk of weight gain.

Table 1: Characteristics of survey participants and their adherence to dietary recommendations

<table>
<thead>
<tr>
<th></th>
<th>% of participants (n=1586)</th>
<th>Average no. of non-adherence per participant</th>
<th>Frequency of eating in a hurry</th>
</tr>
</thead>
<tbody>
<tr>
<td>All participants</td>
<td>100%</td>
<td>2.8 (1.5)</td>
<td>51% (26)</td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>63%</td>
<td>2.6 (1.4)</td>
<td>51% (26)</td>
</tr>
<tr>
<td>Male</td>
<td>37%</td>
<td>3.2 (1.5)</td>
<td>51% (27)</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>22%</td>
<td>2.7 (1.4)</td>
<td>46% (26)</td>
</tr>
<tr>
<td>Graduate</td>
<td>71%</td>
<td>2.8 (1.5)</td>
<td>53% (26)</td>
</tr>
<tr>
<td>Omnivore</td>
<td>78%</td>
<td>3.0 (1.5)</td>
<td>51% (26)</td>
</tr>
<tr>
<td>Vegetarian</td>
<td>17%</td>
<td>1.9 (1.5)</td>
<td>52% (26)</td>
</tr>
<tr>
<td>Vegan</td>
<td>3%</td>
<td>2.2 (1.6)</td>
<td>47 (20)</td>
</tr>
<tr>
<td>Eating in university hospital canteen</td>
<td>40%</td>
<td>2.8 (1.3)</td>
<td>52% (27)</td>
</tr>
<tr>
<td>Eating in medical faculty canteen</td>
<td>18%</td>
<td>3.0 (1.5)</td>
<td>52% (26)</td>
</tr>
<tr>
<td>Eating in general university canteen</td>
<td>30%</td>
<td>2.6 (1.3)</td>
<td>50% (25)</td>
</tr>
</tbody>
</table>

Introduction: University, workplace and hospital canteens can play a crucial role in influencing long-term dietary habits of students, staff and patients, and can thus influence the occurrence of obesity and other diet-related conditions. This study aims to identify barriers to healthy eating in university hospital and medical school canteens.

Methods: A cross-sectional survey was conducted among medical students eating in university hospital and medical school canteens in Germany on their consumption patterns, the perceived food environment and adherence to dietary recommendations published by WHO and the German Nutrition Association on six food items (salad, vegetables, fruit, whole grain or potatoes, meat and fish).

Results: 97.3% of respondents (n=1590) indicated non-adherence to at least one of six dietary recommendations. The average number of declared non-adherences was 2.8 (SD=1.5). Reported reasons for non-adherence were lack of variety (49% of respondents), availability (43%), stable dietary preferences (40%), price (32%), lack of awareness/prompting at the point of purchase (31%), non-inclusion in the default menu (29%), craving for salty/fatty food (29%), perceived value-for-money (24%) and impractical serving and vending arrangements (17%). On average, respondents reported eating in a hurry in 51% of cases (SD=26).

Conclusion: There is considerable room for improvement and a clear need for action in the product range, food environment and choice architecture provided by university hospital and medical school canteens in Germany, which should lead by example.

Table 2: Participants’ perception of the food environment offered by their canteen

<table>
<thead>
<tr>
<th>Food environment characteristic</th>
<th>Mean agreement [median and IQR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>“My canteen allows me to practice the diet I wish to practice.”</td>
<td>37 (10-69)</td>
</tr>
<tr>
<td>“My canteen is a place where I feel comfortable.”</td>
<td>46 (22-72)</td>
</tr>
<tr>
<td>“In my canteen, there is a stressful atmosphere.”</td>
<td>64 (30-92)</td>
</tr>
<tr>
<td>“In my canteen, the vegetables are always fresh.”</td>
<td>26 (6-55)</td>
</tr>
<tr>
<td>“My canteen makes it easy for people to have a healthy diet.”</td>
<td>26 (10-57)</td>
</tr>
<tr>
<td>“Having easy access to healthy food is for me an important part of good study conditions.”</td>
<td>83 (56-98)</td>
</tr>
<tr>
<td>“My canteen pays attention to the salt content of its food.”</td>
<td>37 (14-84)</td>
</tr>
<tr>
<td>“My canteen pays attention to the fat content of its food.”</td>
<td>25 (8-57)</td>
</tr>
<tr>
<td>“I (would) like to eat vegetables and salad in my canteen, because preparing them at home is too burdensome.”</td>
<td>72 (38-92)</td>
</tr>
<tr>
<td>“In my canteen is a place where I can relax and recover.”</td>
<td>28 (11-56)</td>
</tr>
<tr>
<td>“If my canteen offered better food and nicer atmosphere, I would eat there more frequently.”</td>
<td>86 (40-98)</td>
</tr>
</tbody>
</table>
The study was supported by Université Senghor and Santé Diabète (Mali); 3Bamako University Hospital, Mali; 4Université Senghor de la Francophonie, Faso and Mali; 5University of Montreal, Canada.

**Objectives:** To assess the recommendations provided by health professionals to persons with diabetes regarding diet, physical activity and weight control, and to examine the relationship between advice given and the characteristics of the health professionals.

**Methodology:** The cross-sectional study was conducted over three months in 2012 in Ouagadougou and Bamako. Interviews with closed and open-ended questions were conducted with a total of 78 health professionals (including 60 MDs) involved in the treatment of persons with diabetes in public hospitals and health centres. Dietary recommendations pertaining to specific food items, meal and snack patterns, cooking methods and meals away from home were rated. Types of recommendations for physical activity and for body weight were rated in a similar fashion.

**Results:** 24% had no specific training in diabetes management, all respondents declared providing some dietetic advice to patients. In general, recommendations focused on foods to avoid, to restrict or to consume ad libitum, and diet sheets were given to patients. Most interviewed practitioners recognized that they did not have enough time or training to provide adequate dietetic guidance. 44% gave specific advice to patients on insulin and 20% talked about cooking methods. Advice given to patients was considered 'acceptable' in 65% of respondents for diet in 70% for control of body weight, and in 95% for physical activity. Dietary and physical activity guidance scores were significantly higher in professionals with specific training, and in MDs compared with other health professionals.

**Conclusion:** The study highlights the need to improve dietary counseling, particularly as regards developing specific dietary plans with individual patients for better compliance. Health professionals specialized in nutrition are becoming a priority in Africa to address nutrition-related issues, particularly as regards developing specific dietary plans with individual patients.

**Acknowledgement:** The study was supported by Université Senghor and Santé Abbé.
chosen health indicators collected during routine medical examinations, according to a sport type, could be a useful proxy for detecting gender and age-related differences in athletes’ health status.

T3.PO.072
Body mass index and six-minute step test predict cardiorespiratory fitness in lean and obese sedentary young women

Carvalho L.P.1, Di Thommazo-Luporini L.1, Luporini R.L.1, Bonjorno J.C.1, de Oliveira C.R.1, Pacheco E.P.1, Lopes Zangrando K.L.1, Lanzotti H.1, Trimer R.1, Mendes R.G.1, Borghi-Silva A.1

1Cardiopulmonary Physiotherapy Laboratory, Federal University of Sao Carlos, Sao Carlos, Brazil,
2Santa Casa de Misericórdia de Sao Carlos, Sao Carlos, Sao Paulo, Brazil,
3Department of Medicine, Federal University of Sao Carlos, Sao Carlos, Brazil

Introduction: Physical inactivity leads to impaired cardiorespiratory fitness (CRF) as well as it render sedentary people more susceptible to reduced functional capacity and higher mortality risk. Obesity is quite prevalent in women and it is usually associated to sedentary lifestyle, contributing to increase bad outcomes. The six-minute step test (6MST) has been proposed to evaluate functional capacity in this population in clinical centers when the maximal cardiopulmonary exercise testing (CPX) is not available due to limited space and staff. However, it is not of our knowledge the existence of predictive equations of metabolic responses to CPX from demographic and anthropometric variables and from performance in the 6MST. Our aims were to assess the number of step cycles (NSC) obtained by 6MST as well as BMI and age to predict maximal oxygen uptake (VO2) achieved during CPX in sedentary young women.

Methods: Thirty-three sedentary women (20–45y; 18.5<BMI<24.9 or BMI>30 kg.m-2) underwent a clinical evaluation (including body composition), a CPX, and a 6MST. To assess the ability to predict peak VO2 achieved during CPX we applied stepwise multiple linear regression analysis to verify relationships between metabolic and body composition variables we used the Pearson’s correlation coefficients (p < 0.05).

Results: BMI, NSC and age were selected and entered the reference equation explaining 83% of the total variance in peak VO2 obtained during CPX. Strong correlations were found between VO2 and both BMI and body fat (r = -0.85) as well as VO2 and 6MST performance (r=0.81).

Conclusion: Concomitantly, BMI, 6MST and age are able to predict maximal VO2 in sedentary young lean and obese women, including a simple and inexpensive functional evaluation tool.

Acknowledgement: The Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP Process 2009/10182-0 and 2013/15681-3), Sao Paulo, SP, Brazil for funding this study and the Cardiopulmonary Physiotherapy Laboratory of the Physiotherapy Department of Universidade Federal de Sao Carlos.

T3.PO.073
Marital status and educational level in greek obese adults

Fotiadou E.1, Kourtogiou N.1, Gounisioti T.1, Dimitroula C.1, Axiaitidou E.1, Kouniakis R.1, Belliavni M.1, Tzotzas T.1, Savopoulos C.1, Hassapidou M.N.1, Hatzitolios A.J.1

1Obesity & Metabolism Outpatient Clinic, EASO accredited Collaborating COM, 1st Propedeutic Department of Internal Medicine, AHEPA University Hospital of Thessaloniki, Greece,
2Department of Human Nutrition & Dietetics, Alexander Technological Educational Institute of Thessaloniki, Greece

Introduction: A series of studies have stated associations among marital status, educational level and obesity. The aim of this study was to assess whether these associations were observed in Greek obese adults.

Methods: Demographic and anthropometric data from a total number of 153 obese outpatients were analyzed (mean age 47.3 ± 11.8 years and mean BMI 39.6± 7.4 kg/m², 113 women, 40 men). WHO cut-offs were used to define obesity subgroups - Class I, II & III. Marital status and educational level were obtained using a validated questionnaire.

Results: Regarding the overall population 25%, 33% and 42% belonged to the obesity subgroups I, II & III respectively. More than half outpatients (60.5%) were married. Subgroups of obesity and marital status were significantly associated in overall (p < 0.01) as well as in female (p < 0.05) population. In obesity classes I & II there were more married individuals, while in class III the majority was unmarried. According to their educational level, 11% attended primary school, 49% high school and 40% had a university degree. Outpatients, mainly men, who attended only primary school had significantly higher BMI than those who attended high school (p < 0.01) or/and university (p < 0.05).

Conclusions: Marital status seems to influence development of obesity both in men and women. Furthermore, this study indicates the need for higher educational level along with health education programs, especially for the early school leavers.

T3.PO.074
The impact of feeding status on the adipose tissue responses to exercise in overweight men

Chen Y.C.1, Travers R.L.1, Wallin J.P.1, Betts J.A.1, Thompson D.1

1Department for Health, University of Bath, United Kingdom

Background: Feeding profoundly affects metabolic responses to exercise in various tissues but it is unclear whether feeding status influences the way adipose tissue responds to exercise.

Methods: Ten healthy overweight males aged 26 ± 5 years (mean ± SD) with waist circumferences between 105 ± 10 cm completed a walking protocol at 60% of maximum oxygen uptake under either FASTED or FED conditions in a randomised, counterbalanced design separated by a 3–4 week wash-out period. Blood samples were collected at regular intervals to examine changes in metabolic parameters. Adipose tissue samples were obtained at baseline and one hour post exercise to examine changes in adipose tissue gene expression and secretion of selected adipokines ex vivo.

Results: Incremental glucose and insulin area under the curves were significantly higher in FED than FASTED conditions (156 ± 43 vs. 14 ± 6 mmol.300 min.l-1, p = 0.015 and 37.8 ± 8.2 vs.0.7 ± 0.3 mmol.300 min.l-1, p = 0.002, respectively). Significant trial × time interaction effects were found for adipose tissue expression of GLUT4, HSL, PDK4 and IRS2 (all p < 0.05) when exercising under diverse dietary conditions; with expression of HSL (2.09-fold) and PDK4 (1.68-fold) up-regulated under FASTED conditions and expression of PDK4 (0.77-fold) and IRS2 (0.81-fold) down-regulated under FED conditions. Feeding did not impact upon serum and ex vivo adipose secretion of IL-6, leptin and adiponectin.

Conclusions: This study shows that feeding prior to acute exercise affects adipose tissue gene expression responses. Given the potential role of adipose tissue in metabolic health, choosing to exercise whilst in a fed or fasted state will potentially impact the long-term responses to an exercise programme.

Key words: Gene expression, obesity, walking

T3.PO.075
Structured, supervised physical training after gastric bypass has positive impact on weight reduction and aerobic capacity

Stollberg C.R.1, Mundtberg L.H.1, Juhi C.B.2, Gram B.2

1Department of Endocrinology, Hospital of South West Jutland, Esbjerg, 2Institute of Regional Health Research, Hospital of South West Jutland, Esbjerg

Introduction: Bariatric surgery is the most efficacious treatment for severe obesity. Evidence regarding effects of physical training post-surgery is lacking. The purpose of this study was: 1) to evaluate the effect of gastric bypass (GB) on weight loss, VO2max, and muscle strength and 2) to evaluate the effect of 26 weeks supervised physical training on same variables.
Methods: Sixty patients with morbid obesity, qualified for GB, were 6 months post-surgery randomized 1:1 to 26 weeks intervention (I) or a control group (C). The intervention consisted of 2 x 40 min training sessions per week each involving training of aerobic capacity and muscle strength, instructed and supervised by physiotherapists. Measurements on anthropometry, VO2max, and muscle strength were performed pre-surgery, 6, and 12 months post-surgery.

Results: Preliminary results from 42 of the 60 patients are presented (mean (SD)). At baseline the body weight (kg) was: 126.3(8.9), BMI (kg/m²): 43.1(6.0), VO2max (l/min): 2.6(0.7), and muscle strength for hip extension (N): 219.0(58.3). GB resulted in reduced body weight (Δ: -27.7 (1.0), p < 0.001) and BMI (Δ: -9.4(0.6), p < 0.001), no changes in VO2max, and a significant decrease in muscle strength (Δ: -17.4(30.3), p < 0.007). Physical training caused an additional significant reduction in bodyweight (Δ: -1.5(1.5), p < 0.03), in BMI (Δ: -0.6(0.4), p < 0.003), and an increase in VO2max in I compared to C (Δ:0.5(0.1) p < 0.002);There was no significant effect on muscle strength.

Conclusion: Post-bariatric patients undergoing structured supervised physical training lose more weight and increase their aerobic capacity compared to control. The reduced muscle strength during the initial phase of weight loss emphasizes the need of post-surgery specific strength training.

T3.P0.076

Effects of aerobic training, resistance training or both in obese adolescents with the metabolic syndrome: The hearty randomized controlled trial

Frappier A.1, Alberga A.S.1, Sigal R.J.1, Kenny G.P.1, Doucette S.1, Prud’homme D.1,5

1School of Human Kinetics, Faculty of Health Sciences, University of Ottawa, Ottawa, Canada, 2Faculty of Education, University of Calgary, Calgary, Canada, 3Departments of Medicine, Cardiac Sciences and Community Health Sciences, FAculties of Medicine and Kinesiology, University of Calgary, Calgary, Canada, 4Department of Community Health and Epidemiology, Dalhousie University, Halifax, Canada, 5Institut de Recherche de l’Hôpital Montfort, Ottawa, Canada

Introduction: There is little evidence regarding the effect of exercise training in obese adolescents with Metabolic Syndrome (MetS). We aimed to determine the effects of Aerobic, Resistance, and Combined training on the prevalence of MetS in obese adolescents enrolled in the HEARTY (Healthy Eating, Aerobic and Resistance Training in Youth) trial.

Methods: After a 4 weeks run-in, previously-inactive post-pubertal adolescents (N=304) aged 14–18 years old (Tanner Stage IV–V) with Body Mass Index ≥ 85th percentile for age & sex were randomized to 4 groups: Aerobic training (N=11), Resistance training (N=12), Combined aerobic and resistance training (N=12), No-exercising Control (N=16). After receiving dietary counseling with a daily energy deficit of 250 kcal. This is a secondary analysis of the HEARTY trial.

Results: There were no significant changes in the prevalence of MetS between groups, however, significant improvements in MetS parameters were observed within groups; with Aerobic training decreased body mass index (-1.5 kg/m²), percentage body fat (-2%), waist circumference (-5 cm) and systolic (-10 mmHg) and diastolic (-6 mmHg) blood pressure from baseline to post-intervention. Combined aerobic and resistance training decreased triglyceride concentrations (-7 mmol/L), and increased high density lipoprotein concentration (+0.04 mmol/L) when comparing pre- and post-intervention.

Conclusions: Exercise, regardless of modality, did not reduce the prevalence of MetS but did improve MetS components in obese adolescents.

Acknowledgement: Funded by the Canadian Institutes of Health Research (ClinicalTrials.gov NCT00195858)

T3.P0.077

Obese children and adolescents who skip breakfast present abnormalities in the lipid profile and blood pressure

Freitas Jr I.F.1, Monteiro P.A.1, Antunes B.M.1, Silveira L.S.1, Brunholi C.C.1, Christofaro D.J.1, Fernandes R. A.1

1Post-Graduation Program in Science of Morbidity – Univ. Estadual Paulista – UNESP – São Paulo-Brasil

Objective: To analyze the effect of weekly breakfast intake frequency on metabolic changes in obese children and adolescents.

Methods: The study included 285 obese children and adolescents, aged six to 16 years (10.9 ± 2.7). Body composition (percentage of body fat and trunk fat), blood samples (glucose, triglycerides, total cholesterol and its fractions HDL-Cholesterol, LDL-Cholesterol e VLDL-Cholesterol), blood pressure and food intake were assessed. The subjects were distributed in two groups: Breakfast Skippers and Non-Skippers. Non-skippers were just those who answered taking breakfast every day.

Results: In overall sample, 50.9% (n=145) subjects reported daily consumption of breakfast at least once a week. Skippers presented higher mean values of systolic blood pressure (117.3 mmHg and 112.7 mmHg [p = 0.038]), triglycerides (106 mg/dL and 92.5 mg/dL [p = 0.037]). On the other hand, higher mean values of HDL-Cholesterol (44.0 mg/dL and 41.5 mg/dL [p = 0.018]) were observed in non-skippers.
Conclusion: Obese children and adolescents who skip breakfast present- ed abnormalities in plasma lipid concentrations and in systolic blood pressure.

Acknowledgement: UNESP, CAPES, CNPq

T3.PO.078
Optimal cutoffs for defining physical fitness in sedentary obese women
Di Thommazo-Luporini L.1, Carvalho L.P.1, Luporini R.L.1, Trimer R.1, Nogi C.Y.1, Lopes Zangrando K.T., Petronilho A.1, Catui A.M.1, Borghi-Silva A.1
1 Cardiopulmonary Physiology Laboratory, Department of Physiotherapy, Federal University of Sao Carlos, Sao Carlos, Brazil. 2 Santa Casa de Misericordia de Sao Carlos, Sao Carlos, Brazil. 3 Nuclear of Research in Physical Exercise, Department of Physiotherapy, Federal University of Sao Carlos, Sao Carlos, Brazil.

Introduction: Obesity is linked to reduced functional capacity and increased health risk and has been diagnosed using the body mass index (BMI) to stratify its severity. Nevertheless, its use is limited once it does not reflect body composition either physical fitness. Our aim was to identify optimal cutoffs for body composition and performance measurements that predict functional capacity better than BMI does. We hypothesized that a stratification based on oxygen uptake (VO2) and body composition data could identify levels of obesity severity.

Methods: This is a cross-sectional study. Fifty-eight sedentary obese women (20–45 y) were assessed and they were allocated in three groups, accordingly to BMI (kg.m-2): GI (n = 18), GII (n = 19), and GIII (n = 21). Subjects underwent body composition analysis (to obtain body fat (BF%) and lean mass (LM%) percent) and cardiopulmonary exercise testing (CPX). We applied ANOVA one-way with Tukey post-hoc to verify between-group differences and receiver operating characteristic (ROC) curve analyses to find optimal cutoffs to identify appropriate physical fitness.

Results: Demographic, anthropometric, and body composition data and CPX variables are presented in Table 1. The areas under the ROC curve determined for BMI, BF%, LM% and CPX distance were 0.9 (0.8–1), 0.9 (0.8–1) and 0.8 (0.7–0.9) as well as the cutoffs points were ≤ 34.5kg/m2, ≤ 43.6%, ≥ 53.3%, > 546m, respectively.

Conclusions: BMI, BF%, LM% and CPX distance were accurate to determine cutoffs discriminating obese women with adequate physical fitness from those with poor one. Regarding the BMI, the best tradeoff found to discriminate the physical fitness in obese women has a superior value than the usually accepted value for obesity classification.

Acknowledgement: The Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP 2009/51842-0) Sao Paulo, SP, Brazil and the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq 141331/2011-9) for funding this study.

**Table 1.** Group mean Foot Centre of Pressure (mm) through stance; (a) medial/lateral position, (b) anterioposterior position. * significant difference between OWB and HW groups (p < 0.05).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>GI (n=18)</th>
<th>GII (n=19)</th>
<th>GIII (n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>13.5 ± 0.5</td>
<td>13.3 ± 0.5</td>
<td>13.4 ± 0.5</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65.1 ± 10</td>
<td>68.6 ± 10</td>
<td>72.4 ± 11</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.61 ± 0.01</td>
<td>1.62 ± 0.01</td>
<td>1.62 ± 0.01</td>
</tr>
<tr>
<td>Body mass index (kg.m^-2)</td>
<td>33.1 ± 0.4</td>
<td>37.3 ± 0.3</td>
<td>42.2 ± 1.1</td>
</tr>
</tbody>
</table>

Data are expressed in mean ± SEM. GI: subjects presenting BMI between 30.0 to 34.9 kg.m^-2; GII: subjects presenting BMI equal or higher than 35.0 kg.m^-2; GIII: subjects presenting BMI between 30.0 to 34.9 kg.m^-2 and GII: subjects presenting BMI equal or higher than 35.0 kg.m^-2.

**Fig. 1.** Figure 1. Group mean Foot Centre of Pressure (mm) through stance; (a) medial/lateral position, (b) anterioposterior position. * significant difference between OWB and HW groups (p < 0.05).

**Table 2.** Multiple linear regression of Centre of Pressure, strength and activity variables shown to correlate with BMI z-score (dependent variable).

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Beta</th>
<th>SE</th>
<th>p (predictor)</th>
<th>Model $R^2$</th>
<th>p (model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoP ML displacement between MC and FF</td>
<td>-0.48</td>
<td>0.28</td>
<td>0.11</td>
<td>0.66</td>
<td>0.04</td>
</tr>
<tr>
<td>CoP AP displacement between FC and MC</td>
<td>-0.16</td>
<td>0.29</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximal hip flexor force</td>
<td>-0.78</td>
<td>0.36</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 2.** Figure 2. Table 1. Group mean ± standard deviation of maximal force (N.kg^-1), * significant difference between OWB and HW groups (p < 0.05).

**Fig. 3.** Figure 3. Table 2. Multiple linear regression of Centre of Pressure, strength and physical function variables with BMI z-score (dependent variable).
Abstracts

T3:PO.080
Weight-supported (anti-gravity) treadmill exercise in caribbean-black obese women

Ugliaro A.D.1, Ali A.2, Chang N.1, Siborli E.1, Swanenberg I.1, Yearwood L.1, Banerji M.A.1, Godwin E.2, Krej J.1, G.1
1Department of Surgery, SUNY Downstate Medical Center, Brooklyn NY, 2Department of Medicine, SUNY Downstate Medical Center, Brooklyn NY

Background: Diabetes is prevalent in Caribbean-Black women in US inner-city environments with limited access to physical activity. Weight-bearing exercise is time-consuming, painful and difficult for obese people. In this pilot study 16 Caribbean-Black women aged 41 ± 11 y (mean ± SD), mean BMI 35 kg/m² (range: 28–49.5) performed twice weekly 30-minute bouts of moderate exercise on an AlterG Anti-Gravity Treadmill™ at 70%, 65%, and 60% weight support and increasing levels of incline.

Methods: Anthropometry, oral glucose tolerance tests with plasma insulin, C-Protein and GLP-1, fasting adiponectin, ghrelin and IL-6, acetylcarnitine, and triglycerides were recorded for each exercise session. Treadmill speed was the only parameter that was variable and adjusted by the participant depending on fatigue. Responders were defined as having improved 2-hr plasma glucose levels.

Results: Mean participation was 11 weeks (range: 8–20) amounting to a mean ± 6 participants. No statistically significant differences in before-after BMI. Responders were defined as having improved 2-hr plasma glucose levels.

Conclusion: An innovative and convenient moderate weight-supported (anti-gravity) treadmill exercise program improving mobility in this population is a feasible approach to improve metabolic fitness.

T3 – Food reformulation

T3:PO.081
Nutriose®, a resistant dextrin, displays low glycemic and insuliminc responses: Combining technological, organoleptical and nutritional attributes for obesity and diabetes prevention

Lefranc-Millot C.1, Rodriguez B.1, Guerin-Deremaux L.1, Thabuis C.1
1Roquette Nutritional Sciences, Roquette, Lestrem, France

Worldwide obesity has nearly doubled since 1980, with 35% of adults overweight and 11% obese in 2008, and 42 million children under 5 years overweight or obese in 2013. There are also 347 million people with overweight and 11% obese in 2008, and 42 million children under 5 years overweight or obese in 2013. There are also 347 million people with diabetes, among which over 60 and 90 millions in India and China, respectively.1 In this context, dietary fibers, such as the resistant dextrin NUTRIOSE®, offer unmatched advantages to the food balance equation. 2

In the context, dietary fibers, such as the resistant dextrin NUTRIOSE®, offer unmatched advantages to the food balance equation. To evaluate the glycemic and insuliminc responses of NUTRIOSE®, 6 different cross-over trials were conducted in 5 countries. 6 to 24 healthy human volunteers randomly consumed either 50g NUTRIOSE® or 50g anhydrous dextrino or glucose (controls), during experimental sessions of 120 to 240 minutes each. Blood glucose and insulin responses were calculated based on regular sampling, either from capillary or venous origin, and expressed as percent (AUC concentrations for NUTRIOSE® / mean AUC concentrations for control). Depending on the methodologies used, glucose responses for NUTRIOSE® ranged from 25 to 48, insulin responses from 13 to 20, both being very low responses. Previously, a 12-week supplementation with NUTRIOSE® had already demonstrated its ability to lower insulin resistance, improve determinants of metabolic syndrome2 and induce improvements in body composition and weight, energy intake and hunger in overweight men.3 Therefore, NUTRIOSE® soluble fiber may be a good candidate for sugar and energy substitution or reduction, and for fiber content improvement of food, possibly helping consumers to reach the dietary recommendations worldwide and contributing to obesity and diabetes prevention. 1. WHO, 2014. Factsheets 311 and 312. 2. Applied Physiology, Nutrition and Metabolism, 2010 3. International Journal of Food Sciences and Nutrition, 2011

Acknowledgement: NGFN, ENDET, WTCCC, GCAN, GIANT

Regulation of body weight is disrupted in patients with anorexia nervosa (AN). Prior to the onset of AN body weight covers the whole BMI range. Since the genetic contribution to the etiology of AN is high, we hypothesised overlapping genetic loci for AN and BMI. We performed a cross-trait analysis of the 1000 SNPs with the lowest p-values from a genome wide association study (GWAS) of AN (GCAN, Boraska et al. Mol Psych 2014) for evidence of association in the largest published GWAS meta-analysis for BMI (GIANT; Speliotes et al. Nat Genet 2010). We detected Bonferroni corrected significant associations for 9 SNPs at 3 independent chromosomal loci (chr. 2, 10 and 19). None of the nearest genes to these SNPs has previously been associated with AN or BMI. Information on the function of most of these genes is sparse. One gene is biologically plausible as it is involved in the BDNF signaling pathway. GWAS did not reveal a genome wide significant locus for AN. A cross-trait analysis for AN and BMI revealed three independent chromosomal loci with potential relevance for both. In depth molecular genetic and biological analyses are warranted to unravel the relevance of these loci and the genes they contain for AN and BMI.
T3.PO.083

Interactive effects of the irx3 and fto polymorphisms on obesity in a mediterranean population

Corella D.1, Coltell O.2, Sorli JV.3, Asensio EM.1, Barragan R.1, Fernandez-Carrion R.1, Gonzalez I.1, Ordoaives JM.1, Frances F.1

1Department of Preventive Medicine and Public Health, University of Valencia and CIBER OBN, Valencia, Spain,
2University Jaume I Castellon, Spain,
3JM-Human Nutrition Research Center, Boston, USA

Obesity-associated variants within the FTO gene are functionally connected with regulation of the IRX3 (Iroquois related homeobox 3) gene expression. Irx3-knockout male mice have reduced adiposity. Although the IRX3 gene has been identified as the target of the FTO SNPs, epidemiological studies demonstrating associations between IRX3 SNPs and obesity are lacking. Our aim was to analyze the association of IRX3 variants with obesity-related measured as well as their interactive effects with the FTO. We studied participants in the PREDIMED-Valencia Study (n=1094). SNPs in the Chr. 16 (rs3751723 in the UTR 5' IRX3: 54520197; rs12445085 intergenic IRX3: 54322319 and rs9939609-FTO: 53820527) were determined. DNA methylation was analyzed by MALDI-TOF mass spectrometry in 195 subjects (CpG sites surrounding the rs9939609-FTO SNP: Chr16:53817859-53822719). Multivariate regression models were used. rs12445085 C>A was associated with body-weight (77.1±0.6 in CC; 79.3±0.7 in CA and 80.8±1.3 kg in AA; P = 0.007) and BMI (30.0±0.4 in CC; 30.9±0.4 in CA and 31.2±0.5 kg/m² in AA; P = 0.008). Similar results we found for rs3751723-IRX3. Moreover we found a strong interactive effect of the rs9939609-FTO SNP and rs12445085 (P-interaction: 0.043 for body-weight). The association between IRX3 SNPs and BMI were only significant in carriers of the FTO-associated (A) allele (P < 0.001 for rs12445085). No significant associations were found for IRX3 SNPs in homozygous subjects for the rs9939609-FTO T-allele (P = 0.692). Also significant associations between rs12445085-IRX3 and FTO-methylation levels were detected. In conclusion, we found interactive effects of the IRX3 and FTO polymorphisms on obesity-related parameters.

Acknowledgement: Study co-financed by CIBERobn, University of Valencia, and research grants from FIS (PI11/02505), CNIC (CNIC06) and Generalitat Valenci
an (ACOMP/2013/165 and ACOMP/2013/159)

T3.PO.084

TFN-a methylation is positively correlated with waist circumference in young and apparently healthy individuals.

Marques-Rocha J.1,2, Mansego M.3, Bresson J.1, Milagro F.1,2, Martinez J.2,3

1Department of Nutrition and Health, Universidade Federal de Viçosa, Viçosa, Brazil, 2Department of Nutrition, Food Science and Physiology, Centre for Nutrition Research, University of Navarra, Pamplona, Spain, 3Spanish Biomedical Research Centre in Physiopathology of Obesity and Nutrition, CIBERobn, Carlos III Health Institute, Madrid, Spain

Introduction: The aim of this study was to investigate the associations between the methylation and expression of inflammatory genes with anthropometric, biochemical, clinical, and dietary measurements in young and apparently healthy individuals.

Methods: We evaluated 156 individuals (91 women and 65 men; ages 23.1 ± 3.5 y; body mass index 22 ± 2.9 kg/m²) for anthropometrics, biochemical, clinical, dietary, antioxidant and inflammatory markers. DNA methylation and mRNA levels of IL-6 and TFN-a were assessed in peripheral blood mononuclear cells. A statistical analysis was performed to detect differences among subjects by the median of methylation of these genes. Spearman correlation coefficients were also used.

Results: Subjects with higher TFN-a methylation levels showed higher waist circumference and waist-hip ratio, circulating levels of oxidized low-density lipoprotein, and erythrocyte glutathione peroxidase activity values, but lower nail concentrations of selenium, and lower dietary intake of potassium, magnesium and copper (P < 0.05). The methylation of TFN-a was negatively associated with the relative expression of this gene in the same cells (r=−0.333; p < 0.001). However, IL-6 methylation levels were not statistically associated with IL-6 expression, neither relationships were observed between TFN-a and IL-6 plasma levels with the methylation and expression of these genes. The relative expression of TFN-a statistically correlated with the expression of other genes related with the inflammatory process such as ICAM, IL-6, IL-18 and RIL-1.

Conclusions: In young and apparently healthy individuals, the methylation of TFN-a was significantly associated with waist circumference and waist-hip ratio and other important biomarkers related with obesity.

Acknowledgement: We wish to thank the CAPES Foundation, Ministry of Education of Brazil (process nº 6409-13-0). This work has been funded by the Spanish Government (CIBERobn and Nutrigen project, ref. AGL2013-45554-R) and the Government of Navarra (Resmena project; ref. 48/2009).

T3.PO.085

Tas1r3 and Ucn2 transcript levels in peripheral blood cells are associated with sugary and fatty food consumption and with excess of fat accumulation in children

Prietto T.1, Sanchez J.1, Pico C.1, Abrams W.2, De Henauw S.3, Kourides Y.4, Lissner L.1, Molnard D.1, Moreno A.5, Russo P.6, Siani A.7, Veidebaum T.8, Palou A.9

1Laboratory of Molecular Biology, Nutrition and Biotechnology, UIB and CIBER Fisiopatologia de la Obesidad y Nutrición (CIBERobn), Spain,
2Faculty of Mathematics and Computer Science, University of Bremen; BIPS – Institute for Epidemiology and Prevention Research GmbH, Germany,
3Dept. of Public Health/Dept. of Movement and Sport Sciences, Ghent University, Belgium,
4Dept. of Public Health and Community Medicine, University of Gothenburg, Sweden,
5Dept. of Pediatrics, University of Pécs, Hungary,
6GENUD Research group, University of Zaragoza, Spain,
7Institute of Food Sciences, National Research Council, Italy,
8Research and Education of Child Health Institute, Cyprus,
9National Institute for Health Development, Tervise Arengu Instituut, Estonia

Introduction: New types of robust biomarkers of dietary exposure and function are needed to implement strategies for obesity prevention in children. Of special interest are those biomarkers of consumption of food rich in simple sugars and fat, as their intake has been associated with obesity development. Peripheral blood cells (PBCs) represent a new promising tool for identifying novel transcript-based biomarkers. We studied the potential associations between the expression levels of Tas1r3 and Ucn2 genes in PBCs and the frequency of sugary, fatty and junk food consumption.

Methods: 463 children aged 2–9 from the IDEFICS cohort were studied. Expression levels of Tas1r3 and Ucn2 genes were analyzed by RT-qPCR.

Results: Children with low frequency of consumption of sugary foods displayed higher Tas1r3 expression levels with respect to those with intermediate or high frequency; furthermore, children with high consumption frequency of junk food showed lower transcript levels of this gene with respect to those with low or intermediate frequency. In turn, children with high frequency of consumption of fatty foods showed lower Ucn2 expression levels with respect to those with low or intermediate frequency. Moreover, expression levels of Tas1r3 were related with BMI and fat mass changes during a two-year follow-up period, with low expression levels being related with increased fat accumulation over time.

Conclusion: Transcript levels of Tas1r3 and Ucn2 in PBCs may be considered as potential biomarkers of consumption of sugary, fatty, or junk food, to complement data of food intake questionnaires.

Acknowledgement: Research relating to this abstract was funded by the EC within the 7th RTD Framework Programme Contract No. 266044 (I. Family Study).
**T3 – Taste, hedonics and appetite**

**T3:PO.086**

*Food ‘Wanting’ and ‘Liking’ in free-living lean and obese participants using a novel smartphone application: Mindeating*

Alabduljader K.A.¹, Cliffe M.L.², Kubis H.P.¹

¹School of Sport, Health and Exercise Sciences, Bangor University, Gwynedd, LL57 2PZ, U.K.
²Department of Nutrition and Dietetics, Betsi Cadwaladr University Health Board, Bangor, Gwynedd LL57 2PW, U.K.

**Introduction:** In laboratory-based measures of food reward, differences have been detected between lean and obese individuals. We investigated food reward in free-living participants using a new smartphone application (Mindeating), which has been developed to allow recording of real time food ‘wanting’ (anticipatory reward) and ‘liking’ (consummatory reward).

**Methods:** Participants were adult smartphone users recruited via invitations sent to Bangor University and Betsi Cadwaladr University Health Board staff, students and patients in North Wales. Following collection of baseline characteristics participants were given access to the Mindeating mobile phone application and were asked to record food ‘wanting’ on a scale of 0 (not at all) – 10 (very strongly) each time food ‘wanting’ was perceived and ‘liking’ of food immediately after each eating episode using the same scale, continuously for 14 days.

**Results:** 59 participants were recruited in the required BMI categories. 22 lean and 19 obese participants (BMI 22.1 ± 0.73 vs obese 22.1 ± 0.77, p = 0.05). There was no significant difference in wanting scores between groups (lean 7.03 ± 1.08 vs obese 6.88 ± 1.11, p = 0.68). However, obese participants recorded significantly lower liking scores (lean 7.76 ± 0.77 vs obese 7.11 ± 1.10, p = 0.03) and the difference between food liking and wanting scores (food reward gain) was reduced in obese participants (lean +0.73 ± 0.83 vs obese +0.22 ± 0.72, p = 0.045).

**Conclusion:** In daily life, obese participants gained a lower reward from eating in comparison to lean participants. This finding is in agreement with a reward-deficient response to food in obese individuals.

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**T3:PO.087**

*Consumption of green-plant membranes suppresses wanting and hedonic hunger in emotional eaters*

Stenblom E.¹, Montelius C.¹, Egecioglu E.¹, Erlanson-Albertsson C.¹

¹Department of Experimental Medical Science, Appetite Regulation Unit, Faculty of Medicine, Lund University, Sölvegatan 19, S-221 84 Lund, Sweden

**Introduction:** Membranes from green leaves have previously been found to affect appetite-regulating hormones in humans. The aim of this study was to investigate how treatment with green-plant membranes affects hunger, satiety, liking and wanting for palatable food.

**Methods:** 22 female participants were included, receiving either a green-plant supplement (5 g) or placebo on two separate days, before breakfast. VAS-questionnaires about hunger, satiety and cravings were filled out hourly, until an ad libitum snack buffet was served at 16:00, and once after, including questions about liking. The participants also filled out an eating behaviour questionnaire (TFEQR18-V2) with questions regarding emotional eating (EE), cognitive restraint (CR) and uncontrolled eating (UE). The study was a randomised, placebo-controlled, double blind, meal intervention study with a cross over design.

**Results:** Intake of green-plant membranes increased subjective ratings of satiety (p < 0.01, two-way RM ANOVA) and decreased ratings of hunger (p < 0.05, two-way RM ANOVA) and cravings for all snacks and sweets during the day compared to placebo (Fig. 1). In addition, there was a decreased subjective liking for sweet after treatment (Fig. 2). Food intake was not affected significantly. When correlated to eating behaviour scores, we found that the treatment effect of green-plant membranes on wanting for all snacks (Fig. 3), sweet-and-fat snacks in particular (Fig. 4), was positively correlated to emotional eating.

**Conclusion:** Green-plant membranes may be used as a food supplement to reduce wanting and hedonic hunger, associated with overeating and obesity. Individuals scoring high for emotional eating behaviour may have enhanced treatment effect.

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**Fig. 1.** VAS-ratings on wanting palatable foods. Treatment with green-plant membranes before breakfast decreased rated feelings of wanting for all categories of snacks respectively (salty, sweet and sweet-and-fat), and all snacks combined, compared to control during rest of the day (*p < 0.05, **p < 0.01, ***p < 0.001, tAUC, Wilcoxon signed rank test).
Introduction: High protein intake is associated with reduced hunger and increased satiety when compared to normal or low protein intake. However, there is no consensus that one protein source is more satiating than others. We examine whether protein from legumes (beans/peas) is comparable to protein from animal sources (pork/veal) regarding acute meal-induced satiety.

Methods: 43 healthy men (mean ± SD age: 24.4 ± 4.8 y, BMI: 23.0 ± 2.1 kg/m²) completed this randomized, double-blind, placebo-controlled, three-way cross-over meal test. Meals differed in protein content at the expense of carbohydrates and differed in fibre content, but had the same fat content. The meals consisted of high-protein meat (HP-Meat, 18 protein E%, 6 g fibre/100 g), high-protein legumes (HP-Legume, 19 protein E%, 25 g fibre/100 g) and low-protein legumes (LP-Legume, 9 protein E%, 10 g fibre/100 g). Subjective appetite sensations were recorded at baseline and every half hour using visual analogue scales (VAS) until the ad libitum meal was served 3 h after the test meal.

Results: Ratings for VAS showed lower hunger, prospective food consumption and composite appetite score, and higher fullness for HP-Le­gume compared to HP-Meat or LP-Legume (p < 0.05 for all), and higher satiety for the HP-Legume meal compared to HP-Meat meal (p < 0.05). A 12–13% lower energy intake was seen after consumption of HP-Legume compared to HP-Meat or LP-Legume (P < 0.01).

Conclusion: Protein from legumes produces increased satiety and reduced hunger and ad libitum energy intake compared to protein from meat. However, the comparison may be confounded due to higher fibre content of legumes. The public health and clinical implication is that high-protein legumes provide high satiety, and may be beneficial for weight control.

Acknowledgement: We are grateful to the kitchen staff at the Department Nutrition, Exercise and Sports for their assistance and to the volunteers who participated in this study.

Neuroendocrine appetite regulation across the menstrual cycle

Background: The female menstrual cycle is characterized by variable eating patterns. We tested brain responses to visual food cues during the menstrual cycle and correlated them with sex hormones.

Methodology: Brain activity was assessed by functional magnetic resonance imaging (fMRI) to explore activation of homeostatic and reward brain regions in response to pictures of high calorie foods in 18 healthy normal weight females in follicular and luteal phase during fasting and fed states.

Results: In the hypothalamus and the reward system regions, increased activity in response to food images was significantly greater in the luteal phase compared to follicular phase regardless of prandial state. Specifically, in the amygdala- fasting activation in luteal vs. follicular p = 0.006 and fed activation in luteal vs. follicular, p = 0.02; with a similar significant trend in the arcuate cinugulate cortex (ACC) and striatum. Importantly, in the reward areas the response in the fed luteal state was greater than the response in the fasting of the follicular state (amygdala p = 0.06, ACC p = 0.01). The response in reward areas was correlated with progesterone concentrations (r=0.40, p = 0.02 for amygdala and r=0.48, p = 0.003 for ACC). In visual regions, activation was present in both menstrual phases, with greater activation in fast than fed states (follicular p = 0.003, luteal p = 0.005).

Acknowledgement: This study was supported by grants from the Danish Research Council for Developmental Research, Lundbeck Foundation and Kirk SB Foundation.
Conclusions: The effect of the menstrual phase on brain activity in reward regions is more robust than the fed/fasting condition and correlates with progesterone concentrations. Unraveling the hormonal and molecular mechanisms driving these phenomena may identify novel interventional approaches to female obesity.

T3:PO.090

The effects of food perception on energy compensation following exercise in sedentary women

Lafreniere J.1, McNeil J.1, Provencher V.2, Doucet E.1

1Behavioural and Metabolic Research Unit, School of Human Kinetics, University of Ottawa, Ottawa, Ontario, Canada; 2Institute of Nutrition and Functional Foods, Laval University, Québec, Canada

Background: An effect of food labeling on energy intake (EI) has been previously reported and may partly explain the large inter-individual responses in EI previously noted following exercise (Ex).

Objectives: To assess how labeling and exercise interact to influence food perception and EI following physical activity. Design: In this randomized cross-over design, 14 inactive women took part in 4 experimental conditions together with a self-reporting questionnaire about satisfaction. We then assessed blood glucose curves (BGC), serum insulin response curves (IRC), and salivary α-amylase (s-AMY) activity.

Methods: The conventional glucose-loading test was applied to seven healthy male and females (age, 24 - 32 y) under various experimental conditions: Ex and lunch labeled as high in fat (HF), sedentary control (Ctl) and LF, and Ctl and HF. The lunch was composed of a pasta plate, a yogurt and oatmeal cookies with the same nutritional composition throughout sessions. EI at lunch and for the following 34 hours (validated food menu), as well as healthiness perception of the meal, appetite ratings (visual analogue scales) and level of stress were assessed.

Results: No significant difference was observed in EI at lunch and for the following 34 hours across sessions. However, participants with high vs. low scores on a perceived stress scale showed opposite responses to the exercise and labeling manipulation. The food items presented as LF were perceived as healthier (p < 0.001), but this distinction was more consistently significant across food item when no exercise was performed. Healthiness ratings correlated positively with the amount of food consumed (ρ=0.339, p < 0.001). The labeling manipulation showed stronger influence on food item associated healthier initial beliefs.

Conclusion: Despite no effects of exercise and food labeling on acute EI (lunch and total 48h), healthiness perception was influenced by labeling and initials beliefs and linked with the amount of different food item consumed.

Acknowledgement: The authors would like to thank the participant for their devotion in this project.

T3:PO.091

Disrupted normal ingestion during glucose intake modulate glucosekinetics in humans

Tsuchi T.1,2, Tanaka S.1, Satoh K.1, Kogo M.1, Yamamoto T.1

11st Department of Oral and Maxillofacial Surgery, Graduate School of Dentistry, Osaka University; 2Department of Oral and Maxillofacial Surgery, Saiseikai Matsusaka General Hospital.

Introduction: Tastes and flavors that are appreciated during ingestion are thought to induce various physiological effects on energy homeostasis. This study aims to reveal the importance of these chemical senses in glucose kinetics and autonomic nervous activity by imposing interventions during glucose intake.

Methods: The conventional glucose-loading test was applied to seven healthy male and females (age, 24 - 32 y) under various experimental conditions together with a self-reporting questionnaire about satisfaction. We then assessed blood glucose curves (BGC), serum insulin response curves (IRC), and salivary α-amylase (s-AMY) activity.

Results: Three successive oral glucose-loadings induced a gradual downward shift in the BGC together with increased s-AMY activity, which is a stress marker; whereas adding a pleasant flavor to the glucose solution given during the third trial increased the BGC to the same level as that during the first loading with increased satisfaction. Direct delivery of glucose into the stomach without oral sensory stimulation or clipping the nose to interfere with smooth nasal airflow induced a downward shift in both BGC and IRC, resulting in a decrease of the area under the BGC, together with an increase in the s-AMY level that negatively correlated with satisfaction scores.

Conclusion: The present study demonstrates that favorable chemical senses are important in enhancing glucose absorption from the gastrointestinal tract, insulin release and reducing sympathetic nervous activity.

Abstracts
T3.PO.092

Changes in smell function, satiety quotient and food reward in response to a weight loss intervention

McNeil J.1, Prud’homme D.1,2, Rabasa-Lhoret R.3,4, 1, Finlayson G.1, Doucet E.1

1Behavioral and Metabolic Research Unit, School of Human Kinetics, Faculty of Health Sciences, University of Ottawa, Ottawa, Ontario, Canada,
2Montfort Hospital Research Institute, Ottawa, Ontario, Canada,
3Department of Nutrition, Faculty of medicine, University of Montréal, Montréal, Québec, Canada,
4Institut de Recherches Cliniques de Montréal (IRCM), Montréal, Québec, Canada

Introduction: Acute energy deficits increase smell function. It is unknown whether long-term energy deficits induce similar changes in smell function, and whether these potential changes are related to diet-induced changes in body composition, food reward and intake.

Methods: Sixteen overweight postmenopausal women (age: 52.9 ± 3.3 y; BMI: 32.8 ± 6.6 kg/m²) completed a 12-month intervention. Five and 11 women completed a baseline and 12 months later. Satiety quotient (SQ; mm/100 kcal) follow-up appetite (visual analogue scales), food reward (Leeds Food Preference Scale), and appetite (visual analogue scales) before starting on the medication (beginning) and one month later (control) for both questionnaire and taste tests.

Results: Lower BMI (32.8 ± 6.6, 30.8 ± 5.6 kg/m²; P = 0.01), fat mass (39.4 ± 10.4, 34.8 ± 12.5 kg; P = 0.004) and odor discrimination scores (13.1 ± 1.0, 11.7 ± 2.0; P = 0.04), and greater SQ (4.9 ± 3.6, 7.6 ± 3.9; P = 0.0001), were noted in all participants at 12 months. No differences in food reward and intake were noted across time, but lipid intake was lower in the control vs. intervention group (603.7 ± 39.4 kcal, 540.9 ± 20.0 kcal; Δ = 62.8 kcal; P = 0.04). Changes (Δ) in discrimination scores were negatively linked with Δ implicit wanting (p = −0.63; P = 0.02). Changes (Δ) in discrimination scores were negatively linked with Δ implicit wanting (p = −0.63; P = 0.02). Changes (Δ) in discrimination scores were negatively linked with Δ implicit wanting (p = −0.63; P = 0.02).

Conclusion: Lower BMI, fat mass and smell function, and greater SQ, Δ high-fat food reward, and Δ implicit wanting were noted post-intervention. However, changes in these variables were not related. Δ odor discrimination scores were negatively linked with Δ high-fat food reward, suggesting that women with greater decreases in smell function post-intervention saw greater increases in high-fat food reward.

T3.PO.093

Investigation of the effects of metformin and metformin with insulin on food choices and taste changes of the patients applied to dietary polyclinic of an hospital in istanbul

Kökşal S., Beyhan Y.1

1Faculty of Health Sciences, Department of Nutrition and Dietetics, Acıbadem University, İstanbul, Turkey

Introduction: The previous research suggest that using metformine causes increase in sweet taste sensation and decrease in consumption of some foods.

Methods: This study was conducted on 30 individuals started on insulin+metformin for the first time by the endocrinologist and 30 individuals started on just metformin, again for the first time. The individuals included in the study were subjected to both questionnaire and taste tests before starting on the medication (beginning) and one month later (control). During the study, the individuals were subjected to taste tests on four basic tests to test their perceptions at the start of the research (beginning) and one month after they started on antidiabetic agents (control).

Results: During the research, it has been determined that among the individuals using metformin, 50% had diabetes, 44% insulin resistance, and 26% obesity, while among the individuals using metformin + insulin, 100% had diabetes, 8% insulin resistance and 16% obesity. Furthermore, 18% of the individuals on metformin had hyperlipidemia, 12% hypertension and 4%, hypothyroidism incidence, while 28% of the individuals on metformin + insulin had hyperlipidemia, 20% hypertension and 4%, hypothyroidism incidence. The body weights of the group using only metformin recorded at the beginning showed an average of 3.8 kg decrease in the control (p < 0.05). No significant difference has been observed in the beginning and control weights of the group using insulin+metformin (p > 0.05).

Conclusions: As a conclusion, results indicate that increase in sensitivity in the perception of sweet taste, the sensitivity in the perception of the other basic tastes, salty, bitter and sour, has also increased after the use of antidiabetic agent/agents.

T3.PO.094

Exploring the relationship between cognitive, sensory and nutritional food attributes and the perceived satiety potential of food.

Buckland N.1, Dalton M1, Stubbs R.J.2, Hetherington M.M.1, Blundell J.E.1, Finlayson G.1

1School of Psychology, University of Leeds, Leeds, UK,
2Department of Psychology, University of Derby, Derby, UK

Introduction: Identifying and promoting foods that enhance satiety may improve appetite control and weight management. However little is known about consumers’ perceptions of the cognitive, sensory and nutritional attributes which underpin the satiety enhancing potential of foods.

Methods: Using online surveys, 887 consumers rated 75 individual foods based on cognitive (e.g. satiating capacity), sensory (e.g. taste) and nutritional (e.g. energy content) dimensions. Objective nutrient and cost (£/kcal) information per food was sourced from manufacturer packaging and nutrition databases.

Results: Bivariate correlations showed foods perceived as satiating were associated with lower energy and fat content and with perceived higher healthiness, frequency of consumption and with greater perceived control over eating. More satiating foods were associated with higher cost (£/kcal), %protein and lower %fat and energy density. %Carbohydrate was not associated with satiating capacity. Linear regression models showed low energy content (as rated by consumers) (β = −.89, p < .001), low energy density (β = −.54, p < .001), low %fat (β = .23, p = .04) and high cost (β = .23, p = .01) were the strongest correlates of satiating capacity.

Conclusion: Consumer cognitive, sensory and nutrient perceptions alongside objective nutritional attributes are important factors underpinning the perceived satiety potential of foods. Foods rated as most satiating by consumers were low in energy density, low %fat and more expensive (per calorie). These findings have implications for the development and marketing of satiety enhancing foods.

T3.PO.095

The relationship between binge eating status and hormone profiles of obese patients undergoing weight loss intervention

Nozaki T.1, Sawamoto R.1, Furukawa T.1, Monita C.1, Hata T.1, Kawai K.1, Komaki G.1, Sudo N.1

1Department of Psychosomatic Medicine, Graduate School of Medical Sciences, Kyushu University, Fukuoka, Japan,
2School of Health Sciences Fukuoka, International University of Health and Welfare, Fukuoka, Japan

Objective: Some obese patients seeking weight loss treatment have a binge eating problem; however, the psychological and biological mechanisms of the development of their binge eating are not clear. This study was done...
to determine which hormones are related to the binge eating of female, obese patients who participated in a weight loss intervention (WLI) based on cognitive behavioral treatment.

**Methods:** Ninety female, obese patients completed seven months of WLI. Body fat percentage (BFP) was measured using dual energy x-ray absorptiometry and serum levels of the biomarkers ghrelin, leptin, adiponectin, interleukin-6 (IL-6), IGF-1, and insulin were assessed before and after the treatment. Binge eating status was assessed by the Binge Eating Scale (BES). BES scores were classified by tertile value; the group in the highest third of the distribution, “high BES”, was compared to that in the lowest third of the distribution, “low BES”.

**Results:** No significant difference was found in BFP at baseline or after the treatment between the high and low BES groups. However, high BES had a higher leptin level than low BES at baseline, and the difference became significantly stronger after adjusting for confounding factors such as BFP and age. IGF-1 was also significantly higher in the high BES group at baseline, but the difference disappeared after adjustment for confounding factors. The binge eating symptoms decreased significantly after treatment in the high BES compared to the low BES group, independent of the change of BFP. Leptin and IL-6 also decreased significantly after treatment, but only leptin maintained significance after adjustment for confounding factors such as the change of BFP. The serum levels of other biomarkers were not significantly changed between the groups.

**Conclusion:** The present study suggests that binge eating status is related to the serum leptin level, regardless of the degree of body fat loss by obese patients during WLI.

**Acknowledgement:** This study was supported by a Research Grant (23-2) for Neuroses and Mental Disorders from the Ministry of Health, Labour and Welfare of Japan and a Grant-in-Aid for Scientific Research (25460902) from the Japan Society for the Promotion of Science, and a Budget for clinical research base development project (GAQQ250001) from the Ministry of Health, Labour and Welfare of Japan.

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**Figure 1.** Conceptual model of conditional, direct and indirect effects.

**Figure 2.** Interaction plot showing associations between mood change and food intake in grams for women at different values of restraint (RS) and body mass index (BMI). All variables are z-standardized.

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**T3.P0.096 Marital stress and food intake: An examination of the moderating role of BMI and restraint**

Côté M.1, Bégin C.1, Gagnon-Girouard M.1, Provencher V.1

1School of psychology, Laval University, Quebec, Canada

**Introduction:** Stress has been commonly associated with obesity through its disinhibiting effect on food intake (Sominsky & Spencer, 2014). Ego-threatening stressors, particularly relational ones, have been shown to increase food intake among restrained eaters and overweight individuals (Tanofsky et al., 2000). The aim of the present study was to examine the impact of a stressful marital discussion on food intake in both spouses, while taking into account the effect of BMI and restraint on this relationship.

**Methods:** Eighty heterosexual couples were recruited via email. In laboratory, couples discussed for 15 minutes an aspect that they want their partner to change, after what they completed individually a bogus taste project (GAQQ250001) from the Ministry of Health, Labour and Welfare of Japan.

**Results:** Among women, the model was significant, F(8, 70)=3.46, p=0.002. The three-way interaction was significant (p=0.039). Restrained women with high BMI ate more when their mood worsened, as opposed to unrestrained women with high or average BMI who ate significantly less (Fig. 2). Among men, although the overall model was significant, F(8, 70)=3.99, p=0.001, only hunger predicted significantly food intake (p<.001).

**Conclusion:** These results suggest that the impact of a relational stress on food intake is different among genders. For women, higher BMI and restraint score are associated with more disinhibited eating, thus supporting the importance to address restraint and BMI when studying stress-induced eating.
Food cravings are associated with overeating and obesity, and may have implications for successful weight loss. Gaining control over food craving is a component of the management of obesity and the development of healthy eating habits. The present analysis evaluated the psychometric properties of Control of Eating Questionnaire (CoEQ) and tested its predictive validity by examining its association with weight loss in four Phase 3 clinical trials that examined the effect of treatment with a prolonged-release combination of naltrexone/bupropion (NB) on weight loss in obese adults. In an integrated analysis of four Phase 3 trials, subjects completed the CoEQ at baseline and Weeks 8, 16, 28, and 56. All analyses were conducted on subjects who had complete weight and CoEQ measurements at baseline and Week 56, and had completed 56 weeks of NB (n=1238) or Placebo (n=720). Confirmatory Factor Analysis (CFA) was used to determine the psychometric properties of the CoEQ. CFA supported a four-factor solution of the CoEQ. Factors identified were: Craving Control (CRAV), Craving for Sweet (SWT); Craving for Savoury (SAV); and Positive Mood (MOOD). The CoEQ was important in predicting the weight loss response to drug treatment. Improvement in CRAV at each time point was associated with Week 56 weight loss. Further, improvement in CRAV at Week 8 was associated with a greater fat mass loss at Week 56. The CoEQ has good psychometric properties and internal consistency. Food craving is closely associated with drug-induced changes in body fat. Early improvements in CRAV and SWT were predictive of lower body fat and BMI at Week 56. Therefore, the CoEQ is a valid measure for the experience of food cravings and has applications for research and the clinical management of obesity.

**T3.P0.099**

**Superior metabolic efficiency of phosphatidylcholine-rich omega-3 phospholipids compared to soy- or egg yolk-derived phosphatidylcholine in dietary obese mice**

Rossmieli M.1, Pavlisova J.1, Bardova K.1, Kopecky J.1

1Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic

**Introduction:** Studies in animal models of obesity demonstrated that the metabolic effects of dietary omega-3 fatty acids (EPA and DHA) depend on their lipid form, with marine phospholipids (PL) showing better efficacy than fish oils. However, PL themselves could have beneficial metabolic action. We aimed to compare herring-derived omega-3 PL rich in phosphatidylcholine with phosphatidylcholine-rich preparations from soy or egg yolk in dietary obese mice.

**Methods:** Male C57BL/6N mice were fed for 9 weeks a control high-fat diet (CHF; lipids –35 wt%) or CHF-based experimental diets: (i) CHF with 10% lipids replaced by herring-derived omega-3 PL (PC-M), (ii) CHF with 10% lipids replaced by phosphatidylcholine-rich concentrate from soy (PC-S), or (iii) CHF with 6% lipids replaced by phosphatidylcholine-rich concentrate from egg yolk (PC-E). Experimental diets were matched for phosphatidylcholine content.

**Results:** Feeding mice CHF diet resulted in obesity (increased adiposity), glucose intolerance, insulin resistance, hypertriglyceridemia, adipocyte hypertrophy and hepatic steatosis. All these abnormalities were ameliorated to different extents in mice fed PC-M, while PC-S and PC-E were both ineffective except for their marginal effect on hepatic steatosis. In the liver, the complex down-regulation of lipogenic and cholesterol biosynthesis genes was observed in the PC-M group, while less pronounced decreases in the expression of lipogenic genes were also observed in the PC-S and PC-E group.

**Conclusion:** Dietary intervention with omega-3 PL elicited superior effects compared not only to fish oils, but also to other PL-based preparations lacking EPA/DHA. Thus, the combination of both EPA/DHA and the phosphatidylcholine molecule seems to confer the highest metabolic effects.

**T3.P0.100**

**Effect of a dietary portfolio on metabolic syndrome in patients with morbid obesity**

Chávez-Manzanera E.1, Guevara-Cruz M.2, Palomo-Martínez L.1, Gómez-Fernández C.1, García-García E.2, R Tovar A.2, Torres y Torres N.2

1Department of Endocrinology and Metabolism, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, México City, México, 2Department Physiology of Nutrition, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, México City, México

**Introduction:** Obesity and metabolic syndrome are recognized as one of the most important health public challenges. Recently, it has been used the implementation of dietary strategies using specific dietary portfolios (DP; combination 2 or more functional foods) to control circulating levels of lipids and glucose. The aim of this study was to assess the effect of a DP containing nopal, soy protein, oats, chia seed and inulin in subjects with morbid obesity on components of metabolic syndrome and the concentration of total cholesterol, LDL cholesterol, glucose, HOMA-IR and PCR.

**Methods:** This was a single center, randomized, placebo-controlled, double-blind parallel-arm study. Patients with morbid obesity (BMI ≥40 kg/m²) and metabolic syndrome received a diet low in saturated fat, according to ATPIII program, with a reduction of 500 Kcal to their usual diet for the duration of the study.

**Results:** A total of 53 Mexican subjects with a mean age of 36 ±10.9 years and BMI of 43 ± 2.7 kg/m² were studied. There was a significant decrease in serum triglycerides in the DP group (from 184 ± 65.4 to 152 ± 42.6, P < 0.011) compared to the control group. In addition, there was a decrease in serum total cholesterol (from 191 ± 33.8 to 176 ± 32.0, P < 0.010) and LDL cholesterol (126 ± 1.7 to 113 ± 37.7, P < 0.014). DP and control groups had a significant decrease in body weight, waist circumference, glucose and HOMA-IR.

**Conclusion:** These results indicate that DP consumption produced a favorable effect on blood lipids in morbid obese with metabolic syndrome and can be used as an important strategy in the prevention of cardiovascular disease.
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Abstracts

T3:PO.101

Effect of probiotic/prebiotic supplements containing bifidobacterium lactis and chicory inulin to the body composition in obese individuals

Oksuzkaya F., Soylu M., Kaner G., Inanc N.

Department of Nutrition and Dietetics, Faculty of Health Sciences, Erciyes University, Kayseri, Turkey.

This study was conducted to demonstrate the impacts of the probiotic/prebiotic addition which contains bifidobacterium lactis and chicory inulin on body composition in obese individuals. A total of 66 obese participants (BMI: 25–40 kg/m2) aged 18–55 years were divided into two groups and dietary treatment was applied for 12 weeks. A general questionnaire was applied to the participants. In addition to the dietary treatment, study group (n = 45) were given 1 sachet probiotic containing live and active 5 billion CFU Bifidobacterium lactis and prebiotic containing 900 mg chicory inulin. Placebo was given to the control group (n = 21). Height, waist and hip circumference were measured, height and body composition were assessed by Inbody 230 BIA. The mean age of participants were 32.25 ± 9.51 years. 75.5% of individuals were women while 24.5% were male. At the end of the study, body weight decreased –4.79% ± 2.46 kg of the study group, it was found –9.4% ± 4.79 in the control group (p < 0.001). Reduction in BMI of study group (-4.91% ± 2.5) was lower than controls (-9.38% ± 4.8) (p < 0.001). No significant decreases were found in muscle mass of both groups (p > 0.05). Fat weight loss were more statistically significant in the study group (-8.68% ± 4.73) compare with the control group (-19.26% ± 9.89) (p < 0.001). Differences in fat content of the study group (-4.59% ± 4.55) was statistically significant lower compared with the control group (-11.16 ± 6.79%). Reduction in waist/hip ratio in the control group was determined higher than the study group (p=0.001). A significant decreases were found in body weight and fat, BMI, waist/hip ratio and fat ratio in both groups except muscle weight (p < 0.01). At the end of the study, there wasn’t found effectiveness of prebiotic/probiotic supplements to the dietary treatment. For this reason, it would be useful to conduct further research on this topic.

Key words: Obesity, prebiotic, probiotic.

T3 – Energy balance

T3:PO.102

Differential sympathetic nervous system outflow to skeletal muscle in lean vs obesity-prone rats.

Gavini C.K., 1 Britton S.L., 1 Koch L.G., 2 Novak C.M. 2

1School of Biomedical Sciences and Department of Biological Sciences, Kent State University, Kent, Ohio, USA.
2Department of Anesthesiology, University of Michigan, Ann Arbor, Michigan, USA.

Rats selectively bred for high intrinsic aerobic capacity (HCR) are lean, resistant to obesity, and consistently more active than low-capacity runners (LCR), which are more prone to metabolic syndrome. We have shown that HCR have elevated daily energy expenditure (EE), primarily due to activity-EE rather than to resting EE. This high activity-EE stems from heightened daily activity plus low economy of activity in HCR wherein those excess calories are dissipated by skeletal muscle as heat. We primarily focus on the ventromedial hypothalamus (VMH), part of a pathway regulating energy balance (EB) through its actions on peripheral glucose and lipid allocation, modulating respiratory quotient and thermogenesis. We have also shown that activation of receptors for melanocortins (MC), a system involved in controlling EB, in the VMH more effectively impacts metabolism in HCR compared to LCR. We hypothesize that this difference in metabolism is due to differential activation of the sympathetic nervous system (SNS), impacting molecular mediators of energy expenditure. Norepinephrine turnover was used to asses SNS drive. Rats received intra-VMH microinjections of MC receptor agonist Melanotan-II (MT-II) or vehicle (aCSF) to measure MC-induced enhancement of SNS outflow to muscle. Compared to vehicle, intra-VMH MT-II induced a significant increase in SNS activity in most of the tissues analyzed, including muscle; moreover, HCR were significantly more affected than LCR. These results support the hypothesis that pathway modulated by MC receptors in the VMH more effectively impacts metabolism in HCR compared to LCR; this may be due to differences in SNS activation. This likely results in differential alterations in mechanisms impacting muscle metabolism.

Fig. 1. Figure1: Norepinephrine turnover (NETO) in skeletal muscle of HCR and LCR, A) Soleus, B) EDL. Compared to vehicle, intra-VMH MT-II induced a significant increase in NETO in both HCR and LCR. Change in NETO was higher for HCR in soleus and for LCR in EDL. (*p < 0.05).

Fig. 2. Figure2: Norepinephrine turnover (NETO) of HCR and LCR in A) BAT, B) Heart. Compared to vehicle, intra-VMH MT-II induced a significant increase in NETO in both HCR and LCR. Change in NETO was higher for HCR insoleus and for LCR in EDL. (*p < 0.05).
Introduction: For obesity prevention of children and adolescents is very important to keep balanced diet and have regular physical activities. Physically active children and adolescents have to pay more attention to balanced diet and regular meal out of school.

Results: 31 children participated in study, 14 girls and 17 boys. Mean age (years; SD) was 13.25 ± 2.45, weight (kg ± SD) 86.93 ± 23.68, height (cm ± SD) 165.93 ± 12.40, BMI (kg/m^2 ± SD) 30.6 ± 5.22, waist circumference (cm ± SD) 104.53 ± 14.10. 7.1% (n=1) of girls and 41.2% (n=7) of boys admitted regular eating in front of TV and 42.9% (n=6) of girls and 23.5% (n=4) of boys admitted occasional eating in front of TV (p = 0.04). We find also statistically significant difference between children with physical activities out of school and without it relation to overeating and eating in fast food restaurants. 55.5% (n=5) of children with physical activities out of school answered that they have had overeating feeling 1 time per day or more and only 5.9% (n=1) those children, who do not have physical activities out of school have had overeating feeling regularly (p = 0.008). 33.3% (n=3) of physically active children mentioned that they eat in fast food restaurant at least 1 time per 2 weeks or more and 11.8% (n=2) of children who is not physically active (p = 0.043).

Conclusion: Physically active children and adolescents have to pay more attention to balanced diet and regular meal out of school.

Acknowledgement: The study was partially supported by a grant from the ERNYŐ 2013 of the Hungarian Government.

Method: Data about anthropometric parameters (weight, height, body-mass index (BMI), waist circumference), eating habits and physical activities was collected and analyzed by a multidisciplinary team in Children’s Clinical University Hospital (Riga, Latvia) between August and November 2014.

Results: 31 children participated in study, 14 girls and 17 boys. Mean age (years; SD) was 13.25 ± 2.45, weight (kg ± SD) 86.93 ± 23.68, height (cm ± SD) 165.93 ± 12.40, BMI (kg/m^2 ± SD) 30.6 ± 5.22, waist circumference (cm ± SD) 104.53 ± 14.10. 7.1% (n=1) of girls and 41.2% (n=7) of boys admitted regular eating in front of TV and 42.9% (n=6) of girls and 23.5% (n=4) of boys admitted occasional eating in front of TV (p = 0.04). We find also statistically significant difference between children with physical activities out of school and without it relation to overeating and eating in fast food restaurants. 55.5% (n=5) of children with physical activities out of school answered that they have had overeating feeling 1 time per day or more and only 5.9% (n=1) those children, who do not have physical activities out of school have had overeating feeling regularly (p = 0.008). 33.3% (n=3) of physically active children mentioned that they eat in fast food restaurant at least 1 time per 2 weeks or more and 11.8% (n=2) of children who is not physically active (p = 0.043).

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Children and adolescents with obesity and with physical activities out of school have unbalanced diet risk

Maslova O.1, Napituhina I.1, Tase I.1, Agadzanjana K.1, Vetra A.1,2, Dzivite-Krisane I.2,3, Galite J.1,2
1Children’s Clinical University Hospital, Riga, Latvia,
2Riga Stradins University, Latvia

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Differential regulation of metabolic parameters by energy deficit and hunger

Kitka T.1, Tuza S.1, Varga B.1, Horváth C.1, Kovács P.1
1Division of Pharmacological and Drug Safety Research, Gedeon Richter Plc., Budapest, Hungary

Introduction: Hypocaloric diet is known to decrease both energy expenditure (EE) and respiratory exchange rate (RER), affecting the efficacy of dieting oppositely. Energy deficit and subjective hunger may be modulated separately both in human and animal studies by drug treatment (only energy deficit) or food restriction (both energy deficit and hunger). Thus it would be important to separate the effects of energy deficit and hunger on EE and RER.

Methods: Three parallel and analogous experiments were performed using three pharmacologically distinct anorexigenic drugs: rimonabant, sibutramine and tramadol. Metabolic parameters of vehicle-, drug-treated and pair-fed diet-induced obese mice were recorded. The three experiments underwent common statistical analysis to identify effects independent from the mechanisms of action.

Results: RER was similarly decreased by drug treatments and paired feeding compared to both vehicle- and drug-treatment in the passive phase. In the active phase, EE was influenced by the pharmacological mechanisms of action.

Conclusion: Our results suggest that RER is mainly affected by the actual state of energy balance and unaffected by hunger. In contrast, EE is rather influenced by subjective feelings of hunger. Therefore, pharmacological medications that decrease hunger may enhance the efficacy of a hypocaloric diet by maintaining metabolic rate. Furthermore, our results yield the proposal that effects of anorexigenic drugs on EE and RER should be determined compared to vehicle and pair-fed groups, respectively, in animal models.

Acknowledgement: The study was partially supported by a grant from the ERNYŐ 2013 of the Hungarian Government.

The effect of life-style interventions on weight reduction and weight maintenance

Halmy E.1, Kovács F.1, Halmy L.1
1Platon Health Advising and Services Ltd.

Aim: To study the effectiveness of life-style interventions in weight management.

Method: The life-style interventions were based on calory restricted diet, increased physical activity, education, and regular control. The weight reduction program (a) duration 3 weeks in hospitalisation n:146, BMI:41.6 kg/m², daily underwater exercise, gymnastic, brisk walking, LCD. The weight maintenance (b) was supported in self-helped group during 2 years n:129, BMI:30.2 kg/m², weekly organised dietetic consultation, gymnastic with music, education.

Results: (a) Body-weight kg 119.4 (SD:25.8) - 112.9 (SD:24.2) body fat kg 52.2 (SD:18.2) - 47.8 (SD:18.2) Cardiovascular risk factors VFA cm, 177.2...
Abstracts

Obesity Facts 2015;8(suppl 1):1–247

2. Ninety-six participant were in the underweight body weight that often occurs in association with dieting. Weight cycling
large body of research has demonstrated that individual factors may have specific influences on chocolate craving.

Conclusion: The inpatient program was effective in weight reduction and risk factors normalization. The self-helped group program was suitable for long term weight maintenance either in prevention of weight gain or in post-obese condition. Effectiveness is feasible with compliance and the aid of organized follow-up.

T3:PO106
The relation between the menstrual cycle with food craving and eating attitudes
Büyükkarangoz A.H.1, Sağlam D.1, Cengiz E.Ş.1, Karaca E.1, Baş M.1, Arıtcı G.1, Kükşel S.1

1Acibadem University, Health Sciences Faculty, Department of Nutrition and Dietetics, Istanbul

Introduction: A food craving is a desire “so strong that it will cause a person to go far out of his or her way to satisfy it” and leads to the subjective experience of a compulsive urge to eat, and are associated with higher Body Mass Index (BMI) as well as eating disorders. In retrospective studies, women have commonly experience an increase in food cravings during the days prior to menopause (i.e., the late luteal phase), with some studies also finding elevations in food cravings during menses.

Methods: The participants in this study consisted of 678 female university students in Istanbul. The questionnaire was included asked about the socio-demographic items, including age, weight, height and BMI was based on self-report. The participants completed the Dutch Eating Behaviours Questionnaire (DEBQ), Daily Symptom Rating Scale (DSR), Eating Attitudes Test - 26 (EAT-26) and The Attitudes to Chocolate Questionnaire (ACQ).

Results: Participants’ mean age was 20.14 ± 2.04 years. The average BMI was 21.29 ± 2.92 kg/m². Ninety-six participant were in the underweight range, 9.0% of participants were in the overweight range, and 1.2% % of participants were in the obese range. Disturbed eating behaviours was found in 25.2%, and binge eating behaviours was found in 19.2% of the total sample. Results indicated that there was significant correlate between BMI and DSR (r=0.083; p = 0.030), DEBQ-restraint (r=0.357; p = 0.000), DEBQ-emotional (r=0.278; p = 0.000), EAT-26 (r=0.083; p = 0.031) and ACQ (r=0.255; p = 0.000). Also, luteal phase was associated with higher DSQ, ACQ and DEBQ-emotional scores (p < 0.05).

Conclusions: In conclusion, the luteal phase contributed to a higher chocolate craving response to food and high-sweet-fat food, and there was significant relation between the body mass index and chocolate craving. A large body of research has demonstrated that individual factors may have specific influences on chocolate craving.

T3:PO107
Weight cycling and psychological correlates among dieters in turkey
Büyükkarangoz A.H.1, Baş M.1, Karaca E.1

1Acibadem University, Health Sciences Faculty, Department of Nutrition and Dietetics, Istanbul

Introduction: Weight cycling refers to losses and subsequent regaining of body weight that often occurs in association with dieting. Weight cycling (WC) is independently associated with adverse health outcomes such as increased cardiovascular morbidity/mortality and psychological problems.

Methods: The sample was composed of patients who had been consulted at a private obesity clinic in Ankara between May 2014 and December 2014 with the intention of losing weight. The participants in this study consisted of 116 people (90 women and 26 men). The participants completed the Dutch Eating Behaviours Questionnaire (DEBQ), Beck Depression Scale (BECK), Thinness and Restricting Expectancy Inventory (TREI) and the questionnaire to assess weight cycling.

Results: In the whole study group (n = 116), the prevalence of reported WC was 42.2% (46.7% of women, 26.9% of men). Results indicated that there was significant correlation between body mass index and TREI (r=0.295; p = 0.005), DEBQ-restraint (r=0.374; p = 0.000) and DEBQ-emotional (r=0.400; p = 0.000) for women, BECK (r=0.404; p = 0.041) for men. In addition, results from indicated that there was significant correlate between body mass index and TREI (r=0.332; p = 0.032), DEBQ-restraint (r=0.503; p = 0.001) and DEBQ-emotional (r=0.447; p = 0.003) for cycler women, but no cycler men. There was a significant difference between TREI scores of individuals with WC compared to non-WC. There was also a significant difference in the BECK and DEBQ-emotional scores of women compared to men.

Conclusion: As a conclusion, weight cycling prevalence is higher in women than men. Also, weight cycling status is related with thinness and restricting expectancy, emotional eating and depression level among women, but not among men. More efforts are needed by clinicians to focus on better management of weight-loss programs, in order to avoid multiple weight fluctuations and to achieve long-term weight maintenance.

T3:PO108
Is dietary restraint deserving of its poor reputation in obesity management?
Picone T.J.1, Franklin J.L.1, Mansson E.1, Loughnan G.1, Markovic T.1

1Metabolism and Obesity Services, Department of Endocrinology, Royal Prince Alfred Hospital, Sydney, Australia

Introduction: Dietary restraint (DR) has been implicated in both the aetiology and treatment of obesity. While DR is necessary for weight loss, high DR may lead to disinhibition, disordered eating, binge eating, and weight gain. The present study aimed to evaluate the role of DR in a sample of obese weight loss subjects. It was hypothesised that compared to low and high DR, moderate DR would protect against weight gain, poor eating pattern and psychopathology.

Method: Baseline anthropometry, psychological measures (DASS, BDJ), eating and exercise behaviour (Food habits questionnaire and Modified Beacce), medical profiles and weight loss outcomes were assessed according to degree of DR as measured by the TFEQ in 2496 patients (1731 female) who had attended an outpatient obesity management clinic between 1992 and 2013.

Results: Subjects with higher DR had lower baseline weight, BMI and waist circumference. These subjects did not report increased symptoms of depression or anxiety and reported lower fat score and higher better habits score. In women, high DR was also associated with higher activity levels. Although linear regression showed that DR was a predictor of baseline weight secondary to self-esteem, it only accounted for 1.9% of the variance in baseline weight. DR did not remain predictive in men after adjusting for self-esteem. Higher baseline DR did not predict short or long term weight loss.

Conclusion: Contrary to the hypothesis, higher DR is associated with lower body weight and healthier eating and physical activity behaviours in an obese treatment seeking population with no adverse effect on depression or anxiety. Although DR is not predictive of weight loss in the short term, it may be important for everyday weight maintenance.
T3 – Popular diets

T3.PO.109
Determination of Relationship Between Obesity and Alkaline Diet in School Aged Children

Karaci M.1, Koskal E1, Tekciçek M.2

1Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara, Turkey
2Department of Pediatric Dentistry, Faculty of Dentistry, Hacettepe University

Introduction: This study aimed to evaluate relationship between obesity and alkaline diet in school aged children.

Methods: This study was conducted on 96 girls and 92 boys totally 188 children. Anthropometric measurements of children were taken and body fat percentage (%) was measured by bioelectric impedance analyzer that can be used for children and 24-hour dietary recall of children was collected. A Potential Renal Acid Load (PRAL) value formulated by Remer ile Manz was used for evaluating alkalinity of diet.

Results: According to the children's body composition it was not detected children who have low body fat percentage while 39.9% of children have high body fat percentage. Mean body fat percentage of girls (27.6 ± 4.94) were found more than boys (24.3 ± 7.17) and the difference is significant between groups (p < 0.05). It was determined that diet alkalities of children are positive associated with fruit and vegetable consumption but negative associated with meat and meat products and grain consumption (p < 0.01). It was found there is no relationship between dietary PRAL values and height, waist circumference, waist / height ratio, body mass index but there is a negative correlation with body fat percentage which is an indicator of body composition (r = -0.215; p < 0.01)

Conclusion: Increasing of diet alkalinity can be an indicator of a healthy diet in the prevention of many diseases. Nowadays increasing of fruit and vegetable consumption increase diet alkalinity and it will have an important role in prevention of childhood obesity and chronic diseases in adulthood.

T3.PO.110
Pharmacokinetics of quercetin which reduce body fat humans.

Nakamura L1, Tomimori N2, Yoshimura M1, Fukui N1

1Suntory Global Innovation Center Limited, Tokyo, Japan
2Suntory Wellness Limited, Tokyo, Japan

Introduction: Quercetin is one of the most abundant polyphenols in vegetables and fruits. It has been reported that quercetin induces lipolysis. We demonstrated that the beverage containing quercetin glucoside (QG) reduces body fat of obese humans last year. Objective: The objective of this study was to investigate the pharmacokinetics of quercetin on healthy humans.

Methods: A total of 20 volunteers composed of 10 healthy humans (18.5 ± body mass index < 25 kg/m²) and 10 mild obese humans (25 ± body mass index < 30 kg/m²) participated in this study. Test beverage was packaged a bottle of 350 ml containing QG 110mg as QG1. After an overnight fast, each study participant ingested a test beverage without breakfast. Blood samples were collected at 0.25, 0.5, 1, 1.5, 2, 4, 8, 12, 24, 36, 48 and 60 hr after test beverage ingestion.

Results: The mean area under the curve of plasma total quercetin from baseline to 60 hr [AUC 0-60 hr] was 2.8 μg hr/mL, maximum plasma concentration (Cmax) was 997 ng/mL, and time to reach Cmax (Tmax) was 0.5 hr. There was no difference between healthy humans and mild obese humans in the respective pharmacokinetics parameters.

Conclusions: The beverage containing QG is absorbed promptly within an hour and is an excellent way to reduce body fat in humans effectively.

T3.PO.111
Evaluation of Knowledge, Attitude and Behavior on Popular Weight-Loss Diets in Adults

Bilici S.1, Yilmaz H.2, Uyar B.1, Gencer F.1, Karaolioglu N.1, Albayrak Z.6

1Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara,

Turkey

Introduction: Recently, unhealthy and popular weight-loss diet solutions, which are not personally designed and claiming faster results on weight loss, spread among individuals especially with the influence of the media. The aim of this study to determine knowledge, attitude and behavior of popular weight loss diets among adults.

Methods: Total 400 (332 female, 68 male) adults (mean age of participants 24.8 ± 23.7 years) participated this study between October 2013-May 2014. A questionnaire examined face to face by specialists.

Results: According to WHO’s BMI classification, it is determined that 69.9% of individuals had a normal body weight, 11.5% were underweight, 18.8% were obese. Also, 58.9% of normal weight individuals, 54.7% of obese individuals believed obese themselves (p < 0.05) and 31.8% of the participants stated that they had knowledge about the contents of the popular diets. It is determined that they had knowledge about popular diets from internet (34.1%), newspapers and magazines (25.5%), friends, neighbors and relatives (22.2%), books (11.4%) and dieticians (2.5%). Participants, which were indicated that popular weight-loss diets are effective and useful, were 28.3%. It was found that 4% of individuals applied popular diet and 80% of individuals applying popular diet have preferred high protein diets.

Conclusions and Recommendations: Popular weight-loss diets are becoming increasingly widespread use under influence of media often included incorrect and inappropriate to principles of healthy eating practices. Educational and informative programs prepared by experts should be given more space in the media for people’s consciousness.

T3.PO.112
Weight loss with a modified Mediterranean type diet using fat modification through neutral and butter flavored canola oil, walnuts and walnut oil

Austel A.1, Ranke C.1, Wagner N.1, Gørge J.1, Ellrott T.1

1Institute for Nutrition and Psychology at Göttingen University Medical School, Göttingen, Germany

Objective: Mediterranean diets with a high proportion of olive oil and nuts can be effective for weight management and the prevention of cardiovascular disease. For populations with different eating habits and preferences it might be difficult to follow such diets. Therefore, a modified Mediterranean type diet using fat modification through neutral and butter-flavored canola oil, walnuts and walnut oil, and with two portion-controlled sweet daily snacks, was tested in Germany.

Methods: Randomized waiting-list control study with overweight/grade 1 obese subjects: 12-week self-help modified Mediterranean type diet with 6 weeks of modified Mediterranean type diet plans (approx. 1300 kcal/d) and 6 weeks of weight loss maintenance training. 40-week follow-up. Trial duration 12 months. Oils and nuts were provided free of charge. Subjects: See Fig. 1.

Results: Per protocol weight loss after 12 weeks was 5.2kg in IG vs. 0.4kg in CG (p < 0.0001), BMI change -1.8 kg/m² vs. -0.1 kg/m² (p < 0.0001), waist circumference change -4.7cm vs. -0.9cm (p < 0.0001). Weight loss after 12 months: 4.2kg (pooled data). Triglycerides, total cholesterol and LDL-cholesterol were significantly improved in IG but not in CG after 12 weeks, for 1-year-data see Fig. 2. 1-year-dropouts: 44% in IG, 53% in CG.

Conclusion: A five meal modified Mediterranean type diet with two portion-controlled sweet snacks was effective for weight management in a self-help setting for overweight and grade 1 obese subjects. Fat modification through canola oil, walnuts and walnut oil improved blood lipids

even at 12 months. Such adoptions to local eating habits do not seem to compromise important outcomes of Mediterranean diets for weight loss.

<table>
<thead>
<tr>
<th>Group</th>
<th>IG</th>
<th>CG</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>100</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>Gender m/f</td>
<td>21/79</td>
<td>17/95</td>
<td></td>
</tr>
<tr>
<td>Age in years</td>
<td>52.36±0.89</td>
<td>52.64±1.06</td>
<td>n.s.</td>
</tr>
<tr>
<td>Weight in kg</td>
<td>85.06±1.23</td>
<td>84.07±1.09</td>
<td>n.s.</td>
</tr>
<tr>
<td>Height in m</td>
<td>1.68±0.01</td>
<td>1.67±0.01</td>
<td>n.s.</td>
</tr>
<tr>
<td>BMI in kg/m²</td>
<td>30.05±0.27</td>
<td>30.12±0.25</td>
<td>n.s.</td>
</tr>
<tr>
<td>Waist circumference in cm</td>
<td>102.16±1.39</td>
<td>103.17±0.91</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

**Fig. 1.** Baseline characteristics of the participants in groups IG and CG (mean ± s.e.m.)

<table>
<thead>
<tr>
<th>Week 0</th>
<th>Week 12</th>
<th>Week 52</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>109</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td>Total cholesterol (mg/dl)</td>
<td>210.34±38.26</td>
<td>200.26±39.68</td>
<td>213.05±41.82</td>
</tr>
<tr>
<td>LDL cholesterol (mg/dl)</td>
<td>138.60±31.38</td>
<td>129.58±33.63</td>
<td>134.37±30.36</td>
</tr>
<tr>
<td>HDL cholesterol (mg/dl)</td>
<td>60.18±14.80</td>
<td>57.44±13.56</td>
<td>62.03±15.12</td>
</tr>
<tr>
<td>Triglycerides (mg/dl)</td>
<td>142.95±71.75</td>
<td>113.14±46.17</td>
<td>114.39±54.05</td>
</tr>
</tbody>
</table>

**Fig. 2.** Changes in blood lipids over 1 year (completers; pooled data); Legend: +: Week 0 vs Week 1 (p < 0.05); ++ p < 0.01; +++ p < 0.001; #: Week 0 vs Week 52 (p < 0.05); ## p < 0.01, ### p < 0.001; *: Week 1 vs Week 1 (p < 0.05); ** p < 0.01; *** p < 0.001.

**T3.PO.113**

**Effect of intermittent versus continuous energy restriction on compensatory mechanisms activated during weight reduction**

Coutinho S.R.1, Gilsbakk S.1, Halset E.H.1, Kulseng B.1,2, Truby H.1, Martins C.1,2

1Obesity Research Group, Department of Cancer Research and Molecular Medicine, Faculty of Medicine, Norwegian University of Science and Technology, Trondheim, Norway, 2Centre for Obesity, Department of Surgery, St. Olav Hospital—Trondheim University Hospital, Trondheim, Norway.

**Introduction:** Intermittent energy restriction (IER) is a popular weight loss (WL) strategy. The effects of IER vs continuous energy restriction (CER) on body composition and compensatory mechanisms (reduction in resting metabolic rate (RMR), increase in exercise efficiency (Ef) and increase in hunger/reduction in fullness) activated during WL remain unknown. The aims of this study were to compare the impact of IER vs CER, inducing a similar WL, on the above mentioned mechanisms.

**Methods:** 34 obese (BMI: 36 ± 4 kg/m²) individuals (26 females, age: 38.9 ± 9.4y) were randomized to IER or CER for 12 weeks. Each dietary pattern was designed to have an overall 33% energy deficit and a similar macronutrient composition. The IER group underwent 3 nonconsecutive days of very-low calorie diet/week. The CER group had daily energy restriction. Body weight, composition, RMR, Ef and subjective appetite were measured pre and post intervention.

**Results:** WL (~13%) and body composition changes were similar in both groups. A significant reduction in RMR was observed in IER, but not CER group. Ef increased significantly in IER, but not CER group at 25 and 50watts. Fasting prospective food consumption decreased significantly with CER but not IER. Differences between groups were not significant for any of the above. No significant changes occurred in other appetite feelings, either fasting or postprandially, within or between groups.

**Conclusion:** A similar WL, achieved either by IER or CER, induces the same changes in body composition, RMR, Ef and appetite sensations, but CER prevents the reduction in RMR and the increase in Ef observed with IER. However, the continuous or intermittent nature of energy restriction does not appear, on its own, to modulate the compensatory mechanisms activated with WL.

**Acknowledgement:** Allevo (Cederroth Norge A/S); Fundação para a Ciencia e a Tecnologia (Portugal); Regional Center for Morbid Obesity, Department of Surgery, St. Olav Hospital (Trondheim, Norway).

**T3.PO.114**

**Comparison of a low calorie-high protein diet and moderate calorie-high protein diet with a standard diet in the treatment of obesity**

Bas M.1, Cengiz E.S.1, Sağlam D.1, Büyükkaragöz A.H.1

1Acibadem University, Health Sciences Faculty, Department of Nutrition and Dietetics

**Introduction:** Obesity has been defined as a global epidemic, and its prevalence is now maintained or even accelerated in most industrialized countries. The leading non-pharmacological approach is the use of diets, particularly low-calorie and very low-calorie diets. In the last few years, the low-carbohydrate diet has gained progressive recognition over other dietary treatments, and the low-carbohydrate ketogenic diet in particular has been closely examined.

**Methods:** In brief, 45 overweight or obese non-diabetic men and women (age 34.4 ± 4.5 years) undertook a low calorie-high protein diet (LC), moderate calorie-high protein diet (MC) and standard diet (SD) for 4 weeks, during which some meals were replaced with a SDM formulation (S.D.M. - Societá Dietetica Medica, Italy). Bioelectrical impedance was used to measure body weight and composition using the standard adult mode of measurement. A baseline and final blood sample was collected. All groups received counseling by dietitian, no perform physical activity and adhered to the diet.

**Results:** At 4 weeks, the weight reductions in the LC diet, MC diet and SD diet groups were 7.5 ± 32.1, 5.9 ± 1.3 and 4.5 ± 1.8 kg, respectively (p < 0.05). At the end of the study, at 4 weeks, the body fat reductions were 6.9 ± 1.8, 5.4 ± 1.4 and 3.5 ± 1.8 kg, respectively (p < 0.05). Also, the fasting insulin level reductions were 8.9 ± 6.7, 5.9 ± 3.5 and 3.7 ± 0.7 μIU/mL, respectively (p < 0.05). Lean mass was unaffected, especially LC diet and MC diet groups.

**Conclusions:** In summary, the present work demonstrated that a LC diet and MC diet were significantly superior in the induction of weight loss and body composition in otherwise healthy obese patients compared with a SD diet. The prescription of a standard diet in the post weight loss phase was important for achieving weight loss success. Further research is needed to determine the precise mechanism of this effect.
T3 – Physical (in)activity

T3.P0.115

Sedentary behavior is related to fat distribution among children in South China

Vye H.1, Duan R.1, Yang M.1, Liu Y.1, Cheng G.2
1Department of nutrition, food safety and toxicology, West China School of Public Health, Sichuan University, Chengdu, PR, China, 2Department of nutrition, food safety and toxicology, West China School of Public Health, Sichuan University, Chengdu, PR, China. State Key Laboratory of Biotherapy and Cancer Center, West China Clinical Medical School, Sichuan University, Chengdu, PR, China.

Introduction: Little is known whether sedentary behaviors (SBs) are related to body fatness independent of physical activity (PA) among Chinese children. The purpose of this study was to explore the independent associations of SBs (including TV/DVD viewing, computer use and doing homework) with body fatness among Chinese children.

Methods: A cross-sectional study was conducted in 1586 Chinese children (50.3% girls) aged 7–15 years. Height, weight, skin-fold thickness were measured and indicators of body fat distribution including percentage body fat (%BF), fat mass index (FMI) and fat-free mass index (FFMI) were calculated. Information of parental anthropometric measurements etc., as well as socio-demographic data were collected. Data on SBs, PA and dietary intake were assessed by self-reported questionnaires. Energy intake (EI) and energy expended in PA (PAEE) were calculated. The relations of SBs to body fatness were examined by multivariate linear models adjusted for the family average annual income, maternal overweight, EI and PAEE.

Results: Boys spent more time than girls on using computer or doing homework (all p < 0.0002). In girls, TV/DVD viewing, computer use and doing homework were positively related to %BF, FMI and FFMI (all p < 0.04). Moreover, girls who spent more time on SBs had 12.9%–23.3% higher FMI and 2.9% higher FFMI. Among boys, time of using computer was positively related to FFMI. However, no relation of TV/DVD viewing and doing homework to body fatness was observed in boys. Furthermore, the above observed associations were more pronounced in girls aged 7–10 years.

Conclusion: SBs are positively related to fat distribution among Chinese girls, independently of PA. These associations were stronger and consistently significant in the younger groups. Corresponding author: Cheng G.

T3.P0.116

Variability in appetite and energy intake responses to exercise: A pooled analysis of acute laboratory-based studies

King J.A.1, Wasse L.K.2, Deighton K.1, Broom D.R.1, Douglass J.A.1, Snelson D.J.2
1School of Sport, Exercise & Health Sciences, Loughborough University, UK, 2Faculty of Medical and Human Sciences, University of Manchester, Manchester, United Kingdom.

Introduction: Exercise is promoted as an effective weight control strategy for all; however emerging data indicates that large variability exists regarding appetite and energy intake responses to exercise. This investigation pooled 16 of our group’s laboratory studies were pooled to examine the between-subject variability in 1) hunger response during exercise (n = 182) and after exercise (n = 96) exercise; 2) ad libitum energy intake responses to acute exercise (n = 86). Data was derived from young, healthy, active males (age 22.3 ± 2.6 y; BMI 23.6 ± 2.2 kg/m²). Energy responses were determined by comparing exercise and control trial outcomes. Aerobic exercise bouts lasted 30–90 min (45–75% VO2 peak) with trials days en-during for 4–10 h. Hunger (AUC) responses were assessed during trials using a Visual Analogue Scales and post-exercise energy intake was examined at ad libitum meals.

Results: Hunger was suppressed during exercise (-32%, P < 0.001) with no differences apparent afterwards. Large variability in response to exercise was evident however, during (-99% to +391%) and after exercise (-87% to +360%). No difference was observed in energy intake at the first meal (Control 1377 ± 474; Exercise 1411 ± 453 kcal); or for the summation of meals after exercise (Control 2951 ± 1085; Exercise 2999 ± 1083 kcal). Large variation in response was apparent at the first (-1169 ± 1043 kcal) and subsequent meals (-1568 ± 908 kcal) post-exercise.

Conclusion: Large variability exists in the individual appetite and energy intake response to acute exercise. Recognition of this variation is critical for personalised weight management strategies.
Web-based intervention to promote weight loss maintenance using an activity monitor: Study design and 3-month interim report of a randomised controlled trial

Nakata Y1, Sasaki H1, Tsujimoto T2, Kobayashi H1, Hashimoto K1
1Faculty of Medicine, University of Tsukuba, Tsukuba, Japan

Introduction: Our previous study suggested that increased physical activity may be crucial for successful weight loss maintenance. The purpose of this study is to test the effectiveness of a web-based intervention designed to increase physical activity in promoting weight loss maintenance.

Methods: We are currently conducting a two-phase 27-month randomised controlled trial. Participants were recruited through newspaper advertisements. Eligibility criteria included age (40–64 years), body mass index (25–40 kg/m²), and metabolic syndrome components (at least one). In phase 1, a 3-month group-based weight loss programme was provided to participants. We randomly assigned (1:1) participants who lost at least 5% weight in phase 1 to the control or intervention groups. Participants in the intervention group regularly report their body weight and physical activity through a web-based system compatible with a weight scale and activity monitor. Study staff provides personalized feedback based on weight and activity for 24 months. The primary outcome is 27-month body weight change.

Results: We recruited participants in 2 cities in Ibaraki Prefecture. In Mito, we enrolled 55 eligible participants in September 2014. In phase 1, 49 participants decreased 5% of the baseline weight and were assigned to the control (n=25) and intervention (n=24) groups. In Chikusei, we enrolled 64 eligible participants in November 2014; their 3-month measurements will be carried out in February 2015.

Conclusion: We will continue web-based intervention for 24 months and test the hypothesis in February 2017.

Reference:

Physical activity improves functional exercise capacity for children and adolescents with obesity

Napituhiphina I1, Maslova O1, Tase I1, Agodozjanja K1, Vetra A1, 2, Daviite-Krisane I1, 2, Gailite I1
1Children’s Clinical University Hospital, Riga, latvia
2Riga Stradins University, Latvia

Introduction: Physical activities and education about healthy eating habits are essential for children with obesity. Six Minute Walk Test (6MWT) is a valuable and practical tool to measure functional exercise capacity in children with obesity.

Methods: Data about anthropometric parameters (weight, height, body mass index (BMI), waist circumference), 6MWT, eating habits and physical activities was collected and analyzed by a multidisciplinary team in Children’s Clinical University Hospital (Riga, Latvia) between August and November 2014.

Results: 31 children participated in study, 14 of them girls and 17 boys. Mean age (years ± SD) for girls was 13.4 ± 2.2, for boys 13.1 ± 2.7 (p = 0.689). Mean BMI (kg/m² ± SD) for girls was 30.0 ± 5.4, for boys 32.0 ± 5.0 (p = 0.298). No statistically significant difference was found between genders in performing the 6MWT, distance for girls was 582.5 ± 45.4 m, for boys 571.3 ± 75.2 m (p = 0.628). Statistically significant difference was found in between walked distance in children with physical activity out of school (569.0 ± 57.3 m) and children without physical activity out of school (556.0 ± 57.3 m) (p = 0.005). 41.2% of children without physical activity out of school reported regular physical activity (running, swimming, bicycle and playing sports games) and 100% of children with physical activity out of school reported regular physical activity (p = 0.001).

Conclusions: All professionals and parents should emphasise the role of physical activity to children and adolescents with obesity.
physical activity. In this context, it is a widely-held belief that altering posture allocation can modify energy expenditure (EE) to impact upon body weight regulation and health. However, we have recently shown the existence of two distinct phenotypes pertaining to the energy cost of standing – with the majority of individuals having no sustained increase in EE during steady-state standing relative to sitting comfortably. Here we investigated whether or not these two distinct phenotypes could be related to the presence/absence of spontaneous “weight-shifting”, i.e., the displacement of body weight from one foot to the other in order to minimise discomfort or maintain postural balance.

Methods: Min-by-min EE was measured during 10 min of standing in 36 young adults (18 men, 18 women) by facemask indirect calorimetry. Participants were asked to stand “naturally” on a dual-balance system, with each foot on a separate balance placed a few cm apart. Weight-shifting was assessed min-by-min as the delta weight between the two balances.

Results: The vast majority of participants (83%) showed no sustained increase in EE during the standing period compared to sitting. However, there was no discernible relationship between the energetic cost of standing and the presence/absence of spontaneous weight-shifting.

Conclusion: Whilst this study reconfirms that the large majority of individuals maintain sitting and standing postures at the same energetic cost, the mechanisms underlying this heterogeneity do not appear to be related to the general pattern of weight-shifting.

T3.PO.123
A socio-ecologically framed, school-based physical activity intervention has beneficial effects on obesity outcomes in adolescents from low SES communities: The pA4E1 rct
Hollis J.L.1,2, Sutherland R.1,2,3, Campbell L.1,2,4, Morgan P.; Lubans D.; Nathan N.;1,2,3, Wolfenden L.1,2,3, Okely T., Davies L.; Gilham K.1,2, Cohen K.; Wiggers J.1,2
1Hunter New England Population Health, Locked Bag 10, Wallsend, Australia, 2School of Medicine and Public Health, University of Newcastle, Australia, 3Hunter Medical Research Institute, Lambton, Australia, 4Priority Research Centre in Physical Activity and Nutrition, University of Newcastle, Australia,

Objective: One quarter of adolescents are overweight or obese, with the prevalence higher among adolescents from low socio-economic status (SES). Physical Activity 4 Every1 (PA4E1) is a 24-month physical activity intervention implemented in secondary schools from lower SES communities that aimed to reduce the decline in physical activity experienced during adolescence. This study reports the 12-month mid-intervention effects of PA4E1 on the secondary outcomes of weight, waist circumference and body mass index (BMI).

Methods: A cluster randomized controlled trial was conducted in 10 secondary schools located in low SES communities in New South Wales, Australia (1257 students, mean age 12 years, 48% boys). The school-based intervention was guided by socio-ecological theory and included seven physical activity strategies and six implementation strategies. The secondary outcomes included weight, waist circumference and BMI. Data was analysed using linear mixed models adjusting for school clustering.

Results: A total of 959 (78%) students provided anthropometric data at baseline and 640 (52%) at mid-intervention. There was a significant group-by-time effect in favour of the intervention group for mean difference (95% CI) in body weight (-0.65kg [-1.26 to –0.05], p = 0.04), waist circumference (-1.15cm [-1.98 to –0.32], p≤0.01) and BMI (-0.28kg/m^2 [-0.49 to –0.07], p = 0.01). The intervention resulted in significant effects on male students' BMI (-0.33kg/m^2 [-0.63 to –0.02], p = 0.04) and female students' waist circumference (-1.85cm [-3.00 to –0.70], p≤0.01).

Conclusion: A socio-ecologically framed, multicomponent school-based physical activity intervention that increases adolescents’ physical activity may assist in preventing overweight and obesity in low SES adolescents.

T3.PO.124
Inflammation is related to worse self-perceived fatigue in obese boys and girls
Tresiglie J.1, Vantieghem S.1, Proyn S.;1, Baumann T.1
1Department of Experimental Anatomy, Vrije Universiteit Brussel, Brussels, Belgium, 2Department of Frailty in Ageing, Vrije Universiteit Brussel, Brussels, Belgium

Introduction: In obesity, adipocyte dysfunction contribute to elevated circulating levels of C-reactive protein (CRP), an important marker for inflammatory burden. Inflammation is a well-known contributor to fatigue sensations in several diseases; but its role in obesity-related fatigue remains unclear. This study examined the relationship between circulating hs-CRP and self-perceived fatigue in obese adolescents.

Methods: 237 obese adolescents (140 girls and 97 boys; 15 ± 2 years) were examined for heart rate, blood pressure, body composition (DXA) and self-perceived fatigue (Multidimensional Fatigue Inventory, MFI-20). Blood samples were collected and analyzed for hs-CRP, triglycerides (TG), cholesterol (CH), high density lipoproteins (HDL) and low density lipoproteins (LDL). Correlations were computed corrected for gender and age.

Results: Higher hs-CRP was significantly related to higher body weight, BMI, heart rate and sys BP (resp r=0.17; r=0.24, r=0.19 and r=0.16; all p < 0.02). In addition higher hs-CRP levels were related to worse

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self-perceived fatigue (subscale total fatigue r=0.15, general fatigue r=0.16 and physical fatigue r=0.17; all p < 0.03) and fat parameters (segmental and total fat; all r>0.22; all p < 0.001). Despite the fact that hs-CRP was related to fat parameters no relations were found for hs-CRP and blood lipid levels.

Conclusion: Based on our results we conclude that higher hs-CRP is not only related to fat accumulation and cardiovascular risk factors, but also related to worse self-perceived fatigue in obese adolescents.

T3:PO.125
The impact of a 6 week exercise programme on cardiovascular fitness in obese individuals attending the Rotherham Institute for Obesity (RIO)
Walker L1, Redie S1, Capehorn M.1
1Rotherham Institute for Obesity (RIO)

Introduction: Obesity coupled with an association of cardiovascular disease has caused an increased risk of mortality worldwide. For this reason, the assessment of cardiovascular fitness may be useful to help assess CVD risk, and in order to provide appropriate and tailored advice for physical activity.

Methods: 46 participants (age=36.7 +/- 20.6 yrs; BMI=36.1 +/- 7.2 kg/m²) who were attending the on-site gym at the Rotherham Institute for Obesity (RIO) completed the Ebelling Protocol, a single stage submaximal walking test used to calculate predicted maximal oxygen uptake (VO2 max), at baseline and at 6 weeks. The Ebelling Protocol was used as maximal testing is not recommended for obese populations, as it is not feasible for those who may be limited by pain or fatigue, and increases the risk of cardiac events. Data was analysed with parametric tests, descriptive statistics and paired t-tests (t) to compare mean values.

Results: Following 6 weeks attendance at the RIO gym, resting heart rate significantly decreased from 85.1bmp to 76.8bmp (t=5.98, P < 0.001) and VO2 max significantly increased from 34.2 ml/kg min to 36.7 ml/kg min (t=4.86, P < 0.001) in comparison to baseline. Furthermore, there was a significant increase in self-selected speed (t=7.46, P < 0.001) and overall decrease in rate of perceived exertion (RPE), which was significant for those who remained at the same speed (n=17, t=2.13, P = 0.4).

Conclusion: Results support the inclusion of exercise in a weight management programme, facilitating significant improvements on cardiovascular fitness. The reduced RPE suggests that individuals may be able to work harder and that the exercise is more manageable.

T3:PO.126
Effect of submaximal exercise on muscle carnosine: The role of carnosine supplementation
Ukropcova L1, Just-Kukarova I1, Krumpolec P1, deCourten B.1,2, Sedliak M.1, Valkovic L.1, Vajda M1, Vlcek M.1, Derave W.1,2,3, Aldini G.1,4, Krssak M.1,2, Ukropcova B.1,2
1Institute of Experimental Endocrinology Slovak Academy of Sciences, Bratislava, Slovakia, 2MR Centre of Excellence, Department of Radiology, Medical University of Vienna, Austria, 3Department of Internal Medicine III, Medical University of Vienna, Austria, 4Monash Centre for Health, Research and Implementation, School of Public Health and Preventive Medicine, Melbourne, Australia,

Introduction: Carnosine (β-alanyl-L-histidine) is a dipeptide abundant in skeletal muscle, with the ability to quench reactive carbonyl species, reduce metabolic and exercise-related stress and to improve muscle performance.

Methods: The effect of submaximal 1 hour run on carnosine levels in muscle was studied, before and after 2 months of carnosine supplementation (2g/day), in 7 male recreational runners/cyclists (age 34.0 ± 1.4y, BMI 22.2 ± 0.48 kg.m-2, VO2max 46.8 ± 1.9 ml.kg-1.min-1) applying 1H-MRS on 7T MR system (Magnetom, Siemens). Muscle carnosine measurement was performed before one hour lasting run (11.4 ± 0.4km) and repeated twice immediately after the run. Measurements of maximal aerobic capacity (VO2max, bicycle ergometry), muscle strength (leg-press dynamometer) & habitual physical activity (accelerometer) were also performed before and after the supplementation.

Results: Carnosine supplementation was associated with 17% (p < 0.05) increase in muscle strength, while VO2max & muscle carnosine content did not change. Supplemented individuals favored glycolytic energy sources during the maximal load as evidenced by higher respiratory quotient. Interestingly, muscle carnosine was negatively associated with ambulatory activity (steps /h; r=-0.65, p = 0.02) and vigorous physical activity (>8MET, min/day; r=-0.65, p = 0.02). The magnitude of muscle carnosine change after the run was, however, positively associated with volume (steps /h; soleus m. r=0.64, p = 0.03) and dynamics of habitual physical activity (r=0.7, p = 0.01).

Conclusion: Carnosine supplementation increased muscle strength and glycolytic energy utilization during the maximal intensity exercise. The positive association of running-induced change in muscle carnosine with the volume and intensity of habitual ambulatory activity indicate increased carnosine turnover in muscle of physically active individuals.

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T3:PO.127
Moderate to vigorous physical activities during physical education lessons, according to gender and body mass index
Ribeiro J,1 Ribeiro J.R.1,2 Silva G.1
1Research Centre in Physical Activity, Health and Leisure, Sports Faculty, University of Porto, Portugal,
2EB 2,3 Gil Vicente, Guimarães, Portugal

Introduction: Current recommendations for PA, in school-aged children and adolescents, advocate 60 minutes of daily Moderate to Vigorous intensity PA (MVPA). The school, through physical education lessons (PE), plays a major role in the promotion and practice of PA. This study seeks to analyse, comparatively, levels of PA and the relative contribution of 45 and 90 minutes PE lessons to achieve daily recommendations for MVPA, particularly by gender, age, and weight status.

Methods: Sample consisted of 266 students, aged 10–17 years, belonging to an educational establishment of Guimarães, Portugal. BMI and body fat percentage were collected. We used the Actigraph´s accelerometer’s wGT3X-BT during PE lessons, in a total of 23 classes. Standard cut-off points were used for accelerometers.

Results: The results suggest that the percentage of MVPA are approximately equal in 45 and 90 minutes classes (26.7 vs. 26.6 45 min classes contribute about 13.3% of 60 minutes a day recommended for MVPA and 90 min classes contribute with 33.3 ±10.7%; In classes of 45 and 90 minutes, boys accumulate more MVPA and less sedentary PA compared to the girls; In 45 min lessons, only light PA, are statistically higher than in girls, and with similar results when overweight students are compared with normal weight. Boys, in MVPA, with overweight showing statistically higher results than those with normal weight; In 90 min class, only in the vigorous activities, girls with normal weight have statistically higher results than those with overweight/obesity. Age, BMI and percentage of fat mass were inversely related to the time in moderate to vigorous physical activity during 45 and 90 min classes.

Conclusions: Only for classes of 90 minutes, positive correlations were found between the time in MVPA and the number of sports covered during the class.
Increasing physical activity in children for obesity prevention: An innovative methodology using accelerometers

Lecerf J.M.1, Duclos M.1, Brissieux E., Bournez C., Mayer J., Borys J.M.1

1Institut Pasteur Lille,
2Communaute de Communes Flandre Lys,
3EPODE International Network,
4CHU Clermond Ferrand

Introduction: To date, the methods used to measure physical activity (PA) in children and adolescents often lead to missing or non-precise data. This study provides encouraging results on children participation rate and measure of PA, using 3D accelerometers.

Methods: In the EPODE France community-based programme, 7 facilitators were recruited to provide bi-weekly PA sessions to children for 7 weeks, using a kit including 6 different activities. 215 children aged 8 to 11 were recruited, from which 124 composed the control group and 91 the action group. Each child received a 3D accelerometer wristband. Measurement of the children PA was made once a week for 14 weeks (during the PA sessions and for 7 weeks after the PA sessions) thanks to the accelerometers. In parallel, the children completed a questionnaire on their PA habits, screen time and sleeping habits.

Results: The children participation rate in the sessions and motivation is high. First measures of PA level indicate that using an accelerometer is an interesting and accurate way to collect data on physical activity in children. The formal agreement between the community stakeholders enabled the researchers to regularly collect data using the accelerometers and the questionnaires.

Conclusion: Expected results are a 10-minutes increase of the children daily physical activity, 7 weeks after the end of the physical activity sessions.

Knowledge and Beliefs Saudi Female School Teachers on Physical Activity Participation by Girls.

Alarfaj G., Tigbe W.W.

1Division of Health Sciences, Warwick Medical School, Un Warwickviersity of

Background: With the recent shift towards urbanization in Saudi Arabia, physical inactivity and sedentary lifestyle have become predominant, particularly among children and adolescents. Concurrently, obesity levels have risen seven-fold between 1988 and 2005. Some level of knowledge of the anticipated reward is required to motivate the effort required to participate in regular physical activity. Aim: This study explored possible barriers behind physical inactivity in female students by assessing knowledge and beliefs of the female teachers of Al-Abna’a Schools in Riyadh, Saudi Arabia.

Methods: A validated questionnaire was administered and focused group discussions were held with female teachers of Al-Abna’a Schools in Riyadh, Saudi Arabia.

Results: The study found that the majority of teachers believed that physical activity was important for children and that girls should have physical exercise classes in school. However, teachers’ levels of knowledge on physical activity recommendations for children were low. Barriers for regular physical activity in children were reported lack of social and parental support, children’s low interest in physical exercise, and lack of sports facilities suitable for girls.

Conclusion: Saudi female schools have only female teachers. Therefore, a programme to improve physical activity participation by girls will require a comprehensive physical activity education for these female teachers as a start.

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References:


Does objectively quantified physical activity level independently predict NAFLD and visceral obesity?

Keating S.E., Parker H.M., Baker M.K., George J., Johnson N.A.

1Discipline of Exercise and Sport Science, University of Sydney, Sydney, Australia,
2School of Exercise Science, Australian Catholic University, Sydney, Australia;
3Storr Liver Unit, Westmead Millennium Institute, University of Sydney, Sydney, Australia,
4Boden Institute of Obesity, Nutrition, Exercise & Eating Disorders, Charles Perkins Centre, University of Sydney, Sydney, Australia

Introduction: Epidemiologic studies have suggested a negative relationship between nonalcoholic fatty liver disease (NAFLD), visceral adipose tissue (VAT) and self reported physical activity levels, but this subjective measurement can be inaccurate and prone to reporter bias. We aimed to investigate whether objectively measured physical activity predicted NAFLD and VAT in overweight/obese adults.

Methods: Habitual physical activity levels were measured via accelerometry (SensenewaTM across four days (three weekdays and one weekend) during an 8-week period. Average daily time spent in sedentary behaviour (MET<1.6), light (MET 1.6<3), and moderate (MET 3<5.9) activity was quantified (BodyMedia software, v8.0). Liver fat was assessed via proton magnetic resonance spectroscopy and VAT volume via magnetic resonance imaging. Bivariate correlations and hierarchical multiple regression analyses were performed with reference to prediction of liver fat percentage and VAT.

Results: Preliminary data (n=72) showed a significant correlation between VAT and sedentary behaviour (p=0.008) and moderate activity levels (p=0.006) but not between liver fat and any level of activity (p>0.05). Regression analysis revealed that age, gender and the addition of known risk factors for obesity related-NAFLD accounted for 49% and 26% of the variance in VAT and liver fat respectively (p<0.01). Adding sedentary and moderate physical activity levels to the model only accounted for a further 1% of variance for VAT (p=0.24) and reduced it by 3% for liver fat.

Conclusion: Objectively measured levels of habitual physical activity and sedentary behaviour did not improve the overall capacity of known obesity related risk factors to predict VAT or NAFLD in overweight/obese adults.

Associations between sleep patterns and lifestyle behaviors in children: An international comparison


1Children’s Hospital of Eastern Ontario Research Institute, Ottawa, Canada,
2Pennington Biomedical Research Center, Baton Rouge, USA,
3University of Helsinki, Helsinki, Finland,
4St. Johns Research Institute, Bangalore, India,
5University of Cape Town, Cape Town, South Africa,
6University of South Australia, Adelaide, Australia,
7University of Porto, Porto, Portugal,
8CELAFICS, Sao Paulo, Brazil,
9Kenyatta University, Nairobi, Kenya,
10Universidad de los Andes, Bogota, Colombia,
11University of Bath, Bath, United Kingdom,
12Tianjin Women’s and Children’s Health Center, Tianjin, China

Introduction: The objective was to examine the associations between sleep patterns and lifestyle behaviors in children from 12 countries representing a wide range of geographic and socio-cultural variability.
Methods: The sample of this multi-national cross-sectional study comprised 5,777 children aged 9–11 years from sites in Australia, Brazil, Canada, China, Columbia, Finland, India, Kenya, Portugal, South Africa, United Kingdom and United States. Sleep duration (h/day), sleep efficiency (%) and bedtime (h:min) were measured over 7 days using an accelerometer (validated 24-h waist-worn protocol). Outcome measures included moderate-to-vigorous physical activity (MVPA), total sedentary time (SED), self-reported screen time (ST), and healthy/unhealthy eating patterns (HEP/UEP).

Results: Overall, participants averaged 8.8 (SD 0.9) hours of sleep per day with 96.2 (SD 1.4) % sleep efficiency and a mean bedtime of 22:18. After adjustment for age, sex, highest parental education and BMI z-score, results showed that (i) sleep duration was negatively associated with MVPA, SED and UEP score, and positively associated with HEP score; (ii) sleep efficiency was negatively associated with MVPA and positively associated with SED; and (iii) bedtime was positively associated with ST and UEP score, and negatively associated with HEP score. Results also showed that some of the associations between sleep patterns and lifestyle behaviors were different between study sites.

Conclusion: Sleep characteristics are important correlates of lifestyle behaviors in children, especially sleep duration and bedtime. Differences between countries suggest that interventions aimed at improving sleep and lifestyle behaviors should be culturally adapted.

T3.PO.132
Is Obstructive Sleep Apnea Level Related with Anthropometric Measurements and Body Composition?

Celebi E., Toka O., Kokturk O., Rakicioğlu N.*
1Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara, Turkey,
2Department of Statistics, Faculty of Sciences, Hacettepe University, Ankara, Turkey,
3Department of Chest Diseases, Faculty of Medicine, Gazi University, Ankara,
4Department of Nutrition and Dietetics, Faculty of Health Sciences, Hacettepe University, Ankara, Turkey

Introduction: Obesity is associated with Type 2 diabetes, hypertension, cardiovascular diseases, obstructive sleep apnea syndrome (OSAS). In this study, it was aimed to examine body composition and some anthropometric measurements of individuals who have different OSAS classification.

Methods: This research was carried out on 105 patients (74 males, 31 females), who got diagnosed with OSAS, aged 19–64 years, in Sleep Disorders Center of Gazi University Faculty of Medicine. The classification of OSAS was done according to Apnea Hypopnea Index (AHI). The measurements of body weight, height, waist and hip circumference, neck circumference were taken and body composition was analyzed.

Results: In this study, the ratio of individuals whose BMI ≥30 kg/m² was 60.0% of patients. The percentage of obesity was found to be 48.38%, 56.67% and 70.45% in patients with mild, moderate and severe OSAS, respectively. The mean body mass index (BMI) and neck circumference (cm) values with severe OSAS were found higher than moderate OSAS in male (p < 0.05). In women, the mean waist circumferences, BMI and body fat percentages were found higher in severe OSAS than mild OSAS (p < 0.05). AH1 was correlated with fat mass (kg) in males (r=0.327) and BMI in females (r=0.505) more than the other anthropometric measurements. Oxygen saturation (SaO2) was found higher correlated with body fat percentage in males (r=0.472) and fat mass in females (r=0.717) than the other anthropometric measurements.

Conclusion: It was concluded that body composition parameters were related to OSAS. The percentage of obesity was found to be higher in individuals with OSAS. The correlation between body composition and some anthropometric measurements were seen differences according to gender and OSAS levels.
T3 – Sugar and artificial sweeteners

T3.PO.134

Rare sugar D-allulose prevents progression and development of diabetes in type 2 diabetes mellitus (T2dm) model otsuka long-evans tokushima fatty (oletf) rats

Hossain A.1, Sui L.1, Yamaguchi F.1, Kanitori K.1, Dong Y.1, Tsukamoto I.1, lida T.1

1Department of Cell Physiology, Faculty of Medicine, Kagawa University, Kagawa, Japan, 2Matsutani Chemical Industry Co., Ltd., Hyogo, Japan

Background: Prevalence of obesity has emerged as single most life-style-related health problem, mostly due to excess calorie leading to one of its complications, insulin resistance followed by concomitant increase in T2DM. To cope with increased demand of insulin pancreatic -cells become hypertrophic leading to failure followed by glucose intolerance. The situation demands age-adjusted balanced food intake.

Objectives: We introduce a zero-calorie sweet-taste monosaccharide, D-allulose, rare in nature and produced through enzymatic conversion in Kagawa University, Japan. D-allulose has been evaluated as a unique metabolic regulator of hyperglycemia and hyperlipidemia.

Methods: Treated OLETF rats fed 5% D-allulose where control OLETF and non-diabetic healthy control, LETO were fed water only. Body weight, food and drink intake were measured weekly, blood glucose and insulin monthly. Oral glucose tolerance test was performed. Liver, pancreas and other organs were preserved and stained.

Results: D-allulose controlled abdominal fat accumulation and thus prevented excess body weight increase. D-allulose improved insulin resistance through maintenance of fasting, random and OGTT blood sugar levels. It also significantly attenuated progressive β-islet fibrosis and preserved islets, evaluated by HE and Masson’s staining and immunostaining of insulin, glucagon and α-smooth muscle actin. Serum levels of pro-inflammatory and anti-inflammatory adipokines were also controlled well by D-allulose. Among several mechanisms of the activity of D-allulose against both hyperglycemia and hyperlipidemia strong anti-inflammatory activities were prominent.

Conclusion: Rare sugar D-allulose might be a promising strategy for the prevention of obesity and, commencement and prevention of T2DM.

T3.PO.135

Acute metabolic and cardiovascular responses of healthy young adults to the ingestion of galactose - the forgotten sugar

Charrrière N.1, Montani J.P.1, Dullio A.G.1

1Department of Medicine/Physiology, University of Fribourg, Fribourg, Switzerland

Background: Overconsumption of refined sugars has been implicated in the development of obesity and cardiovascular diseases, with fructose considered as a more damaging monosaccharide than glucose - in part attributed to its greater de novo lipogenic and blood pressure elevating effects. Little is known, however, concerning the metabolic and cardiovascular effects of galactose – another monosaccharide (derived from lactose). We investigated here, at rest, the extent to which blood pressure (BP), energy expenditure (EE) and respiratory quotient (RQ) in response to galactose differ from those of glucose and fructose.

Methods: In a randomized cross-over design, 12 healthy young men and women of normal BMI attended 3 separate morning sessions during which continuous cardiovascular and indirect calorimetry monitoring were performed while sitting comfortably for at least 30 min before and 150 minutes after ingestion of 500 mL of water containing 60g of either glucose, fructose or galactose.

Results: Fructose ingestion elicited significant increases in both systolic and diastolic BP (p < 0.001) compared to little or no changes in BP after ingestion of glucose or galactose. EE increased to a similar extent after each of the three sugar drinks reaching similar peak values in about an hour, but its subsequent fall towards baseline values was faster with galactose and glucose than with fructose (p < 0.05). RQ increased with all three sugars, but to a much greater extent with galactose and fructose than with glucose (p < 0.001).

Conclusion: The kinetics of postprandial changes in BP and EE in response to galactose are similar to those for glucose, while galactose-induced increase in RQ (reflecting greater carbohydrate oxidation and/or de-novo lipogenesis) is closer to that for fructose.

T3.PO.136

Effect of sweetness intensity on ad libitum intake of milkshake, appetite, and subsequent snack intake

Yin TW.1, Fisk I.D.1, Taylor M.A.1, Hewson L.1

1Department of Food Sciences, School of Biosciences, Faculty of Science, University of Nottingham, Sutton Bonington Campus, LE12 5RD, UK, 2Faculty of Medicine & Health Sciences, University of Nottingham, Queen’s Medical Centre, NG7 2UH, UK

Introduction: Overconsumption of sugar-sweetened beverages is linked to obesity. Previous studies on the effect of sweetness intensity on satiation have been conflicting. It may be that sweetness intensity and palatability were confounded in these studies. Higher sweetness may lead to faster satiation due to increased sensory exposure [1]. However, the high palatability of sweet food may trigger overeating [2]. Our primary objective is to investigate if sweetness intensity affects ad libitum intake of milkshake, while palatability is controlled. The second aim is to investigate if sweetness intensity in milkshake affects subsequent snack intake.

Methods: 26 females consumed ad libitum low, ideal, and high sweetness milkshakes (LSM, ISM and HSM) varying in the concentration of sweeteners on 3 mornings. Sweetness intensities were selected individually by subject. LSM and HSM were similarly pleasant while ISM was the most pleasant. Subjects consumed ad libitum salty and sweet snacks following the milkshake. Hunger, desire for sweet and desire for salty food was rated before and after milkshake and snack intake.

Results: After consuming milkshakes, the desire for sweet food decreased (p < 0.05) whilst the desire for salty food was unchanged. Subjects consumed more salty snacks than sweet snacks (p < 0.05). There was no significant effect of sweetness intensity on intake of milkshake or appetite ratings.

Conclusion: Sweetness intensity did not affect ad libitum intake of milkshake, appetite or subsequent snack intake, despite of similar or different palatability.

References:

T3.PO.137

Sugar-sweetened beverages and obesity among children and adolescents: A review of systematic literature reviews

Keller A.1, Bucher Della Torre S.1

1University of Applied Sciences Western Switzerland (HES-SO), School of Health, Geneva (HESGS-GE), Nutrition and Dietetics Department, Switzerland, 2Research Unit for Dietary Studies, Institute of Preventive Medicine, Bispebjerg and Frederiksberg Hospitals, Frederiksberg, Nordre Fasanvej 57, 2000 Frederiksberg, Denmark

Introduction: The prevalence of overweight and obesity among children and adolescents has increased worldwide and has reached alarming proportions. Currently, sugar-sweetened beverages (SSB) are the primary source of added sugar in the diet of children and adolescents. Contra-
dictive findings from studies and reviews have fuelled an endless debate on the role of SSBs in the development of childhood obesity. The primary aim of the present review of reviews was to assess how review-level and study-level methodological factors explain conflicting results across reviews and meta-analyses by providing an up-to-date synthesis of recent evidence regarding the association between SSB consumption and weight gain, overweight and obesity in a population of 6-month to 19–year-old children and adolescents. The secondary aim was to assess the quality of included reviews using the AMSTAR measurement tool.

Method: Systematic reviews and meta-analyses were included. The literature search was performed through the platforms Pubmed, Cinahl and Web of Knowledge.

Results: Thirteen reviews and meta-analyses were included. Nine reviews concluded that there was a direct association between SSBs and obesity in children and adolescents and four others did not. The quality of the included reviews was low to moderate and the two reviews with the highest quality scores showed discrepant results.

Conclusion: The majority of reviews concluded that there was a direct association between SSB consumption and weight gain, overweight and obesity in children and adolescents. However, recent evidence from well conducted meta-analyses shows discrepant results.

T6 – Environmental/ecological drivers

T6:PO.001

Fitness and food environments around junior high schools in Taiwan and their association with body composition: Gender differences for recreational, reading, food and beverage exposures

Chiang PH1, Huang LY1, Tsou H.C.1, Yeh H.L.1, Chang Y.C.1, Lee M.S.2, Wahlgvist M.L.1,2

1Division of Preventive Medicine and Health Services Research, Institute of Population Health Sciences, National Health Research Institutes, 35 Keyan Road, Zhunan Town, Miaoli County 350, Taiwan, ROC.
2School of Public Health, National Defense Medical Center, No.161, Sec. 6, Minchuan East Road, Taipei, Taiwan 114, ROC.

Introduction: In early adolescence personal behaviours, reproductive physiology and body composition (BC) change and the school environment may contribute. We investigated determinants of energy balance and nutritional status during child development by mapping.

Methods: The Nutritional and Health Survey in Taiwan (2010) for 1458 junior high school students was geo-mapped for 30 school environs. Facilities for physical activity (fitness centers, gymnasiums and sports stadiums, activity centers and parks), sedentary activities (reading material rental shops (RMRs), internet cafés) and food and beverage outlets were calculated as weighted numbers within 1000 m of schools. Multiple linear regressions were used to predict BC variable z-scores.

Results: For boys, higher fitness center densities and, for girls, gymnasium and sports stadiums were associated with less abdominal fatness. For girls, body mass index, waist circumference (WC) and triceps skinfold thickness (TSF) were greater when RMRs density was higher as was TSF with internet café density. Where there were no food and beverage outlets, boys’ WC and TSF were less with more parks, but girls were shorter and WC more adverse. With greater RMRs density and no FBOs, girls still had increased WC/TSF ratio, and less mid-arm muscle circumference. Boys’ findings were more evident after considering puberty.

Conclusion: Physical activity facilities in school environments favour healthier adolescent body composition, but differently for boys and girls. Food and beverage outlet absence increases the likelihood of healthier BC for boys.

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T6:PO.002

Association between obesity in a social context and autism and other neurodevelopmental disorders

Yamazaki T1, Tajima K.1, Sokejima S.1

1Epidemiology Centre for Disease Control and Prevention, Mie University Hospital, Japan

Background: Several studies reported risk factors for autism and other neurodevelopmental disorders (AND) in children, such as maternal smoking, age and metabolic condition. However, other risk factors, particularly impacts of social determinants on AND remain unclear. We therefore examined the association between obesity at community level and AND in children.

Methods: We conducted a cross-sectional study in 2014, which recruited citizens aged 20 years or older of two towns in central Japan. A self-administered questionnaire was used to assess possible confounding factors such as age, body mass index (BMI), smoking habit and household income. A composite outcome of AND was used, which consists of their children’s history of pervasive developmental and other three neurodevelopmental disorders. To adjust for demographic and possible confounding factors and to investigate the contextual effect of obesity at the community level, a mixed-effects logistic regression model was performed. Mean BMI in each dwelling area was entered into the model as a random effect.

Results: 5,272 female who had at least one child were included. Individuals with missing data or outliers of age and BMI were excluded. Finally, 5,095 female were analysed. Prevalence of AND was estimated as 1.4%. In the final model, maternal age was associated with AND. However, the other individual factors and mean BMI at the community level were not associated.

Conclusion: In the cohort, we did not find any association between obesity at the community level and AND in children. However, we would need to conduct further investigation into impact of social determinants on neurodevelopmental disorders like other diseases.

T6:PO.003

Urinary phthalate metabolites are associated with insulin resistance in obese subjects

Dirinck E1, Durtu A.C.1, Geens T1, Cavaci A1, Van Gaal L1, Jorens P.1

1Department of Endocrinology, Diabetology and Metabolism, Antwerp University Hospital, Edegem, Belgium, University of Antwerp, Antwerp, Belgium,
2Toxicology Centre, University of Antwerp, Antwerp, Belgium,
3Department of Clinical Pharmacology, Antwerp University Hospital, Edegem, Belgium, University of Antwerp, Antwerp, Belgium

Introduction: Commonly used chemicals such as phthalates have come under scrutiny for their potential causative role in type 2 diabetes development.

Methods: 123 obese subjects were recruited. Data were collected on physical activity level (PAL), medication use and smoking. Body mass index (BMI), 24-hour urine collection, a fasting blood sample and an OGTT were obtained. Several fasting and OGTT based estimates of insulin resistance and beta-cell function were calculated. Analysis of 10 major phthalate metabolites (PM) was performed. The relationship between PM and estimates of insulin resistance and beta-cell function was assessed using regression analysis, the first adjusting for gender, the second adjusting for gender, age, PAL, smoking, medication use and BMI.

Results: Ten participants were diagnosed with type 2 diabetes, 50 individuals had abnormal glucose tolerance. Mean age was 41 and mean BMI was 38.7 kg/m2. Both gender and multiple adjusted regression analyses indicated several PMs as significantly associated with the Belfiore Index. 1 PM was significantly associated with HOmA-IR in the multiple adjusted model. Several PMs were significantly associated with the Matsuda index, however only in the multiple adjusted model.
Conclusion: Phthalate levels are associated with markers of increased insulin resistance and decreased insulin sensitivity in an overweight and obese population.

References:

T6:PO.004
Environmental xenoestrogens contribute to inflammation and cardiometabolic risk during obesity in pre-menopausal women

1Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Portugal,
2Department of Biochemistry, Faculty of Medicine, University of Porto, Porto, Portugal,
3CENTES – Center for Research in Health Technologies and Information Systems, Porto, Portugal,
4Health Information and Decision Sciences Department, Faculty of Medicine, University of Porto, Porto, Portugal,
5REQUIMTE – Instituto Superior de Engenharia, Instituto Politécnico do Porto, University of Porto, Porto, Portugal,
6General Surgery Department, Oporto Hospital Center, Porto, Portugal,
7Department of Endocrinology, Diabetes and Metabolism, S. João Hospital, Faculty of Medicine, University of Porto, Porto, Portugal,
8General Surgery Department, Pedro Hispano Hospital, Faculty of Medicine, University of Porto, Porto, Portugal.

Introduction: Xenoestrogens (XEs) exposure have recently emerged as a risk factors for obesity and cardiovascular disease. In this regard, we investigate the levels of XEs in plasma and AT depots in a sample of pre- and postmenopausal obese women and their cardiometabolic impact in an obese state.

Methods: We evaluated XE levels in plasma and visceral (v) and subcutaneous (sc) adipose tissue (AT) samples of Portuguese obese women undergoing bariatric surgery. Association with metabolic parameters and 10-year cardiovascular disease (CVD) risk was assessed, according to menopausal status (73 pre- and 48 postmenopausal). Levels of XEs were determined by gas chromatography. Anthropometric and biochemical data were collected prior to surgery.

Results: There was a different distribution of XEs among the three analyzed locations according to menopausal status. Furthermore, in pre-menopausal women, there was a positive correlation between XEs levels and metabolic and inflammatory parameters, namely HbA1c and the count of plasma monocytes with vAT XEs levels, and more important-ly XE levels in plasma seem to predict CVD risk.

Conclusions: Our findings suggest that XEs exposure/accumulation/burden and not obesity per se may contribute to increase CVD risk and inflammation especially in premenopausal women, and thus these chemicals may have a potential role in the later development of cardiometabolic disease in obese women.

Acknowledgement: This work was supported by FCT (Fundo Social Europeu, Programa Operacional Potencial Humano da EU (POPH); PT1-PET-01034/2011; SFRH/BD/64691/2009, SFRH/BPD/75294/2010, SFRH/BD/93073/2013), and Projetos de Investigação na Pré-graduação 2011, Universidade do Porto (IIPJ).

T6:PO.005
Engendering positive partnerships with industry to address obesity: A framework for collaboration.

M. Binks.
Texas Tech University, Lubbock, TX, USA.

As obesity continues to dominate public health discussions we are mired in an era of conflict and blame that does nothing to serve public health. If we are to solve the obesity epidemic worldwide, adversarial relationships with industry, particularly the food and beverage industry, must be set aside and we must identify ways to successfully engender collaboration. By doing so we will leverage resources from all possible constituencies who are interested in contributing to being part of the solution. If we are to address the obesity epidemic effectively we must engage in thoughtful scientific appraisal and develop sound evidence-based approaches to positively impact energy balance (i.e. improving the nutrition and physical activity environments) and for identifying safe and effective interventions to achieve this both at the population and individual level. Unfortunately, efforts to build effective industry-academic-public health partnerships in nutrition and obesity research are often met with emotional hyperbole and efforts to find common ground are met with interference and opposition. Increasingly both in the public and professional domains we have seen otherwise well-conducted research, involving fully transparent and appropriate funding, rejected out-of-hand based solely on the source of that funding, with no evidence whatsoever of misconduct. This must stop if we are to move forward. In this presentation, we will address how decades of experience and success in other sectors can inform our engagement with the food and beverage industry to allow meaningful scientific discovery to occur and effective public health strategies to be implemented and tested within a collaborative and transparent framework. Guidelines to promote ethical industry/academic partnerships that can expand our scientific knowledge and improve public health will be discussed and relevant research and policy papers discussed.

T6:PO.006
Weight Stigma “gets under the skin” – evidence for an adapted psychological mediation framework – a systematic review

1IBF Adiposity Diseases, Leipzig University Medical Center, Leipzig, Germany,
2Institute of Social Medicine, Occupational Health and Public Health, University of Leipzig, Leipzig, Germany,
3Mailman School of Public Health, Department of Epidemiology, Columbia University, New York City, USA,
4LIFE - Leipzig Research Center for Civilization Diseases, University of Leipzig, Leipzig, Germany

Objective: Research consistently shows a negative view of individuals with obesity in the general public and in various other settings. Stigma and discrimination can be considered a chronic stressor as these factors have a profound impact on the psychological well-being of the affected individuals. This article proposes a framework that entails a mediation of the adverse effects of discrimination and stigmatization on mental well-being through elevated psychological risk factors that are not unique to weight but that could affect overweight and normal weight individuals alike.

Methods: A systematic research was conducted to assess the prevalence of psychological risk factors, such as self-esteem and coping, in individuals with obesity.

Results: 46 articles were assessed and included for detailed analysis. The number of studies on these topics is limited to certain dimensions of psychological processes. The best evaluated association of obesity and psy-
choosocial aspects is seen for self-esteem. Most studies establish a negative association of weight and self-esteem in children and adults. All studies with mediation analysis find a positive mediation through psychological risk factors on mental health outcomes. 

**Conclusions:** This review shows that elevated psychological risk factors are present in individuals with obesity and that they may be a mediator between weight discrimination and pathopsychological outcomes.

**Acknowledgement:** This work was supported by a fellowship within the Post-doc-Program of the German Academic Exchange Service (DAAD) and by the Federal Ministry of Education and Research (BMBF), Germany, FKZ: 01EO1001. We would also like to thank Mark Hatzenbuehler for his valuable comments and advice in drafting this manuscript.

**T6.P0.007**

**The influence of weight-related teasing and non-normative eating behaviors on weight loss maintenance**

Hübner C.1, Baldofski S.1, de Zwaan M.2, Hilbert A.1

1Leipzig University Medical Center, Integrated Research and Treatment Center Adiposity Diseases, Leipzig, Germany, 
2Hannover Medical School, Department of Psychosomatic Medicine and Psychotherapy, Hannover, Germany

**Introduction:** Weight-related teasing (WRT) during childhood and adolescence is associated with non-normative eating behaviors of which a negative relationship with weight loss maintenance is well-documented. Due to the lack of longitudinal studies investigating the predictive value of WRT and non-normative eating behaviors, the present study aimed to prospectively examine the influence of WRT on weight loss maintenance as well as the role of non-normative eating behaviors as possible mediators of this relationship.

**Methods:** The sample consisted of N = 381 participants of the German Weight Control Registry who had lost at least 10% of their maximum weight and had maintained the reduced weight for at least one year. Participants' WRT during childhood and adolescence, their current eating behavior, and the change of their body mass index (BMI) across two years were assessed. Structural equation modeling was used to analyze the assumed mediational relationship.

**Results:** After controlling for age and sex, a greater effect of WRT during childhood and adolescence predicted more frequent restrained, external, and emotional eating. Emotional eating in turn predicted a smaller decrease or a greater increase of BMI and fully mediated the direct relationship between the effect of WRT and change of BMI. Fit-indices indicated good model-fit.

**Conclusion:** Weight loss maintenance is less favorable in individuals who had suffered from WRT during childhood and adolescence, especially when more frequent emotional eating is reported. Results underline the influence of WRT on non-normative eating behaviors, however, only emotional eating adds to the prediction of weight loss maintenance. Thus, results highlight the importance of interventions for the reduction of WRT and emotional eating.

**T6.P0.008**

**Dieticians and stigma in the context of obesity- a systematic review**

Juna E.1, Sikorski C.1,2, Wiemers N.1, Riedel-Heller S.1

1Institute of Social Medicine, Occupational Health and Public Health, University of Leipzig, Leipzig, Germany, 
2Leipzig University Medical Center, IBF Adiposity Diseases, Leipzig, Germany

**Background:** Recently, many studies examined negative prejudice of health care professionals towards people with obesity. Only a few studies focus on diabetics and nutritionists. The aim of this article is to provide a systematic review on the current state of quantitative research on weight-related stigma by diabetics and nutritionists.

**Methods:** A systematic literature review was conducted using Pubmed, Psycinfo, Web of Science and Cochrane Library. Only studies that investigated the attitude of diabetics towards people with obesity were included. Studies investigating other health care professionals, reviews or qualitative studies were excluded.

**Results:** Eight studies were found. Studies differ in terms of study characteristics (e.g. sample size), measuring instruments or scales (implicit vs. explicit) and the origin of the sample. Five studies clearly report prejudice by nutritionists towards people with obesity or overweight. Causes of obesity according to diabetics' beliefs were also investigated, indicating, that there is a defined preference for internal factors (such as lack of willpower or overeating) rather than genetic or biological causes.

**Conclusions:** Results of studies in dieticians are not as homogenous compared to other health care professional groups. The degree of negative attitudes towards people with obesity has been found to be slightly less pronounced. However, the current review outlines that this type of stigma is by all means relevant, especially when looking at diabetics' beliefs of what triggers overweight and obesity.

**Acknowledgement:** This work was supported by the Federal Ministry of Education and Research (BMBF), Germany, FKZ: 01EO1001, and by a junior research grant by the Medical Faculty, University of Leipzig.
lic health campaigns targeting obesity-related themes have been discussed as a source of WB due to reinforcing stigmatizing notions. The present study examined whether health messages influence explicit and implicit WB.

Methods: In a randomized-controlled study, one hundred thirty-nine participants from the community were assigned to an experimental group (EG) or a control group (CG). Participants in the EG were presented with health related messages and participants in the CG were presented with neutral information. Measures of explicit and implicit WB were completed before and after manipulation.

Results: In the EG but not in the CG, paired samples t tests showed a medium effect increase of explicit WB and a medium effect decrease of implicit WB.

Conclusion: We provided first evidence that brief exposure to health related messages might have the potential to change WB. Dual-model approaches postulated two independent information processing systems, thus, health messages might have differentially affected measures of explicit and implicit WB. While emphasizing deliberative processes, health messages simultaneously activated automatically associative processes. Hence, obesity-related health messages might contribute to both health behavior and the pervasiveness of WB.

Acknowledgement: Research relating to this abstract was funded by grant 01EO1001 from the Federal Ministry of Education and Research (BMBF), Germany.

T6:PO.011

Emotional and behavioural responses to perceived weight discrimination before and after substantial weight loss

Stubs R.1,2, Greenwood L.1, Caven J.1, Morris L.1
1Slimming World, Alfreton, UK, DE55 4RF,
2College of Life and Natural Sciences, University of Derby, UK, DE22 1GB

Introduction. This study examined experience of weight stigma and discrimination in 2573 people participating in the Slimming World programme who had attended for a mean (SD) of 16.6 (24.7) months, lost 20.1 (14.0) kg in weight and were trying to maintain their weight loss.

Methods: Subjects were questioned about (i) duration of attendance and weight change (ii) their experience of discrimination and stigma before and after losing weight, (iii) their emotional response to this experience, (iv) the impact it had on attempts to control their weight and (v) the impact it had on their ability to manage their weight.

Results: At their heaviest 40% of participants reported experiencing judgment, criticism or humiliation at least once per week. Incidents of perceived discrimination left recipients feeling ashamed (47%), depressed (41%) and useless (30%). In response to weight discrimination 65% turned to food for comfort while only 2% made long-term lifestyle changes. When asked, 63% of respondents reported gaining weight over time since they were first treated unkindly because of their size. Respondents said that since losing weight they were now more likely to be acknowledged by strangers with a smile (61%), eye contact (54%), a compliment (49%), a hello (43%) and a conversation (41%).

Conclusion: In people with significant weight to lose, perceived weight discrimination can cause emotional distress, which undermines weight control behaviours. Losing weight reduces experience of weight discrimination and we hypothesise that reducing stigma may actually facilitate weight management behaviours.

T6:PO.012

A human rights approach to childhood obesity

O Cathaoir K.E.1
1Faculty of Law, University of Copenhagen, Copenhagen, Denmark

Lessons from HIV/AIDS can be applied to obesity Introduction: Childhood obesity is primarily considered an issue of public health or individual responsibility. It has been given limited consideration as a human rights concern. However, given human rights’ application to the HIV/AIDS, it is suggested that human rights norms should be explored in order to avoid stigmatization and boost access to healthcare.

Methods: An examination of the United Nations’ recommendations to states on a human rights approach to HIV/AIDS is conducted. General principles that may have application to obesity treatment and prevention are distilled.

Results: Although HIV/AIDS and obesity are different, there are a number of general principles that could be given consideration in state responses to obesity. The recommendations include identifying and addressing discrimination, securing children’s participation in decisions affecting them, ensuring access to age appropriate information, and access to healthcare that is adequate, accessible, acceptable and quality. Furthermore, states should adopt child centred national action plans, allocate appropriate resources and gather data disaggregated by gender, region and socioeconomic considerations.

Conclusion: Although HIV/AIDS and obesity are different, the approach suggested warrants consideration. In light of the evidence of stigma and discrimination of persons with obesity, human rights principles should be given consideration in state interventions in childhood obesity. States should include these principles in action plans and outreach in order to avoid doing harm through their efforts to prevent obesity. Furthermore, states should contribute to the knowledge on childhood obesity by gathering disaggregated data in a rights compliant manner.

T6:PO.013

Obesity in childhood is associated with a much lower degree of education

Hagman E.1, Danielsson R.1, Brandt L.2, Ekholm A.2, Marcus C.1
1Department of Clinical Science Intervention and Technology, Karolinska Institutet, Sweden,
2Department of Medicine, Karolinska Institutet, Sweden

Introduction: Obesity in childhood may predispose to poor psychosocial health. Here we have investigated if the completion of secondary school (9 years) and upper secondary school (13+ years) is lower in children who have been treated for obesity than in matched controls.

Methods: 1061 Individuals from the Swedish childhood obesity treatment registry, BORIS (www.e-boris.se) were selected. Inclusion criteria: ≥20 years of age at follow-up. Exclusion criteria: Mental retardation. BMI SDS, median (IQR), was 3.36 (1.11), age at last visit was 17.1 (2.7). Mean(SD) time from last visit to follow-up was 6.3 (3.0) years. 778 individuals, matched for gender, age and living area, were randomly selected as controls. They were linked to the national education registry. Level of education at follow-up was divided into: 1 = not graduated from secondary school, 2 = graduated from secondary school, but not started upper secondary school, 3 = started but not graduated from upper secondary school, 4 = graduated from upper secondary school.

Results: The proportion of school completers was much lower among obese cases compared with matched controls (Table 1). No differences in ethnicity between cases and controls were observed (p = 0.09). Being non-Swedish, was associated with a lower degree of graduating from upper secondary school among the controls (p < 0.001), but not among the cases (p = 0.09). Being a women increased the chance of graduating upper secondary school among both cases (p = 0.006) and controls (p < 0.0001).

Conclusion: Obesity in childhood is associated with a severely lower educational level. The differences between the groups do not seem to depend upon gender, ethnicity or socioeconomic status based on living area.
Table 1. Completion of educational level.

<table>
<thead>
<tr>
<th>Educational Level (see Methods)</th>
<th>Control n (%)</th>
<th>Case n (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26 (0.3)</td>
<td>14 (0.9)</td>
<td>0.06</td>
</tr>
<tr>
<td>2</td>
<td>926 (11.9)</td>
<td>390 (24.4)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>3</td>
<td>931 (12.0)</td>
<td>300 (18.7)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>4</td>
<td>5897 (75.8)</td>
<td>897 (56.0)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Total</td>
<td>7780</td>
<td>1601</td>
<td></td>
</tr>
</tbody>
</table>

Tab. 1.

T6 – Inequalities/Cultural variation

T6:PO.014

Regional inequalities in overweight and obesity among first-time pregnant women in Sweden, 1992–2010

Chaparro M.P.1, Jarvisson A.2, Koupidi3, Nilsson K.4, Häggström J.4, de Luna X.1, Lindgren U.2

1Centre for Health Equity Studies (CHESS), Stockholm University & Karolinska Institutet,
2Department of Epidemiology and Global Health, Umeå University,
3Department of Sociology, Umeå University,
4Department of Statistics, USBE, Umeå University,
5Department of Geography and Economic History, Umeå University

Introduction: Overweight and obesity are on the rise in Sweden but regional variations and time-trends are underexplored. Pre-pregnancy weight status has implications for pregnancy outcomes and can influence later health of the mother and offspring.

Methods: Using weight and height data on pregnant women from the Swedish Medical Birth Register (≥18 years, 8–12 weeks of gestation, first pregnancy only), age-standardized prevalence of pre-pregnancy overweight/obesity (BMI ≥ 25 kg/m²) and obesity (BMI ≥ 30 kg/m²) were estimated for each Swedish county for the years 1992, 2000 and 2010 (N=116,122). Maps were created using ArcMap v10.2.2 to display regional variations over time and logistic regression analyses used to assess if the observed trends were significant.

Results: The prevalence of overweight/obesity and obesity among pregnant women increased significantly between 1992 and 2010 in all Swedish counties. In 2010, Södermanland and Gotland exhibited the highest age-standardized overweight/obesity (40%) and obesity (15%), respectively. Västerbotten had the sharpest increase (75%) in overweight/obesity prevalence and obesity prevalence nearlytripled in Gotland between 1992 and 2010. Stockholm County had the lowest prevalence of overweight/obesity (26% in 2010) and obesity (7% in 2010) across years.

Conclusion: Regional inequalities in overweight and obesity prevalence are apparent in Sweden with Stockholm, the capital, displaying an advantage with the lowest prevalence. Further research should elucidate the reasons behind such disparities.

T6:PO.015

Extreme obesity and youth unemployment: Evaluation of a structured approach of care to facilitate access to bariatric surgery

Mühlig V.1, Hebebrand J.1

1Department of Child and Adolescence Psychiatry and Psychotherapy, LVR-Klinikum Essen, University Duisburg-Essen

Introduction: Adolescent obesity entails a high risk of somatic and psychiatric comorbidities. Additionally, especially extreme obesity often impedes with social and vocational integration. For several reasons, socio-economically disadvantaged individuals have limited access to available obesity treatment options, including bariatric surgery. In our pilot study we aimed to capture the rate of unemployed adolescents with extreme obesity willing to participate in a structured program to potentially enable bariatric surgery.

Methods: Unemployed adolescents (14.0–24.9 years) with obesity (BMI ≥ 30 kg/m²) were offered to participate at a group intervention on the premises of a local job center. We applied standardized questionnaires to assess health-related quality of life (DISABKIDS), depression (BDI-II), self-esteem (Rosenberg-Scale) and social anxiety (SASKO).

Results: Over the 18-months recruitment period of our pilot study, 80 eligible adolescents were identified by their case managers; of these 53 attended the initial appointment. 34 adolescents (mean BMI (SD) = 45.59 (6.29)) consented to participate. We found clinically relevant depressive symptoms in 33% and symptoms of social anxiety in 60% of the sample. Six participants were eligible for bariatric surgery and directed to a local competence network for an individual assessment of indication.

Conclusion: The preliminary results are promising with regard to the proportion of unemployed adolescents with extreme obesity who benefited from our treatment program. To evaluate the efficacy of such a program, longitudinal data concerning health and vocational perspective are required. Furthermore, the feasibility of this approach needs to be assessed in a larger model region encompassing more than one job center.

Acknowledgement: This study was supported by the German Federal Ministry of Education and Research and was integrated within the German Competence Network Obesity (Consortium “Youth with Extreme Obesity”).

T6:PO.016

Health inequalities in energy balance-related behaviours among schoolchildren across in Europe: Baseline results of the “EPODE for the Promotion of Health Equity” (EPHE) project.

Mantzi K.1, Vassilopoulos A.1, Radulian G.2, Borys J.3, Gregorio M.3, Graca P.4, De Henauw S.4, Andjelic J.5, Visscher T.6, Seiell J.6

1U University of Amsterdam, The Netherlands,
2Agricultural University of Athens, Greece,
3University of Medicine and Pharmacy Bucharest, Romania,
4Proteines, France,
5University of Porto, Portugal,
6Directorate General of Health, Portugal,
7Ghent University, Belgium,
8BASORD, Bulgaria,
9Windesheim, Netherlands

Background: Tackling inequalities in overweight and obesity has become a top priority for the European research and policy agendas. It is well-known that such inequalities accumulate from early childhood onward, although they have not been studied extensively in children. This study is part of the EPHE project, the overall aim of which is to assess the impact and sustainability of the EPODE methodology to reduce health inequalities in childhood obesity. The current data are the results of an explorative analysis to identify inequalities in behaviours and determinants between groups with high and low socio-economic status.

Methods: 1266 children aged 6–8 years and their parents, from different socio-economic backgrounds, were recruited in 7 countries. To measure the energy balance-related behaviours of the children and their determinants, a questionnaire was addressed to the parents. The Mann-Whitney U test and Pearson’s χ² test were used to test differences between the socio-economic groups.

Results: Children of relatively low socio-economic status consumed fruits and vegetables less frequently, had higher intake of fruit juices and/or soft drinks and higher screen time than their peers of high socio-economic status. Parental rules and home availability were consistently different between the socio-economic groups in all communities. However a common pattern for all behaviours was not found and the variability across the countries was large.

Abstracts

Obesity Facts 2015;8(suppl 1):1–247

119
Conclusions: This study shows socio-economic inequalities in children’s behaviours and parental determinants. These baseline results have been used to tailor community-based intervention of the EPODE programmes. The impact is measured in a second evaluation and first results will be available by the time of the congress.

T6 – Consumer perspectives

T6:PO.017
Perceptions and participation in physical activity and pe in uk primary schools
Potter J.A.1, Everley S.C.1
1Department of Physical Education, University of Chichester, Chichester, UK.

Introduction: The importance of children in engaging in physical activity and understanding its role in healthy weight healthy lives is well-established. This paper will compare genders and year groups for perspectives, knowledge and activity levels.

Methods: 81 pupils from 2 primary schools wore accelerometers for 5 days during the 6 hours of the school day, drew pictures of them being active, followed by interview and completed knowledge and perspective questions on health and physical activity.

Results: Findings indicate differences in, activity levels, choices, perceptions and understanding around healthy activity, PE and sport. Boys were significantly more active than girls and there were difference in activity between years. The groups described activity and physical education differently, for example year 5 boys were more likely to identify physical activity as sport and exercise, but were more likely to be correct in the recommended levels of activity required to stay healthy. Girls perceived themselves as active but not necessarily healthy whereas boys married the two.

Conclusion: There is a great deal more knowledge and insight needed with regards to the opportunities within school for health-inducing activities and understanding its role in healthy weight healthy lives is well-established. This paper will compare genders and year groups for perspectives, knowledge and activity levels.

Acknowledgement: The authors would like to acknowledge the invaluable assistance of the recording team at the Malta Broadcasting Authority.

T7 – Lifecourse perspective

T7:PO.001
Predicting metabolic syndrome in mid-adulthood from body mass index and skinfold thickness values in childhood
Raskiliene A.1, Petkeviciene J.1, Klumbiene J.1, Kriaucionien V.1
1Institute of Health Research, Faculty of Public Health, Medical Academy, Lithuanian University of Health Sciences, Kaunas, Lithuania

Introduction: Several studies demonstrated the association between childhood weight status and metabolic syndrome (MS) in adults. However, is still unclear whether the observed associations reflect the tracking of body mass index (BMI) from childhood to adulthood or whether childhood adiposity has an independent effect on risk of MS. This study aimed to examine the effect of childhood BMI and skinfold thickness in prediction of MS in adults controlling for BMI gain from childhood to adulthood.

Methods: The study subjects were participants of the Kaunas Cardiovascular Risk Cohort study that started in 1977. A random sample of Kaunas schoolchildren born in 1964 was examined in the first survey. In 2012, a total of 507 subjects (63.9% of eligible sample) participated in the 35-year follow-up survey being 48–49 years old. In childhood, height, weight, subscapular and triceps skinfold thickness measurements were taken. The follow-up health examination involved measurements of BMI, waist circumference, blood pressure, glucose and lipids levels. Logistic regression models were fitted to assess the associations of childhood BMI and skinfold thickness as well as BMI gain with MS in middle age.

Results: BMI in childhood predicted development of central obesity (OR=1.2; 95% CI=1.1–1.3) and MS (OR=1.2; 95% CI=1.1–1.2) in adulthood. The sum of subscapular and triceps skinfold thickness measurements were taken. The follow-up health examination involved measurements of BMI, waist circumference, blood pressure, glucose and lipids levels. Logistic regression models were fitted to assess the associations of childhood BMI and skinfold thickness as well as BMI gain from childhood to childhood did not diminish the effect of childhood anthropometric measurements for the prediction of MS.

Conclusion: Risk of MS may be affected by childhood BMI and skinfold thickness, irrespective of BMI gain from childhood to adulthood.
Introduction: Few studies have explored psychological wellbeing and association of body mass index (BMI) in children as young as 6–9 years old. The purpose of this study was to describe the association of psychological well-being (dieting behaviours and body image perception) and BMI in primary school children from Year 2 (age 6–7 years) and Year 4 (age 8–9 years).

Methods: Baseline measurements are of 301 pupils (52% boys) from 8 primary schools in Northern England participating in the Phunky Foods feasibility study. Psychological well-being was measured using the Body Shape Perception Scale and the Measure of Dieting Behaviours (modified version of the Dutch Eating Behaviour Questionnaire). Fixed effects models were used to explore the association between BMI and psychological well-being, adjusting for gender and year group.

Results: Children categorised as overweight (85th to 95th percentile) or obese (≥95th percentile) using WHO BMI Growth Charts had higher body shape dissatisfaction scores than normal weight children (p < 0.0001) and girls had higher scores than boys (p = 0.03). Higher dietary restraint scores were observed in obese compared to normal weight children (p < 0.0001) and in Year 2 compared to Year 4 pupils (p = 0.002).

Conclusion: The results suggested that body shape dissatisfaction may begin in children, as young as 6–7 years old, and there is an association with increased BMI. Obesity prevention programmes need to ensure that psychological-wellbeing is not compromised and further research should be conducted on how interventions can help improve psychological well-being in this age group.

Acknowledgement: This project was funded by Purely Nutrition and Nestle Healthy Kids Network UK.

Correlations of BMI with handgrip strength, body composition, anthropometry, physical performance and inflammation markers in (pre)frail community-dwelling persons

Luger E.1,2, Haider S.3, Kapan A.1, Schindler K.E.2, Lackinger C.1, Dorner T.E.1

1Centre for Public Health, Institute of Social Medicine, Medical University of Vienna, 2Department of Internal Medicine III, Medical University Vienna, Vienna, Vienna, Austria, 3Sportunion Oesterreich, Vienna, Austria

Introduction: In European countries, the prevalence of frailty and prefraility is about 17% and 42%, respectively. The aim of the study was to investigate the association between handgrip strength, body composition, anthropometry, physical performance and inflammation markers among the BMI of (pre)frail community-dwelling persons.

Methods: Frailty status (SHARE-FI2), handgrip strength (dynamometer), physical performance (SPPB3), anthropometry, body composition (BIA) and inflammation markers (leucocytes, CRP, IL-6) were assessed in (pre) frail community-dwelling (≥65 years) persons in Vienna, Austria. Fat free mass index (FFMI), fat mass index (FMI) and relative handgrip strength were height-normalised indices (kg/m²). The statistical correlations were assessed using the Spearman’s correlation coefficient.

Results: 85 (pre)frail persons [15% men; 83(8) years; BMI of 27.3(4.5) kg/m²] were analysed. According to the WHO criteria 33% were normal weight, 43% overweight and 24% obese. There were significant correlations between BMI and age (r=−0.41; p = 0.001), relative handgrip strength (r=−0.22; p = 0.005), FFMI (r=0.71; p = 0.001), FMI (r=0.86; p = 0.001), abdominal girth (r=−0.70; p = 0.001), mid arm circumference (r=0.75; p = 0.001), calf circumference (r=0.45; p = 0.001), leucocytes (r=0.19; p = 0.001), CRP (r=0.39; p = 0.02), and IL-6 (r=0.23; p = 0.001).

Conclusion: The BMI correlates significantly with age, handgrip strength, fat free mass and fat mass index, anthropometry and inflammation markers but not with physical performance.

References:

Waist circumference at 13 years and systolic blood pressure at 21 years of age: A direct or indirect effect? - A path analysis application.

Araújo J.1,2, Severo M.1,2, Barros H.1,2, Ramos E.1,2

1EPIUnit – Institute of Public Health, University of Porto, Porto, Portugal, 2Department of Clinical Epidemiology, Predictive Medicine and Public Health, University of Porto Medical School, Porto, Portugal

Objective: To study if the prospective association between waist circumference (WC) in adolescence and systolic blood pressure (SBP) in adulthood is direct or indirect through the tracking of these variables.

Methods: We analysed data from 1109 adolescents evaluated at 13, 17 and 21 years of age under the EPITeen cohort (Porto, Portugal). Sample z-scores were calculated for both WC (sex-age-specific) and SBP (sex-, age-, and height-specific). Path analysis was used to evaluate the relationships between WC and SBP, using the data collected at 13, 17 and 21 years of age. Models were stratified by sex and results are presented as correlations, r (p-value).

Results: The total effect of WC at 13y on SBP at 21y was r=0.148 (<0.001) for females and r=0.169 (<0.001) for males. Path analysis showed that this association was mainly mediated by the tracking of WC across age: the path representing this tracking (WC13 to WC17 to WC21 to SBP21) presented a correlation of 0.159 in females and 0.184 in males, while the path representing the SBP tracking (WC13 to SBP13 to SBP17 to SBP21) was much weaker (r=0.085 for females and r=0.067 for males). Non-significant correlations were found for the longitudinal associations (WC13 to SBP17 and WC17 to SBP21). We also tested the direct association between WC at 13y and SBP at 21 years, but it was not statistically significant and did not improve the goodness-of-fit of the path model.

Conclusion: Our results from a path analysis shows that the positive association found between WC in adolescence and SBP in early adulthood is mainly explained by the tracking of WC during this period, suggesting that a causal relationship might happen earlier than 13y.
T7 – Population trends (European comparison)

T7.PO.005
Rapid increase of obesity prevalence in young adults among Koreans

Kwon K.Y.1,2, Park H.S.1,3, Kim S.H.4
1Department of Family Medicine, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea
2Department of Pediatrics, Haukeland University Hospital, Bergen, Norway, 3Department of Clinical Science, University of Bergen, Bergen, Norway, 4Department of Pediatrics, Stavanger University Hospital, Bergen, Norway

Background: It is well-known that obesity increases socio-economic loss of regional communities as well as individual health problem. Globally, prevalence of obesity has been increasing and the obesity was expanding more rapidly in developing countries than developed countries. In the present study, we investigated the trend and prevalence of obesity in Korea, one of the developing countries in Asia, through Korean National Health and Nutritional Examination Survey(KNHANES).

Methods: We performed cross-sectional analysis using KNHANES data from 1998 to 2012 over five time periods. Total 54,008 persons (men:23,357 and women:30,651) whose demographic data such as BMI (Body mass index) or estimated weight and height were participated into study. The study population was classified into three groups according to age (20–39, 40–59, and 60–79yr). All subjects also divided into five groups by BMI and obesity is defined as BMI ≥30.0 kg/m².

Results: The prevalence of obesity increased from 2.38% to 4.50% between the first (1998) and fifth (2010–2012) survey. Compared to survey in 1998, the odds ratio (OR) of obesity in 2010–2012 was 2.37 in men and 1.67 in women at the same age group. The risk of obesity more rapidly increases in young adult group (20–39yr) than that in other age groups.

T7.PO.006
Prevalence of overweight and obesity at children and adolescents – data from electronic databases GPCY

Stritecka H.1, Zmrzla H.1,2, Marinov Z.1
1University of Defence, Faculty of Military Health Sciences, Department of Military Internal Medicine and Military Hygiene, Hradec Kralove, Czech Republic, 2Svitavska hospital Inc., The children’s department, Svitavy, Czech Republic, 3Outpatient Clinic for the Treatment of Child Obesity, University Hospital Prague Motol, Prague, Czech Republic

Introducing: Czech Republic through nationwide anthropological surveys (CAV), which were organized in every ten years from 1951 to 2001, had world-unique tradition in the collection and evaluation of anthropometric data paediatric population. However, in 2011 this tradition was interrupted. The aim: Evaluate anthropometric data from electronic databases practitioners for children and young (GPCY). To evaluate changes in the prevalence of overweight and obesity in the child population in 2011 Group: Of the 8 randomly registered offices of primary care paediatricians were selected data from children who meet the conditions for regular preventive medical examination for fixed age (the age ± 2 months). Was evaluated data from 9507 children (girls: 4808 boys: 4699) aged 3–17 (19) years. In each age group (3.5, 7, 9, 11, 13, 15, 17) years were 632–708 children, only in the highest (19) years, only 174.

Methods: The obtained values of anthropometric parameters (height, weight) were processed by assessing software evaluated physical growth of a child under the CAV 1991 “RustCZ 2.3”.

Conclusion: In offices GPCY is currently registered by age group 24% of children with overweight, 14% with obesity and 4% with severely obesity. Obese and overweight children form the second largest group of chronic disease, immediately after group of children with allergic diseases. Maximum for girls (23.8%) overweight were at age 11, (13.5%) obesity at age 13. For boys maximum (25.9%) overweight were at age 13 and (15.9%) obesity at age 11. The ration of obesity on overweight prevailed 57%. Seriousness of obesity significantly increased. Till third of obese children had a morbid degree of obesity with maximum incidence of 4.4% in adolescence.
Excluding overweight and obese children had only a minor impact on the growth curves with largest difference in mean height SDS –0.09 in the Belgian and –0.12 in the Norwegian sample with a corresponding increase of up to 0.5% and 1.2% in number of children above +2 SD.

Conclusion: Current Belgian and Norwegian growth references for length/height were found largely unaffected by the current proportion of overweight and obese children.

T7:PO.008
**Weight status and blood pressure (bp) in pre-school children**


1Social and Health Care Research Center, University of Castilla-La Mancha, Spain

Introduction: The relationship between BP and excess body weight has consistently been recognized in adolescents and adults, but the evidence of this association at early ages is scarce and controversial. The aim of this study was to examine the association of weight status and BP among children aged 4 to 6 years.

Methods: Cross-sectional study including all the children aged 4–6 years from 21 primary schools of Castilla-La Mancha region, Spain (n: 1588). Weight and height were measured twice by standard procedures. Body Mass Index (BMI) was categorized as thinness, normal weight, overweight and obesity according to gender-and-age specific cut-offs defined by Cole et al, 2000. After 5 min resting interval, with the right arm semi-flexed at heart level position, BP was measured twice using a calibrated semiautomatic OmronW M5-I device and appropriate cuff sizes according to arm circumference, with a 5 min interval between measurements, in a quite and relaxing conditions. ANCOVA models were estimated using BP as dependent variables, weight status categories as fixed factor and age and sex as covariates.

Results: Thinner and normal weight children has lower BP levels than their peers with excess of weight (figures 1 and 2).

Conclusions: Excess of weight is associated to higher BP levels even at early ages.

T7:PO.009
**Thinness and excess of weight prevalence by parental socioeconomic status (ses) in spanish preschool children**


1Social and Health Care Research Center, University of Castilla-La Mancha, Cuenca, Spain.

Introduction: The latest reported obesity prevalence in Spanish children was higher than 35%. The aims of this study were to estimate the prevalence of thinness, overweight and obesity in the 2008–2009 birth cohort, and to examine the association between parental SES with weight and height status in this cohort.

Methods: Cross-sectional study including all the children aged 4–6 years from 21 primary schools of Castilla-La Mancha region, Spain (n:1398). Weight and height were measured twice by standard procedures. Children weight status was estimated according to the cut-offs proposed by the IOTF child growth standards criteria. Highest father-mother SES index was obtained by using the self-reported occupation and education levels.

Results: Showed in Fig. 1.

Conclusions: i)obesity prevalence in Spanish children born after the financial crisis is drastically decreasing; ii)the prevalence of excess of weight is not more frequent in lower SES categories; iii)parental SES is positively associated to stature.

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Conclusions: Excess of weight is associated to higher BP levels even at early ages.
Fitness and fatness in Spanish pre-schoolers.

Cavero-Redondo I,1, Álvarez-Bueno C,1, Caniete García-Prieto J,1, Arias-Palencia N,2, Torjós-Niño C,1, Cernillo-Urbina A,1, Moreno-Escobar P,1, Terán-Boaben M.1

1Social and Health Care Research Center, University of Castilla-La Mancha, Spain

Introduction: At early ages the evidence of the relationship between physical fitness (PF) and body fatness indicators is limited. Aerobic capacity has been the only PF parameter studied, forgetting others parameters such as strength may be also related with cardiometabolic health. The aim of this study is to analyse the association between adiposity parameters with strength and aerobic capacity estimators in pre-school children.

Methods: Cross-sectional study including all the children aged 4–6 years from 21 primary schools of Castilla-La Mancha region, Spain (n: 1555). Adiposity parameters included: weight, height, waist circumference (WC) and triceps skinfold thickness (SFT) measured twice using standard procedures; body fat percentage (BF%) was estimated by bioelectrical impedance analysis; body mass index (BMI) was calculated as weight (kg)/height (m)2. PF parameters included: cardiorespiratory fitness (CRF) measured by 20-m shuttle run test, lower limbs muscular strength by standing long jump test corrected by allometric parameter of 0.67 (Jaric et al., 2005), and velocity by 4×10m shuttle run test. Partial correlation coefficient controlling for age between adiposity and PF parameters for each sex was estimated.

Results: Showed in Fig. 1.

Conclusions: Adiposity parameters are associated to PF even at early ages. Strength is the PF parameter more closely related to adiposity in pre-schoolers.

<p>| Boys | | | | | | |
|------|---|---|---|---|---|</p>
<table>
<thead>
<tr>
<th>Velocity</th>
<th>CRF</th>
<th>Strength</th>
<th>BF%</th>
<th>SFT</th>
<th>WC</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.409</td>
<td>-0.305</td>
<td>0.250</td>
<td>0.208</td>
<td>0.186</td>
<td>0.161</td>
<td></td>
</tr>
<tr>
<td>CRF</td>
<td>-0.368</td>
<td>0.343</td>
<td>-0.296</td>
<td>-0.302</td>
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<td>-0.263</td>
</tr>
<tr>
<td>Strength</td>
<td>-0.224</td>
<td>0.258</td>
<td>-0.709</td>
<td>-0.686</td>
<td>-0.715</td>
<td>-0.700</td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BF%</td>
<td>0.153</td>
<td>0.279</td>
<td>0.724</td>
<td>0.871</td>
<td>0.889</td>
<td>0.925</td>
</tr>
<tr>
<td>SFT</td>
<td>0.147</td>
<td>0.263</td>
<td>0.667</td>
<td>0.845</td>
<td>0.824</td>
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<tr>
<td>WC</td>
<td>0.150</td>
<td>0.258</td>
<td>0.732</td>
<td>0.902</td>
<td>0.780</td>
<td>0.937</td>
</tr>
<tr>
<td>BMI</td>
<td>0.123</td>
<td>0.257</td>
<td>0.703</td>
<td>0.944</td>
<td>0.826</td>
<td>0.928</td>
</tr>
</tbody>
</table>

Fig. 1. Partial correlation coefficients between adiposity and PF parameters controlling for age. All coefficients were significant at p≤0.001

Surveillance of Overweight including Obesity in Children Under 5: Opportunities and Challenges for the European Region

Jones R.1,2, Breda J.1,2

1Department of Public Nutrition, Rollins School of Public Health, Emory University, Atlanta, Georgia,
2Department of Nutrition, Physical Activity and Obesity, Division of Noncommunicable Diseases and Lifecourse, World Health Organization European Regional Office, Copenhagen, Denmark

Introduction: Current estimates report over 40 million children under 5 were overweight or obese globally (deOnis et al., 2010). Childhood overweight has become an increasingly important contributor to adult obesity, diabetes, and noncommunicable diseases (O’Malley et al., 2010) and at the opening of the 2014 World Health Assembly Dr. Chan announced a new initiative on childhood obesity (WHO press release. ‘Director-general announces new initiative, 2014). The European Region needs to be more aware of the current state of the nutritional status of children under 5 in order to begin to make headway in this emerging area.

Methods: A review of publicly available data collected from 2000 on which reported prevalence of nutritional status in children under 5 in any WHO European Region Member States was done. The authors compiled estimates to form a cohesive perspective on the state of young childhood nutritional status in the Region.

Results: 28 of the 53 Member States had data available on the nutritional status of children under 5, particularly over-nutrition. This data differed in age ranges evaluated, cutoffs used (IOTF, WHO or country-specific), national representation and the method evaluated (self-report versus direct measurement). The prevalence of overweight (including obesity) in children under five ranges from 1% to 27.5% in Member States.

Conclusion: While it is generally recognized that nutritional surveillance data are crucial for the development of targeted action and the monitoring progress and success in countering obesity, regular assessments of the magnitude of overweight and obesity, particularly in children are not common in the 53 WHO European Member States (Wijnhoven et al., 2013). Evidence suggests that early intervention before five years of age is necessary if the trajectory to overweight in children is to be arrested (Black et al., 2013) and action needs to be taken to have consistent surveillance on this specific population.

Fig. 1. Prevalence of overweight (including obesity) in children under 5 in the European Region

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T7 – Health promotion policies

T7:PO.0012
Overcoming obesity - wellbeing from healthy nutrition and physical activity. National obesity programme in Finland
Mäkki P1, Männistö S1, Laatikainen T1,2, Vartiainen E3, for the behalf of the Working Group for the National Obesity Programme4
1National Institute for Health and Welfare, 2University of Eastern Finland

In 2012, the National Institute for Health and Welfare (THL) launched national programme Overcoming obesity–wellbeing from healthy nutrition and physical activity. Obesity is a serious problem in Finland. The mean body mass index has increased in men since the 1970s and in women since the 1980s. Although this trend has leveled off over the past ten years, the prevalence of obesity is still at too high level. In 2012, 66% of working aged men and 46% of women were overweight or obese (BMI ≥ 23). Every fifth adult was obese (BMI ≥ 30). The aim of the programme is to achieve a downward trend in obesity prevalence in order to improve health and wellbeing and to maintain the population's functional and work ability. The health care sector plays an important role, but there are other stakeholders (e.g. policy makers, schools, community planning, non-governmental organizations, industry, media) at local, regional and national level which have an important role in preventing obesity of citizens. The aim of the programme is to challenge different stakeholders to work towards common goal. The actions will focus on healthy diet and physically active lifestyle. There are five main priorities: take into account health in all policies, advance fiscal incentives, improve the prevention and care of obesity in the health care, publish positive and not misleading health messages in the media and invest in obesity research. THL has developed checklists of the targets for different stakeholders. The purpose of lists is to assess how the targets of the national programme are achieved at local, regional or national level. THL promotes the implementation of measures through information guidance and collaboration with stakeholders and monitors outcomes through health monitoring and research.

T7 – Community based interventions

T7:PO.0013
What is the impact of a community pharmacy-led weight management service for adults in a deprived urban area in UK? A mixed methods service evaluation
Smith S1, Todd A1, Summerbell C.D.1
1School of Medicine, Pharmacy and Health, Durham University, UK.

Introduction: WHO acknowledges that community pharmacies may be an important component of the public health agenda to tackle obesity. The aim of this study was to evaluate a 12-week community pharmacy-led weight management service in a deprived urban area of Stockton-on-Tees, UK.

Methods: The service was delivered by pharmacists and pharmacy technicians over a 12 week period, targeting overweight adults. Quantitative data included participants' weight, height, waist circumference, and wellbeing scores. One-to-one, face-to-face interviews were conducted post-intervention with three pharmacists, two technicians and 11 service users (7 completers and 4 dropouts).

Results: 8 pharmacies and 58 participants were recruited, of which 11 completed the 12-week programme. On average, a reduction in weight, waist circumference and BMI, and an improvement in wellbeing scores, were found. The pharmacy was deemed to be a convenient and easily accessible setting by service users who praised the one-to-one personalised delivery approach. The service appeared to be equally effective when delivered by pharmacy technicians and pharmacists, which could prove useful in future delivery and practice in terms of freeing up pharmacists’ time and making best use of resources. The service had knock-on effects of improved dietary habits for family and friends. Non-completers were complimentary of the service and the delivery, and continued to make lifestyle changes and lost weight.

Conclusion: The feasibility and impact of the service appears promising, and a useful option to the range of weight management services commissioned by local health authorities and councils. Further evaluation to assess whether the service has the potential to be offered effectively as a brief intervention is planned.

T7:PO.0014
Community pharmacy interventions for public health priorities: A systematic review of community pharmacy-delivered weight, smoking and alcohol management interventions
Brown T1, Todd A1, O’Malley C1, Moore H.J.1, Smith S1, Husband A.K.1, Bambara C1, Kasim A1, Sniehotta F.F.1, Steed L1, Summerbell C.D.1
1School of Medicine, Pharmacy and Health, Durham University, UK, 2Department of Geography, Durham University, UK, 3Institute of Health and Society, Newcastle University, UK, 4Centre for Primary Care and Public Health, Queen Mary, University of London, UK.

Background and Aim: Worldwide, community pharmacies may be an important component of the public health agenda to tackle obesity. WHO acknowledges that community pharmacies and their staff are easily accessible and, as such, could play a key role in public health initiatives. This systematic review aims to assess the effectiveness of interventions based in community pharmacies with a focus on weight management, smoking cessation and alcohol misuse.

Methods/design: We searched 10 databases for international studies that evaluated interventions based in community pharmacies that targeted weight management, smoking cessation and/or alcohol misuse. We included RCTs, non-RCTs, controlled before-after studies, interrupted time series and repeated measures studies.

Results: At the time of writing (December 2014), 29 studies are included in the review, including 13 on weight management. The final report will be delivered to the funders in March 2015. We intend to present the results of the review as they relate to weight management, alongside the dissemination strategy for the review, at ECO 2015. Discussion: The review will summarise the evidence base on the effectiveness of community pharmacy interventions in relation to weight management, smoking cessation and alcohol misuse. It will also explore if, and how, socio-economic status, gender, ethnicity and age moderate the effect of the interventions and will describe how the interventions have been organised, implemented and delivered, since context is an important factor governing the success of public health interventions. The protocol for this systematic review is registered with PROSPERO (registration no. CRD42013065943) and published (Todd et al. Systematic Reviews 2014, 3:93).

T7:PO.0015
Questionnaire on life style for 8–10-year-old children: Concordance between parents and child responses
Boulic G1, Roy C1, Deken V1, Roman M1
1EA 2694 Lille 2 University, 2Association FLVS

Introduction: Vivons en Forme (VIF) is a program aiming at supporting municipalities to implement actions in line with French Nutrition Recommendations. To evaluate actions directed towards children, we built a questionnaire on child life style for 8–10-year-old children and their parents. The aim of this study is to compare the concordance between the responses given by parents and children. Material and methods: The study
was conducted in four schools located in 3 different cities, one school was located in deprived area. The questionnaire was given to 99 children and their parents. Children filled the questionnaire at school, and parents at home. Only 87 parents responded. Statistical analyses were made on 87 parent-child pairs. Concordance was analysed by concordance percentage (C) and calculation of Kappa coefficient (K).

Results: Parent/child concordance is excellent for i) TV in child bedroom C 83%, K0.63 (52% of children declare watching TV in their bed room), ii) computer in bedroom C 85%, K0.66 (29% of children having computer), iii) extracurricular physical activity C 89%, K 0.73 (72% of children having physical activity; responses are discrepant for i) snacking while watching TV C 59%, K0.10 (yes : 42% children, 22% parents), ii) candy daily consumption C 25%, K0.11 (yes: 39% children, 17% parents), iii) chips daily consumption C 36%, K 0.15 (yes: 21% children, 3% parents).

Conclusion: One more than half of children have a screen in their bed room, and this should be considered in public health promotion campaigns. 2 Discrepancies between parents and children relate to unhealthy behaviours that are underestimated by parents and may be ignored. Related actions targeting parents should be reinforced.

T7.PD016
PREVIEW: Prevention of diabetes through lifestyle intervention and population studies in Europe and around the world. Over 2,000 volunteers randomized to the 3-y RCT.

Roben A.1, Fogelholm M.2, Larsen T.M.3, Drummens M.4, Poppitt S.5, Formiguera J.A.6, Macdonald I.7, Handjiev S.8, Stratton G.9, Feskens E.10, Lam T.11, Schlicht W.12, Brand-Miller J.13, on behalf of the PREVIEW consortium

1Dep Nutrition, Exercise & Sports, Uni Copenhagen, DK,
2Dep Food & Environmental Science, Uni Helsinki, SF,
3Dep Human Biology, Maastricht Uni, NL,
4Human Nutrition Unit, Uni Auckland, NZ,
5Dep Nutrition, Uni Navarra, ES,
6School of Biomedical Science, Uni Nottingham, UK,
7Dep pharmacology & toxicology, Medical Uni Sofia, BG,
8School of Engineering, Swansea University, UK,
9Div Human Nutrition, Wageningen Uni, NL,
10NetUnion, Lausanne, SW,
11Dep Sport & Exercise Science, Uni Stuttgart, DE,
12Boden Institute of ONEED, Uni Sydney, AUS.

Introduction: PREVIEW is a 6-y EU project (2013–2018) under the FP7, KBBE programme. It involves 15 partners from Europe, Australia, Canada, and New Zealand. The primary goal is to identify the most efficient lifestyle pattern for the prevention of type-2 diabetes in a population of pre-diabetic overweight and obese individuals.

Methods: The project comprises 2 main lines of evidence: a 3-y multicentre, 2*2 factorial, clinical, randomized intervention trial (RCT) with up to 2,500 participants as well as large population studies in about 170,000 individuals across all age groups. The impact of a high-protein, low-glycemic index diet vs a high-carbohydrate, medium-glycemic index diet in combination with moderate or high intensity physical activity on the incidence of type-2 diabetes and related end-points are investigated. Interactions with habitual stress, sleeping pattern, behavioral, environmental, cultural, and socioeconomic variables are also studied. The RCT starts with an 8-week weight loss phase on a low-calorie diet, LCD (Cambridge Weight Plan) followed by randomization to a 146-weeks weight maintenance phase in the 4 intervention arms.

Results: Between Jun 2013 and Dec 2014, about 13,900 adults have been pre-screened; 4,740 screened and more than 2,050 adults enrolled by the 8 intervention centres. About 50 children/adolescents have also been included. The average age of the adults is 52 y; 2/3 being female. During the 8-week LCD, a total of 1,327 have now achieved more than 8% weight loss (average 10.7% of initial body weight of 99.7 kg), allowing them to continue into the weight maintenance phase.

Conclusion: The PREVIEW project is running well with > 2,000 volunteers included in the RCT. PREVIEW will continue recruiting till end of Feb 2015.

Acknowledgement: The PREVIEW project receives funding from: EU 7th Framework Programme (FP7/2007-2013), grant agreement no. 312057. National Health and Medical Research Council - EU Collaborative Grant, AUS. The NZ Health Research Council (14/191) and UoA Faculty Research Development Fund. The Cambridge Weight Plan has kindly donated all products for the 8-weeks Low-Calorie Diet.

T7.PD017
Bulgarian experience in the prevention of childhood obesity. “School for health” – for children, parents and teachers

Handjiev S.9, Kuzeva A.1, Handjieva-Darlenska T.1

1Bulgarian Association for the Study of Obesity and Related DiseasesThe problem of childhood obesity in Bulgaria is of significant medical and social importance.

Recent studies show increase in obesity and overweight rates by 5–15% (depending on the age group). As part of the EPHE project (EPODE for the Promotion of Health Equity) Bulgarian association for the study of obesity and related diseases (BASORD) organized “School for Health – for children, parents and teachers” under patronage of the Minister of education and science. 270 children (age 7–9 year), parents and teachers from ten different schools in Sofia participated in the “School for health”. At one of the most famous Bulgarian seaside resorts - Albena families and teachers spent one week together. For this period all the participants were educated in the principles of healthy and balanced lifestyle with an emphasis on diet and physical activity. Anthropometric parameters (body weight, body mass index, waist and hip circumferences) as well as body composition (fat mass and fat free mass) were measured in all participants. Children, parents and teachers had special meals for breakfast, lunch and dinner based on the national recommendations for healthy nutrition. Each day the program began with gymnastics on the beach and was followed by swimming in the pool and walks. The experience that all participants gained had very positive impact on their lifestyle. Two years after their participation in the project “School for health” they continue to apply the new methodic of nutrition and have increased their physical activity.

Acknowledgement: Funded and supported by EPHE project (EPODE for the Promotion of Health Equity)

T7.PD018
Community-based pilot to tackle childhood obesity in a London Borough: A whole-system approach

Hrobonova E.1, Lewis E.1, Dunsford E.A.1, Vamos E.P.1

1Westminster City Council,
2Imperial College London

Introduction: Tackling childhood obesity is a pressing public health priority requiring multilevel and multi-stakeholder action. The aim of this intervention is to enable all members of the community to take part in effective and sustainable actions to promote healthy lifestyles and ultimately prevent childhood obesity.

Methods: This presentation describes the methodology of the intervention. The programme will be piloted in a London Borough between 2015 and 2018 focusing on children aged 4–16 years in the environment where they live, learn and play. Activities will be implemented at 3 levels: local government, community and children and their family. Activities will be built on existing public and private community-based initiatives, preventative and management services and environmental strategies. The programme has a dedicated local programme manager to mobilise local stakeholders and networks and implement actions. In every 6 months, a themed social marketing campaign will be developed based on evidence.
and national recommendations focusing on a specific nutrition or physical activity issue (6 themes during the 3-year pilot). All activities at all levels will focus on the specific themes. A local steering group will be formed with a wide representation of local stakeholders including private and public partners. Methodology also includes continuous workforce training, wide dissemination of information resources, working with other local government departments and local agencies to improve the environment and community development including a grant scheme to support local initiatives. Expected results include increased awareness, improved skills and social norms, behaviour change regarding the specific lifestyle themes, and ultimately reduced in childhood obesity.

Acknowledgement: To the Royal Borough of Kensington and Chelsea for funding and supporting the design and implementation of this pilot.

T7.P0020
Are Intervention-Design Characteristics More Predictive than Baseline Participant Characteristics on Participant Attendance to a Paediatric, Community Weight Management Programme?

Nobles J.1, Pringle A.1, Griffiths C.1, Gately P.1,2
1Leeds Beckett University.
2MoreLife (UK)

Background: Approximately 50% of participants complete a paediatric weight management programme, yet the predictors of attendance and dropout are inconsistent. This study investigates subject and intervention-design characteristics associated with attendance at a based group, family weight management programme. SETTING AND SUBJECTS: Secondary data analysis of 2948 subjects (Age 10.4 ± 2.8 years, BMI 26.0 ± 5.7kg/m², Standardised BMI (BMI SDS) 2.48 ± 0.87, White 70.3%) from 244 MoreLife (UK) programmes. Subjects attend weekly for 10–12 weeks, sessions last 2–3 hours. Sessions include lifestyle guidance and physical activity.

Method: Subject characteristics (demographics, psychological (body satisfaction & self-esteem) and sedentary behaviour) were gathered at first contact and BMI SDS was noted weekly. Intervention-design characteristics were recorded (year, length (weeks), group size, age segregation and day of session). Attendance was calculated as total number of sessions attended (%). Multivariate linear regression examined predictors of attendance and multiple imputation countered missing data.

Results: Average attendance was 59.4%±29.3%. Baseline subject characteristics were ‘poor’ predictors of attendance. Intervention year, group size and day of session significantly predicted attendance (Tables 1 & 2). Yet, the most predictive marker of attendance was a change in BMI SDS during the programme (B = -0.38, 95% CI = -0.43 - -0.33).

Conclusion: A reduction in BMI was seen to predict greater attendance. However, baseline subject characteristics were weakly associated with attendance, refuting past findings. Dominant intervention characteristics (large groups, weekend sessions and recent delivery) predicted lower attendance. Future programmes may be better informed.

Acknowledgement: The author would like to thank MoreLife (UK) for providing the data for the study and the assistance given by the staff in aiding the author to understand the measures used. Additional thanks extend to the British Heart Foundation for funding the PhD study.

<table>
<thead>
<tr>
<th>B value</th>
<th>SE B</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.726</td>
<td>0.052</td>
</tr>
<tr>
<td>Length of Intervention</td>
<td>-0.021</td>
<td>0.012</td>
</tr>
<tr>
<td>Year of Intervention</td>
<td>-0.030**</td>
<td>0.005</td>
</tr>
<tr>
<td>Intervention Group Size</td>
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<td>0.011</td>
</tr>
<tr>
<td>Intervention Age Groups</td>
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<tr>
<td>Day of Intervention</td>
<td>-0.052**</td>
<td>0.012</td>
</tr>
<tr>
<td>Gender</td>
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<td>0.011</td>
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<tr>
<td>Age (Years)</td>
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<tr>
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<td>Pre-Existing Medical Condition</td>
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<tr>
<td>BMI SDS</td>
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</tr>
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<td>Self-Esteem</td>
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<td>Sedentary Behaviour</td>
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<tr>
<td>Body Satisfaction</td>
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<td>0.000</td>
</tr>
<tr>
<td>Change in BMI SDS</td>
<td>-0.377**</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Note: *p < 0.05, **p < 0.01, ***p < 0.001

Fig. 1. Predictors of Attendance - Imputed Data
Scaling-up community-based programmes (CBPs) for childhood obesity prevention: First results following the methodology appraisal of 13 CBPs

Mantziki K.1, Mayer J.1, Renders C.1, Bors J.M.1, Seidell J.C.1
1VU University of Amsterdam, Netherlands, 2Proteins, France, 3EPODE European Network Coordinating Team, Proteines, Paris, France

Background: Childhood obesity and overweight is major public health concern in Europe. Programmes and initiatives across the region use various approaches to prevent this issue, encountering challenges in the implementation field. The current study aims to appraise the methodology of 13 community-based programmes and initiatives (CBPs) for strengthening and up-scaling their process, based on the pillars of EPODE methodology.

Methods: This is a descriptive research to identify strengths and weaknesses of the participant programmes. We conducted semi-structured interviews with the principal programme coordinators, assessing their approach to political commitment, public-private partnerships, social marketing, communication and scientific evaluation and dissemination. Two researchers appraised the information in reference to the EPODE pillars, using a scoring scale from 0 to 2.

Results: Formal political commitment existed in the majority of the programmes. 46% of the programmes had structural public-private partnerships and no interference with the methods/contents of programmes. The social marketing approach was lacking target group analysis and focus on environmental change in most of the programmes. The communication and dissemination methods were lacking for the majority of the programmes. 70% of the programmes conducted an evaluation, but usually that did not include all the important aspects of the programme. Results will be presented in more details during the congress.

Conclusions: The context and methods of implementation varied between the CBPs. We identified various aspects to be improved; tailored feedbacks, trainings and workshops are led. The next step is the progress appraisal of each CBP included in the project.
relevant outcome (e.g., consumer or retail level data for dietary fat intake or sales figures of certain items).

**Results:** 23 studies were included; 13 repeat cross-sectional, 5 cohort, 2 controlled before and after, and 3 controlled clinical trials. 23 studies of six types of interventions/policies were included: nutrient labelling (12), trans-fat legislation (1), multicomponent multilevel health promotion (6), personalised receipts (1), price promotion (1) and telemarketing (2). Nutrient labelling only reduces calories purchased in specific fast food chains and for those who use labels. Multicomponent multilevel interventions increased healthy food purchases in certain restaurants, but not others. No data on cost implications were identified. Nutrient labelling does not appear to increase inequalities by having differential effects by age, gender, ethnicity, or socioeconomic status.

**Conclusion:** Calorie labelling legislation does not appear to be associated with a significant decrease in the amount of calories purchased across all fast-food chain restaurants. Further robust research is required, particularly in young people and in European populations. The protocol for this systematic review has been registered with PROSPERO (registration no. CRD42013006931) and published (Hillier-Brown et al. Systematic Reviews 2014, 3:17).

**T7-PO.024**

**Effects of differences in frequency of guidance and intervention period on weight loss**

Katayama Y.1, Wakaba K.2, Nagao Y.1

1Department of Education, Kogakkkan University, Ise, Japan, 2Graduate School of Education, Kogakkkan University, Ise, Japan

**Introduction:** There is no evidence on the relationship between weight loss and frequency of guidance and intervention period. The aim of study was to examine the effects of differences in frequency of guidance and intervention period on weight loss.

**Methods:** Sixty-four obese or overweight Japanese women with increased waist circumference, hypertension, dyslipidemia, or hyperglycemia participated in the dietary intervention with different frequency of guidance and intervention periods: 1.5-month, bi-weekly guidance (1.5m2w, n = 7, 54.4 ± 6.6 years); 3-month, weekly guidance (3m1w, n = 32, 54.8 ± 4.4 years); 3-month, bi-weekly guidance (3m2w, n = 25, 56.5 ± 5.0 years); 6-month, weekly guidance (6m1w, n = 7, 47.6 ± 14.3 years). All four groups engaged in equal guidance contents (received same information in 24 hours guidance in total) and were instructed to reduce their dietary energy intakes to 1,200 kcal per day.

**Results:** Weight decreased significantly during the intervention in all groups (1.5m2w: -5.1 ± 2.9 kg, 3m2w: -4.9 ± 2.6 kg, 3m1w: -5.8 ± 3.0 kg, 6m1w: -5.8 ± 2.5 kg, P < 0.05), while group × time interaction was not significant (P > 0.05). However, weight loss per guidance (efficiency) in 3m1w and 6m1w were significantly higher than the other two groups (-0.2 ± 0.1 kg/guidance, -0.4 ± 0.2 kg/guidance, -0.2 ± 0.1 kg/guidance, -0.5 ± 0.2 kg/guidance, respectively). Weight loss per week in 1.5m2w was significantly higher than the other three groups (-0.8 ± 0.5 kg/week; -0.4 ± 0.2 kg/week; -0.5 ± 0.2 kg/week; -0.2 ± 0.1 kg/week).

**Conclusion:** Since there were little to no effect on the amount of weight loss and decrease in the efficiency, it is not necessary to increase the frequency of guidance over weekly or to extend intervention periods over 1.5 months blindly.
T7.PO.027
Group studio cycling is an effective intervention to improve cardio-metabolic health in overweight sedentary individuals
Faulkner S.H.1, Pugh J.K.2, Hood T.M.1, Menon K.1, King J.A.1, Nimmo M.A.1,2
1School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, UK
2College of Life and Environmental Sciences, University of Birmingham, Birmingham, UK

Introduction: High intensity interval training (HIIT) improves health markers in groups at risk of cardiovascular and metabolic disease. The majority of evidence comes from laboratory studies with fixed intensity intervals and one to one supervision. Studio cycling, incorporating both aerobic and high intensity exercise, offers a platform for the implementation of HIIT within the wider community. The aim of the present investigation was to test the efficacy of group based studio cycling at improving markers of cardio-metabolic health in overweight individuals.

Methods: Eight, overweight, sedentary (86.1 ± 10.6 kg; 27.1 ± 4.7 ml/kg, min-1; <1.5 hr.wk-1) but otherwise healthy volunteers completed 8 weeks of supervised studio cycling lasting 50 minutes 3 times per week. Heart rate was monitored as a guide to exercise intensity achieved. Participants underwent evaluation for blood pressure, maximal oxygen uptake (VO2 max), body composition, and blood lipid profile before and after the intervention.

Results: Adherence to training was >95%. VO2 max improved by 11.8% (p < 0.0001) and MAP reduced by 6.5% (p < 0.05). Fat free mass index increased by 4.4% (p < 0.05) and waist:hip by 1.2% (p < 0.05). Cholesterol was reduced by 13% (p < 0.05).

Discussion: These data show that group exercise is effective at improving cardio-metabolic health in overweight individuals and improves markers of disease risk with comparable benefits as reported in many laboratory HIIT studies. Studio cycling improves fat free mass and as such may help improve function of daily tasks due to an increase in lean mass. Coupled with a high adherence rate, studio cycling offers an effective intervention to improve cardiovascular health in physically inactive cohorts that can be implemented on a community wide scale.

Acknowledgement: The present work was in part funded by the NIHRI Diet, Lifestyle & Physical Activity Biomedical Research Unit based at University Hospitals of Leicester and Loughborough University. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health. The authors were fully responsible for conducting the trial and analysing the data.

T7.PO.029
Adding Context: Process evaluation of a childhood obesity prevention trial (the WAVES study)
Griffin T.L.1, Clarke J.L.1, Lancashire E.R.1, Pallan M.J.1, Adab P1
1School of Health and Population Sciences, University of Birmingham, Birmingham, West Midlands, UK

Introduction: Process evaluation can help contextualise trial outcomes. It can also assess an intervention’s acceptability. A comprehensive process evaluation was implemented for the WAVES study, an evaluation of a childhood obesity prevention intervention for 6–7 year-olds delivered in UK primary schools (n=26). The intervention included additional daily school-time physical activity (PA), three cooking workshops (CW) for children and parents, a 6-week healthy lifestyle programme at a football club (Villa Vitality (VV)) and two information sheets signposting to local activities.

Methods: Data were collected using logbooks, observations, questionnaires, focus groups and interviews. Quantitative data were summarised as appropriate. Qualitative data were analysed using the framework approach. Based on the data collected for each intervention component schools were allocated an implementation score (low-high).

Results: Scores showed variation between schools in terms of implementation. Most schools implemented PA least well, and VV the best. This was contextualised by teacher reports of timetable constraints making PA delivery challenging. Parent attendance at CWs was another challenge. Teachers thought that VV offered a ‘wow-factor’ which was particularly appealing to children. The impact of the signposting sheets was questioned by teachers, and parents struggled to recall them.

Conclusion: The process evaluation results will provide context to the trial outcomes. Additional daily PA was challenging for teachers to implement. The importance of PA for health supports its continued inclusion in interventions, but strategies to support implementation are essential for adherence.

Acknowledgement: With thanks to the WAVES study research team, the trial investigators and collaborators, and the schools participating in the study.
Child obesity is a dire public health issue. Trials show promising results, however few are translated to practice. This paper describes the process of translating an effective child weight management program (PEACHTM) from an RCT intervention to a community health program and public health initiative. PEACHTM is an Australian evidence-based, family-focused child weight management intervention for 5–9y olds (NHMRC-funded RCT from 2004–08, ACTR 00001104). The trial showed a 10% reduction in relative adiposity at 6m, maintained for 18m with no further contact. Findings were disseminated via academic, professional and lay channels. Relationships were developed with government departments, clinicians and managers. Funding for translation was secured from state government and a car manufacturer. This iteration, “PEACHTM in the Community”, involved development of a facilitator training program, revision of program content, relaxation of eligibility criteria and development of an evaluation framework based on the REAIM model. From 2009 to 2011, 8 training workshops were delivered to 54 participants, of which 11 delivered 8 programs to 62 families. Reach, adoption and implementation were limited and key lessons were: a) build trust between researchers, service deliverers and management, b) understand and implement strategies to respond to the political environment in which community health programs are funded and delivered, c) need for adaptation of programs to enhance adoption, and d) importance of data collection support. These insights inform the current iteration of PEACHTM as a public health initiative in the state of Queensland (PEACHTM QLD), where it will be delivered to 1400 children over 3y.

Impact of participation in the peachtm child weight management intervention on parenting and family lifestyle behaviours: Pilot results of peachtm queensland

Magarey A.1,2, Moores C.1, Hartley J.1, Perry R.1, Vidgen H.2, Daniels L.1,2
1Nutrition and Dietetics, School of Health Sciences, Flinders University, Adelaide, South Australia, Australia, 2School of Exercise and Nutrition Sciences, Queensland University of Technology, Queensland, Australia

Australian clinical practice guidelines for management of childhood overweight and obesity 2013 recommend family-focused lifestyle interventions involving frequent contact with a health professional as effective. PEACHTM is an evidence-based group program supporting parents to improve the lifestyles of their overweight children 5–11 years via parenting skills training focussing on family eating and activity behaviours. Funded by the Queensland Government the program will be delivered to 1400 families in Queensland Australia in four phases over three years. This study presents pilot data of the impact on parenting and family lifestyle behaviours. A total of 53 families (59 children) were enrolled at 6 sites. Baseline and follow up data (at 6 month program end) were obtained from 22 families (24 children). Child dietary intake was assessed using the Child Dietary Questionnaire (CDQ), activity and sedentary behaviour using the CLASS questionnaire and impact on other family members via purpose developed questions. Descriptive pre-post comparisons are reported. There were improvements in all five sub-scales of the CDQ (eg fruit & vegetable score pre vs post median 10.9 vs13.1) and a reduction of 40 minutes/day in screen based activity. Parents reported increased confidence in setting limits regarding their child’s eating and activity behaviours and improvements in their ability to manage their child’s behaviour. All parents reported an improvement in eating habits (21/21) and 20/21 in activity patterns of the whole family. Most parents (20/22) felt the health and wellbeing of their whole family improved post-program. These early results suggest the merits and wider impact of taking a parent-led family-focused approach to child weight management, as not only the target child benefits.

Acknowledgement: The families who participated in the program and provided evaluation data, and the project team at Queensland University of Technology, Queensland, Australia

Android obesity and inflammatory markers under the action of an interdisciplinary therapy program.

Poli V.S.1,2, Fidalgo J.P.1,2, Nascimento M.A.1,2, Sanches R.B.1,2, Moraes A.S.2,3, Araujo G.S.1, Cerrone L.A.1,2, Bresciani P.1,3, Andrade-Silva S.G.1,2, Clemente J.C.1, Caranti D.A.1,2
1Post Graduate Program of Interdisciplinary Health Sciences, Federal University of São Paulo – UNIFESP - Santos, Brazil, 2Post Graduate Program of Nutrition, Federal University of São Paulo – UNIFESP – São Paulo, Brazil, 3Obesity Study Group (IEG), Federal University of São Paulo – UNIFESP - Santos, Brazil, 4Department of Biosciences, Federal University of São Paulo – UNIFESP - Santos, Brazil

Introduction: Obesity is one of the major public health problem actually. It has a multifactorial etiology and it’s characterized by excessive accumulation of adipose tissue (AT). It’s known that AT, especially with that android distribution, has an secreting-endocrine function, releasing any adipokines, which are responsible for developing metabolic disorders. They are responsible to modify vital functions of the body, such as the heart and immune function.

Objective: Check the effect of Long-Term Interdisciplinary Therapy (IT) in Android Obesity (AO) and in pro- and anti-inflammatory markers in obese adults.

Methods: There were 23 volunteers with a mean age of 41.34 ± 5.82 years old and mean body mass index of 33.97 ± 2.81 kg/m². They underwent 32 weeks of IT, composed of six weekly interventions, three of physical exercise, one of physiotherapy, nutrition and psychology. The evaluations were performed on two occasions: before and after 32 weeks of IT. The distribution of AT was verified by Dual-energy X-ray absorptiometry (DEXA). The plasma levels of inflammatory markers were determined after collecting blood of volunteers, by ELISA immunoassay for IL-6, adiponectin and TNF-α. In statistical analysis were used the Student-t test and Wilkoxon, according to the normality of the samples. The level of considered significance was 5%.

Results: After IT the AO showed a significant reduction of 3.93% ±3.26 (p <0.001) and TNF-α (-1.43mg/dL, p = 0.006). The adiponectin showed an increasing trend, although it wasn’t significant.

Conclusion: The IT against obesity promoted reduction of AO and decreased plasma levels of pro-inflammatory markers IL-6 and TNF-α.
Adolescents’ experiences with obesity. A qualitative study.

Gøen G.1, Tvedt KE.2, Kvithaugsvik B.2, Halding A.G.1

1National Centre for Food, Health and Physical Activity, Bergen University College, Bergen, Norway.
2Sogn and Fjordane University College, Førde, Norway.

Introduction: The Norwegian Healthy Future project aims to develop knowledge of how evidence-based interventions could be implemented by use of a Comprehensive Participatory Planning and Evaluation (CPPE) process. Obese adolescents are especially at risk for being obese adults, therefore important to reach to tailor interventions built on adolescents’ needs. In-depth understanding of adolescents’ perspectives can reveal potential footholds for interventions, and might strengthen the patient-clinician partnership in identifying patients’ strengths and motivating for weight loss. The aim of this study is to explore adolescents’ experiences of being obese.

Methods: A qualitative approach with action oriented research in a Norwegian context of primary health care was chosen. Individual repeated in-depth interviews were carried out and data analyzed by qualitative content analysis. Themes occurred from the data by stepwise developed codes, subcategories and categories.

Results: Across the 12 interviews of adolescents’ perspectives on everyday life with overweight five categories were identified: 1. Adolescents’ suggested causes for obesity; 2. To speak about overweight; 3. Challenges in changing behavior; 4. Social relationships; 5. To ask for help. Three themes emerged: 1. Obesity as a multi-faced and “difficult-to-solve” condition; 2. Overweight as a shameful and vulnerable subject; 3. Obesity as a source for bullying and fragile social relationships.

Conclusion: Adolescents experienced everyday life with obesity differently, according to their experiences from being bullied, given social support, and their feelings of control and possibilities to reduce obesity.

Outcome of public obesity clinics in Malaysia: Retrospective data of 417 subjects

Mazupuzupuzu M.Y.1, Mohamad M.1, Yusoff K.1, Bulgiba A.4

1Primary Care Medicine Discipline, Faculty of Medicine, Universiti Teknologi MARA, Selayang Campus, Selangor, Malaysia.
2Endocrinology, Medical Department, Hospital Putrajaya, Malaysia.
3Cardiology, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh, Selangor, Malaysia.
4Julius Centre University of Malaya (JCUIM), Department of Social & Preventive Medicine, Universiti of Malaya, Kuala Lumpur, Malaysia

Introduction: Data are scarce concerning weight loss outcome of obese subjects following clinic program (Vasconcelos et al., 2004, Compe et al., 2003). The objective was to evaluate outcome and predictors of weight loss in outpatient obesity clinics.

Methods: Studies clinician provided endocrinologist and dietician consultations, physical activity with physiotherapists, support group meetings, meal replacement and anti-obesant therapy. Records of patients were scrutinized at first and 6th month entry. Outcome measures: Anthropometry measurements; biochemistry and co-morbidity profiles. Statistical tests: paired t tests, correlation, regression analysis, and ANOVA.

Results: Total of 417 patients (63.1% female, 77.2% Malay, 62.8% married) with mean age of 42.7 years (SD±12.43); and mean BMI of 47.1 (SD±9.47) kg/m². 63.8% had weight loss but only 17.3% had at least 5% weight loss. Mean weight loss is 2.15 (P < 0.001) with an average of 1.64%; BMI decreased by 0.89 (P < 0.001), pulse rate by 2.06 (P < 0.04), and waist circumference by 2.12 (P < 0.001). BMI change was negatively correlated with HDL (r = -0.57, p < 0.01). Total cholesterol and LDL decreased by 0.16 (P < 0.02); Alkaline Phosphate and Alanine Transaminase decreased by 3.99 (P < 0.006) and 4.72 (P < 0.018). Weight reduction was significantly correlated with frequency of support group attended.

Conclusion: The obesity clinic resulted in an effective weight loss, which related to the attendance of support group sessions.

Acknowledgement: The authors acknowledged the Hospital Putrajaya and Hospital Kuala Lumpur staffs for their contributions towards the study. The authors also extend their appreciation to all participants, The Centre for Translational Research and Epidemiology (Centre), Faculty of Medicine, Universiti Teknologi MARA USTM, and The Julius Center University Malaya for their support.

Table 1. Demographic characteristics of the study subjects at baseline

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>All subjects, n (%)</td>
<td>417 (100%)</td>
</tr>
<tr>
<td>Mean age in years (standard deviation SD)</td>
<td>42.7 (±12.4)</td>
</tr>
<tr>
<td>Location, n (%)</td>
<td>274 (65.8%)</td>
</tr>
<tr>
<td>Clinic 1</td>
<td>111 (26.8%)</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td>262 (63.1%)</td>
</tr>
<tr>
<td>Male</td>
<td>154 (36.9%)</td>
</tr>
<tr>
<td>Female</td>
<td>108 (25.4%)</td>
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<tr>
<td>Ethnic group, n (%)</td>
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<tr>
<td>Malay</td>
<td>322 (77.2%)</td>
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<tr>
<td>Chinese</td>
<td>32 (7.9%)</td>
</tr>
<tr>
<td>Indian</td>
<td>59 (14.1%)</td>
</tr>
<tr>
<td>Others</td>
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<tr>
<td>Age groups (years), n (%)</td>
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<tr>
<td>&lt; 20</td>
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<td>20-29</td>
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<td>40-49</td>
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<td>50-59</td>
<td>117 (28.2%)</td>
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<tr>
<td>≥ 60</td>
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<td>Marital Status, n (%)</td>
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<tr>
<td>Single</td>
<td>87 (24.6%)</td>
</tr>
<tr>
<td>Married</td>
<td>265 (72.4%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>13 (3.8%)</td>
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</tbody>
</table>

*Number do not equal to n=417 due to missing data.

Fig. 1. Demographic characteristics
T7:PO.036

Preliminary results of a dietary intervention among primary-school children

Zafropoulos V.1, Chatzi V.1, Dimitropoulakis P.1, Markaki A.1, Fthenakis Z.G.1, Thalassinos N.1, Fragkiadakis G. A.1

1Department of Nutrition & Dietetics, Technological Educational Institute of Crete (TEI of Crete), 723 00 Sitia, Greece

Introduction: Prevention of obesity in schools has been planned by developing and then by evaluating the effectiveness of a Web-based Dietary Intervention. The research project „Evaluation of a Web-based Dietary Intervention among primary school children“ is being carried out in a randomly selected sample of Elementary Schools in central/eastern Crete.

Objective: The aim is to evaluate the effectiveness of the dietary intervention by measuring body composition and dietary behavior of children prior to and after the intervention.

Methods: The nutritional intervention (material presented in another abstract) has been applied in a number of primary schools in ages 8–11. We followed two interventional approaches. The first is the ‘traditional’ intervention, which requires the presence of a dietitian for the lectures. The second is web-based, where the students attend digital presentations on nutrition and play respective interactive games, assisted by their teachers.

For body composition measurements the methods BIS, NIR, triceps and circumferences were employed, while for dietary behavior a long questionnaire was distributed. For body composition measurements the methods BIS, NIR, triceps and circumferences were employed, while for dietary behavior a long questionnaire was distributed.

Results: A statistically significant decrease was found (independent samples t-test) in %BF (P < 0.0001), as well as in triceps (P = 0.002) of children participated in the intervention courses (N=382) compared to the control group (N=86). There was no difference between the two intervention methods or between boys and girls. In parallel, a statistically significant improvement of dietary behavior was recorded.

Conclusions: The dietary intervention applied to 8–11 years old children was found to be effective in terms of decreasing the %BF levels and in improving the dietary behavior.

Acknowledgement: The current project is implemented through the Operational Program „Education and Lifelong Learning“ action Archimedes III and is co-funded by the European Union (European Social Fund) and Greek national funds (National Strategic Reference Framework 2007 - 2013). We thank the teachers of participating schools, as well as Dr. Roussakis and Mr. Klinakis for their valuable help.

T7:PO.037

Trends in obesity and low birth weight among macedonian women in the period 2004–2013 in trends in obesity and low birth weight among macedonian women in the period 2004–2013

Spasovski M.1, Kasapinov B.1, Gudeva Nikovska D.1

1Department of Social Medicine, Faculty of Medicine, University Ss Cyril and Methodius, Skopje, Republic of Macedonia

In our study we have analyzed 23000 births in the 10 years period 2004–2013, reported and recorded in the national statistics by National Institute of Public Health. In the analyzed period, the average infant mortality rate (IMR) was 10.44/1000 live births [95% CI, 9.25 – 11.63]. Analyzed by 5-years intervals, IMR for 2004-2008 was 11.5 [95% CI, 10.18 – 12.82], while in the period 2009–2014 the rate was 9.38 [95% CI, 7.81 – 10.96], with remarkable continuous decrease. However, there are regional differences, with highest average IMR registered in Skopje and Polog region (11.12/1000 live births), while the rate is lowest in North-East region (8.18/1000). Another social determinant associated with IMR is mother’s education, with IMR of 15.9/1000 in mothers without education, compared to 4.7/1000 in mothers with university education. Smoking, alcohol consumption and adolescent pregnancy are identified as main behavioral risk factors for infant mortality, while main biological and social factors are perinatal depression, bacterial infections, domestic violence and mother’s body weight. Smoking, substance abuse, maternal infections and obesity have been identified as conditions that are compromising fetal development and result in pre-term delivery, low birth weight, respiratory problems and chronic conditions that can lead to death of the newborn.

Holistic approach in defining strategies and implementation of public health interventions is key to risk mitigation and provision of environment in favor of minimizing risks. There is also implicit need to stimulate quantitative and qualitative research aimed at identification of specific characteristics of infant mortality in Republic of Macedonia and development of appropriate programs to address them, based on research data.

Acknowledgement: The study has been funded by University “Sts. Cyril and Methodius” – Skopje. The study has been funded by University “Sts. Cyril and Methodius” – Skopje.

T7:PO.038

The role of obesity in hypertension - Epidemiological long-term trends in the Austrian population

Großschädl F.1, Stolz E.1, Mayerl H.1, Freidl W.1, Räsky E.1, Stronnegger W.1

1Institute of Social Medicine and Epidemiology, Medical University of Graz, Graz, Austria

Introduction: There is a lack of empirical evidence for the development of hypertension prevalence and its related factors. Therefore the aim of this study is to analyze the prevalence and long-term trend of hypertension in Austria and identify subpopulations that are affected the most (stratification by obesity, sex, age, educational level).

Methods: This representative population-based study is based on self-reported data of adults (mean age: 47.7 ± 17.5; n = 178,818) that were taken from five national health surveys between 1973 and 2007. An adjustment of self-reported BMI was performed based on a preliminary validation study. Obesity was defined as a BMI ≥ 30 kg/m2. Absolute changes (AC) and aetiologic fractions (AF) were calculated from logistic regressions to measure trends. To quantify the extent of social inequality, a relative index of inequality (RII) was computed.

Results: During the study period the age-standardized hypertension prevalence increased from 1.0% to 18.8%, with a considerable rise from 1991 onwards. There was a positive trend in all subpopulations, with the highest AC among obese women (+50.2%) and obese subjects ≥ 75 years old.
Obesity-related breast cancer risk is higher in women with Asian than white ancestry

Maskarinec G.1, Morimoto Y.1, Wilkens L.R.1, Henderson B.E.2, Kolonel L.N.1, Le Marchand L.1

1Institute of Molecular BioMedicine, Medical Faculty, Comenius University, Bratislava, Slovakia, 2University of Southern California, Los Angeles, CA, USA

Introduction: Breast cancer incidence remains lower in Asian than Western countries, while rates in Asian migrants have risen. Although obesity increases postmenopausal breast cancer risk and mortality across populations, the relation appears to differ by ethnicity. This review examines the association of obesity with breast cancer in women of Asian and white ancestry and proposes potential mechanisms of action.

Methods: Using data from the Multiethnic Cohort (MEC) as well as published reports from women with Asian ancestry, risk estimates were compared by ethnicity.

Results: A higher risk for Japanese than white women with a body mass index (BMI) >30 kg/m² was found in the MEC (HR=1.59; 95%CI: 1.24–2.05 vs. HR=1.38; 95%CI: 1.24–1.53) when compared to normal weight participants (1). The risk associated with a high waist to hip ratio (WHR) was also stronger for breast cancer incidence (2) and mortality (3) among Asian American than white women. This disparity may be due to a higher proportion of visceral than subcutaneous adipose tissue resulting in varying levels of adipokines and inflammatory markers (4).

Conclusion: Anthropometric measures from imaging are needed to understand the relation between obesity, biomarkers, and breast cancer across ethnic groups.

Acknowledgement: Research relating to this abstract was funded by grants R37CA54281 and UM1CA164973 from the US National Cancer Institute.

References:

Association between semicarbazide sensitive amine oxidase/soluble Vascular adhesion protein-1, insulin resistance and central obesity in adolescent males

Koborová L.1, Gurecká R.1, Szikárla É.2, Tábi T.1, Šebeková K.1

1Institute of Molecular BioMedicine, Medical Faculty, Comenius University, Bratislava, Slovakia, 2Department of Pharmacodynamics, Faculty of Pharmacy, Semmelweis University, Budapest, Hungary

Introduction: In the adult type 2 diabetes the activity of semicarbazide sensitive amine oxidase (SSAO), analogous to vascular adhesion protein-1 (VAP-1), is increased; resulting in the production of H2O2 and (among others) methylglyoxal (MGO), Enhanced oxidative stress as well as MGO might induce insulin resistance (IR). In diabetics, elevated SSAO/VAP-1 levels are linked to cardiovascular complications. We asked whether alteration in SSAO/VAP-1 system occurs already in early stages of IR, with regard to presence/absence of central obesity (CO).

Methods: In a cross-sectional study SSAO activity (determined radio-metrically) and sVAP-1 levels (commercial ELISA) were determined in 4 groups of male Caucasian non-diabetic adolescents aged 17-to-21-years: 1/ lean insulin sensitive (LIS, n=33), 2/ lean IR (LIR, n=32), 3/ CO insulin sensitive (OIS, n=32), and 4/ CO-IR (OIR, n=31). CO was classified as waist-to-height ratio >0.5, IR as QUICKI<0.319.

Results: No significant between-group differences either in the activity of plasma SSAO (LIS=61 ± 18, LIR=60 ± 22, OIS=61 ± 16, OIR=60 ± 14 pmol/mg/h), or the levels of sVAP-1 were revealed. Enzyme activity of SSAO correlated significantly with concentrations of circulating sVAP-1 (R²=0.33; p < 0.001).

Conclusion: In non-diabetic adolescent males presence of cardiovascular risk factors such as CO, IR or their concurrent manifestation is not associated with altered activity of SSAO or circulating sVAP-1 levels. Whether SSAO/sVAP-1 alterations become manifested in presence of risk factors in older subjects prior to manifestation of diabetes remains to be elucidated. Satisfactory correlation between determination of plasma SSAO activity and sVAP-1 concentration suggest that the methods could substitute for each other.
Abstracts

T7:PO.042
Is There an Association Between Weight and Dental Caries in School Aged Children: Effect of Being Overweight or Low Weight
Karaci I.S.1, Tekciçek M.1,2, Koskal E.1
1Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara, Turkey,
2Department of Pediatric Dentistry, Faculty of Dentistry, Hacettepe University

Introduction: Body weight status and dental caries has been associated in children by several studies in recent years. This study was aimed to evaluate the relationship between antropometric measurement and body composition with dental caries of children.

Methods: This study was conducted 12 ages 96 girls and 92 boys totally 188 children. Anthropometric measurements of children were taken and body fat percentage (%) was measured by bioelectric impedance analyzer. Body mass index (BMI) was evaluated according to age and gender with the reference of WHO 2007 for 5–19 years. Oral health clinical examinations of children were checked by a dentist. Mean DMFT and dmft index are used to evaluate dental caries status of children.

Results: The children were divided into three groups as underweight (9.6%), normal weight (44.7%), and overweight (45.7%). It was found that 48.3% of children had one tooth decay at least and mean DMFT was 1.1 ± 1.41. There was a negative correlation between body weight, waist circumference, BMI, body fat and dmfs with dmft index and number of temporary teeth caries (p < 0.05). Underweight children had higher DMFT and dmft index value and number of decay in primary teeth, than obese children but the difference was not found significant (p > 0.05). The number of temporary decay and filling teeth were lower in obese children. Children who have higher body fat percentage had better values of oral health indicators but the difference between the groups was not found significant (p > 0.05).

Conclusion: Development of dental caries is associated with underweight as obesity in children. Maintaining of ideal body weight and prevention of underweight and obesity with providing adequate and balance nutrition are important for prevention of dental caries in children.

T7:PO.043
Association of serum 25-hydroxyvitamin d and parathyroid hormone with hypertension in middle-aged and older korean adults
Kim D.1, Kim J.1,2
1Department of Medical Nutrition, Graduate School of East-West Medical Science, Kyung Hee University, Yongin, South Korea,
2Research Institute of Medical Nutrition, Kyung Hee University, Seoul, South Korea

Background: Previous studies have suggested that serum 25-hydroxyvitamin D [25(OH)D] and parathyroid hormone (PTH) levels are associated with hypertension. However, the associations have yet to be studied in Korea. This study explored the relationship among serum 25(OH)D, PTH concentrations and the risk of hypertension in middle-aged and older Korean adults using the most recent nationally representative survey data.

Methods: A population-based, cross-sectional study was conducted with data collected from 5,260 Korean adults (aged ≥ 50 years) who participated in the 2010 and 2011 Korean National Health and Nutrition Examination Surveys. Hypertension was defined as a systolic blood pressure ≥ 140 mmHg, diastolic blood pressure ≥ 90 mm Hg, or current use of antihypertensive medication.

Results: The prevalence of hypertension significantly increased according to the quartiles of serum PTH levels (P < 0.0001), but not of serum 25(OH)D levels. In multivariable logistic analysis, the adjusted odds ratios (ORs) for hypertension were significantly higher among subjects in the highest quartile than among subjects in the lowest quartile of serum PTH level, after adjusting for potential confounders [OR = 1.28, 95% confidence interval (CI) = 1.04–1.59, P for trend = 0.0007]. The adjusted ORs for hypertension tended to decrease across the quartiles of serum 25(OH)D level, but the associations were not significant.

Conclusion: Serum 25(OH)D was not associated with the risk of hypertension, whereas serum PTH was positively associated with the risk of hypertension, suggesting that serum PTH may be an independent risk factor for hypertension in middle-aged and older Korean adults.

Acknowledgement: This research was supported by the Basic Science Research Program of the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (NRF2012R1A1A1012317).

T7:PO.044
Economic and public health burden of obesity in hungary
Burik L.1
1University of Debrecen,
2Hungarian Society for the Study of Obesity

Background: “Obesity pandemic” reached Hungary, resulting visible high prevalence in the population. Previous evaluation in Hungary was completed in 1988, while obesity related health care expenditures were never estimated.

Aim: (1) to collect updated prevalence data (2): estimating the economic burden of overweight/obesity for health budget.

Method: (1) Anthropometric, educational and morbidity data of persons above 18y were registered in community and primary care settings, representative in all regions of Hungary. (2) National Health Insurance Fund expenses related to inpatient (hospital), outpatient services and sick-leave finances related to obesity, diabetes and hypertension were analyzed. The incidence of obesity was calculated as 80% among diabetics and as 60% among patients with hypertension.

Results: (1) Data (BMI, waist circumference, educational level) of 40,331 individuals (16,544 men, 23,787 women) were analyzed. Overall prevalence for overweight was 40.4% among men, 31.3% among women, while for obesity 32.0% and 31.5%, respectively. Abdominal obesity was 37.1% in males, 60.9% in females. Data are presented by age-decades as well. The highest odds ratio for overweight was at middle the lowest for obesity at the highest educational level. The highest proportion of obese people lived in villages and in Budapest. Registered metabolic morbidities were strongly correlated with BMIs and both were inversely related to the level of urbanization. (2) According to the estimation 15–18% of total health expenditures and at least 1% of the GDP were spent.

Discussion: There was a shift in the population toward being overweight and moreover obese, mainly in younger generation. Obesity is an important contributor of the increased health care expenditures.

Acknowledgement: Since 25y; it is the first population based survey in Hungary and the first about the national health care expenses. Shortening the abstract needed some compromises in the English grammar.

T7:PO.045
Beyond BMI: Projecting the future burden of obesity in england using different measures of adiposity
Shaw A.1, Retat L.1, Brown M.1, Divajeva D.1, Webber L.1
1UK Health Forum

Introduction: Body mass index (BMI) is a frequently used measure to assess the weight of an individual adjusted for their height. At a population level BMI is a useful tool for monitoring and surveillance, but it can underestimate the risk of disease. Waist circumference (WC) appears to be a better predictor of disease risk, however comparatively fewer data exist. In this study, projections in England to 2050 for BMI and WC were compared.

Methods: Cross-sectional datasets from the Health Survey for England (HSE) for 2006–2011 were used to analyse both BMI and WC. For BMI, 3 categories were used, defined by WHO cut-offs: underweight and healthy weight (<25 kg/m²), pre-obese (25–29.99 kg/m²) and obese (≥30 kg/m²).

Obesity Facts 2015;8(suppl 1):1–247
135
For WC, 3 categories were used as suggested by the WHO [1]. For men: <94 cm, 94–101.99 cm and ≥102 cm and for women: <80 cm, 80–87.99 cm and ≥88 cm. Pearson correlation coefficients of BMI and WC were calculated in R. Projections to 2050 were generated for BMI and WC in males and females by fitting multivariate categorical regression models to the datasets.

**Results:** In '01', the correlation coefficient was 0.43. BMI and WC were predicted to increase over time for males with a greater increase predicted for WC. Preliminary results showing that ~44% will be obese but ~66% will have a WC ≥102 cm by 2050.

**Conclusion:** Our prediction model shows that current predictions of the future burden of obesity related diseases [2] are likely to be underestimated and that predictions may be improved with the inclusion of WC. Understanding how distributions of obesity will change in the future is important for policy resource planning.

**References:**

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**Fig. 1.** Projected BMI prevalence to the year 2050 using HSE data from 2006–2011 for 18–100 year old males.

**Fig. 2.** Projected WC prevalence to the year 2050 using HSE data from 2006–2011 for 18–100 year old males.

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**T7.P0.046**

**Adenovirus-36 infection and its relation to dietary intake and response to in-patient weight management in obese girls**

**Zamrazilova H.1, Alidhoon Hainerova I.1, Dusatkova L.1, Atkinson R.L.4, Sedlackova B.1,2, Lee Z.P.3, Hill M.2, Kunosova M.1, Hainer V.1**

1. Obesity Management Center, Institute of Endocrinology, Prague, Czech Republic
2. Department of Pediatrics and Center for Research of Diabetes, Metabolism and Nutrition, Third Faculty of Medicine, Charles University, Prague, Czech Republic
3. Faculty of Science, Charles University, Prague, Czech Republic
4. Obetech Obesity Research Center, Richmond, VA, USA

**Introduction:** Human adenovirus 36 (Adv36) enhances an accumulation of fat mass. The response to weight management program (WMP) as well as an evaluation of dietary intake with respect to the presence of Adv36 antibodies has not been broadly investigated.

**Methods:** Subjects: 184 Czech obese girls, age 13.0–17.9 years, BMI > 97th percentile for sex and age. WMP: a 4-week in-patient supervised program included decreased dietary intake individually modified according to age and BMI with ensured recommended daily consumption of all essential nutrients and appropriate macronutrient balance, aerobic physical exercise and cognitive behavioral therapy. Adv36 antibodies: competitive enzyme-linked immunosorbent assay. Dietary intake: pre-treatment evaluation of 3-day dietary records by PC program NutriMaster. Anthropometric measurements, clinical examination and fasting laboratory assessment performed before and after WMP.

**Results:** In the pre-treatment period no difference in energy and nutrient intake between Adv36 infected and uninfected girls was revealed. After the intervention Adv36 positive girls presented with significantly greater decrease of z-score of waist circumference (p = 0.024), waist-to-hip ratio (p = 0.007) and weight-to-height ratio (p = 0.019) compared to Adv36 negative girls. On contrary the sum of four skinfolds decreased significantly more in Adv36 negative than in Adv36 positive individuals (p = 0.013).

None of the further studied metabolic and hormonal parameters showed any significant relevance to Adv36 status in response to in-patient WMP.

**Conclusion:** In infected obese girls WMP led to a greater decrease of abdominal fat but to a preservation of subcutaneous fat.

**Acknowledgement:** Research related to this abstract was funded by these grants: IGA MZCR NT/13792-4, MH CZ-DRO (Institute of Endocrinology - EU, 000235761), CZ0123 from Norway through the Norwegian Financial Mechanisms.

**T7.P0.047**

**Impact of body mass index (BMI) on clinical in-stent restenosis (ISR), de-novo stenosis (DNS) and repeat revascularization (RR) rate in patients undergoing percutaneous coronary intervention (PCI)**

**Simoni L.1, Shirk E.1, Kallashi N.1, Kabili S.1, Goda A.1**

1. Cardiology Service, University Hospital Center "Mother Theresa" Tirana

**Background:** Previous studies have described an “obesity paradox” with prognosis and various treatments of cardiovascular disease, including PCI. Until now exist contradictory data for the impact of BMI on clinical ISR, DNS and RR rate in patient undergoing PCI. We sought to investigate the impact of BMI on clinical ISR, DNS and RR rate in patients following first-time elective PCI.

**Methods:** Were included 735 patients from September 2011 to November 2013 in Department of Cardiology and followed for one year. Patients were categorized according to BMI groups. BMI 18.5 - 24.9 kg/m² as normal, 25 - 29.9 kg/m² overweight and > 30 kg/m² obese group. Primary endpoints were defined as the rate of clinical ISR, DNS and RR (PCI/CABG) in survivors.

**Results:** During follow-up survived 726 patients. Baseline clinical parameters were more severe in overweight and obese individuals. Obese compared to normal weight individuals had a higher length of stents per person (36.7 ± 22.02 vs 31.7 ± 17.5 p = 0.016) and a larger diame-
Obesity Facts 2015;8(suppl 1):1–247 

Abstracts

T7.PO.049

Higher BMI z-score, frequent meals and a propensity to consume sugar are associated with cariogenic microorganisms in children

Aridorsson L1, Birkhed D1, Hunsberger M1, Lanfer A1, Lissner L1, Mehlig K1, Måland S1, Eiben G1

1Section for Epidemiology and Social Medicine, University of Gothenburg, Gothenburg, Sweden;
2Department of Cardiology, Institute of Odontology, Sahlgrenska Academy, University of Gothenburg, Sweden;
3Department of Paediatrics, Queen Silvia Children's Hospital, University of Gothenburg, Sweden;
4Leibniz Institute for Prevention Research and Epidemiology - BIPS GmbH, Bremen, Germany

Introduction: The microorganisms mutans streptococci (MS) and lactobacilli (LB) ferment carbohydrates from the diet and contribute to caries by lowering the pH in dental plaque. In adults, high counts of MS and LB in saliva have been associated with overweight, but in children evidence is limited. The objective of the present study was to investigate the association between salivary counts of MS and LB and children's weight status, while considering associated covariates.

Methods: Cross-sectional analysis of 271 children in Sweden, from the IDEFICS study. Saliva and anthropometric measures were obtained. MS and LB counts were dichotomized into low and medium-high counts (cut-off values related to caries-risk). Number of meals, propensity to consume sugar and sleep duration were assessed by parental questionnaire and a 24-hour dietary recall. Logistic regression with forward selection of variables was used to predict medium-high versus low counts of MS and LB.

Results: Medium-high counts of MS, but not LB, were positively associated with higher BMI z-score (OR 1.6; 95% CI 1.1–2.3). Furthermore, associations were found between medium-high counts of MS and larger number of meals (OR 1.5; 95% CI 1.1–2.2), higher sugar propensity (OR 1.1; 95% CI 1.0–1.3), longer sleep duration (OR 0.5; 95% CI 0.3–1.0) and female sex (OR 2.4; 95% CI 1.1–5.4).

Conclusion: Higher BMI z-score was independently associated with medium-high counts of MS. Limiting intake frequency of sugar-rich foods and beverages, and promoting adequate amount of sleep could provide multiple benefits in public health interventions aimed at reducing caries and overweight.

Acknowledgement: We gratefully acknowledge Ann-Britt Lundberg at the Department of Cardiology at the Institute of Odontology in Gothenburg for analyzing the saliva samples.

T7.PO.050

The prevalence of obesity in hospitalised patients and ethnicity related variance in access to healthcare may adversely influence management of obesity

Shah S.R.1, Coppack S.1, Emmanuel L1

1Department of Metabolic Medicine, The Royal London Hospital, Barts Health, London, United Kingdom

Introduction: In England 67% of men and 57% of women are overweight or obese. We set out to identify the prevalence of obesity in patients admitted acutely unwell, and assess for sleep apnoea. At present there is no data exploring the lack in access to healthcare by ethnic minorities in the UK.

Methods: We assayed all medical patients admitted to The Royal London Hospital over 4 weeks (n=441). Weight, height and body mass index (BMI) calculated. Epworth Sleepiness Scale score calculated, and primary/secondary care consultations in relation to obesity over a year recorded. BMI by ethnicity and Epworth score were analysed by one-way analysis of variance (ANOVA).

Results: 50.1% of patients were classified as overweight or obese and 26.3% of patients had their weight recorded in the bedside clinical notes. No significant difference (p > 0.05) in BMI across ethnic groups. The average BMI of women was significantly greater (27.03 vs 25.18, p < 0.05).
Worryingly 53.8% of the 40.0–49.9 BMI group and 66.7% of the ≥50.0 BMI group were aware of their stage of obesity. 25.6% of overweight and obese Caucasians sought out healthcare advice vs 22.8% of ethnic minority patients. The mean Epworth score was; 5.77 for the 30.0–39.9 BMI group and 10.62 for the 40–49.9 BMI group.

**Conclusion:** The BMI of women was greater and obesity prevalence in hospitalised patients is low, contrary to other (HSE 2012) reports. There was no difference in BMI across ethnic groups, but fewer ethnic minority patients sought healthcare advice than Caucasian counterparts due to the cultural differences Iqbal G et al (2012). A clear correlation between BMI and the Epworth Sleepiness Scale. Only a quarter of patients had weight recorded on admission, reflects our approach to managing obesity in secondary care.

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**Fig. 1.** Bar graphs to show Epworth sleepiness score across BMI ranges

**Fig. 2.** Bar graphs to compare health care access across ethnicity variance

**Fig. 3.** Bar graphs to illustrate lack of awareness of obesity stage by severe obese patients

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**T7.P0.051**

**Mediterranean Diet and telomere length: The predimed-navarra study**

Garcia Cazón S.¹, Martínez-González M.A.²,³, Razquin C.²,³, Bes-Rastrollo M.²,³, Martínez J.A.¹,²,³, Zaïlaa G.²,³, Martínez J.A.¹,3,4, Zalba G.⁵, Martínez J.A.¹,3

¹Department of Nutrition, Food Science and Physiology, University of Navarra, Pamplona, Spain,
²Department of Preventive Medicine and Public Health, University of Navarra, Pamplona, Spain,
³CIBER Fisiopatología de la Obesidad y Nutrición (CIBERobn), Instituto de Salud Carlos III, Madrid, Spain,
⁴Centre for Nutrition Research, University of Navarra, Pamplona, Spain,
⁵Department of Biochemistry and Genetics, University of Navarra, Pamplona, Spain

**Introduction:** A healthy lifestyle has been associated with longer telomeres, but whether a Mediterranean dietary pattern affect telomere length (TL) has not been fully elucidated yet. The aim of this study was to assess the cross-sectional relationship between TL and the adherence to a Mediterranean diet (MeDiet) in high cardiovascular risk subjects.

**Methods:** A total of 521 participants (55–80 years, 55% women) were randomly selected from the PREDIMED-NAVARRA trial. Leukocyte TL was measured by RT-PCR and age-adjusted z-scores for TL were calculated. A validated 14-item questionnaire was used to appraise adherence of participants to the MeDiet.

**Results:** A significant interaction for TL was found between the adherence to MeDiet and sex, since as the adherence to MeDiet increased, TL was predicted to increase only in women (P for interaction=0.049). Female subjects with a high adherence to a MeDiet (≥9.3 points) had longer telomeres than those with a lower adherence (<9.3 points) in multiple-adjusted models (PANCOVA=0.009). Interestingly, differences in TL between quintiles groups of adherence to MeDiet among women were tested, where the higher the compliance to a Mediterranean dietary pattern, the longer the telomeres in adjusted models (P trend=0.015). Moreover, a higher adherence to MeDiet (Q5) was associated with a 34% lower risk of having shorter telomeres (z-scores≤ –1).
Conclusion: A greater adherence to a Mediterranean dietary pattern was associated with longer telomeres in high cardiovascular risk women in the frame of the PREIDMED trial.

Acknowledgement: Research relating to this abstract was funded by Linea Espe- cial University of Navarra (LE/97), Spanish Government (FIS-ISFII: PI051579, PI050976, PI070246, PI081943, PI1002293, RTIC 06/0045, CIBERobn, CNIC/06, SAF-2010-20367) and Government of Navarra (PI41/2005, PI79/2006, PI36/2008, PI54/2009). The FPU fellowship to García-Calzón is gratefully acknowledged.

T7:PO.052
Non-overweight apples’ have higher cardiometabolic risk factors than overweight pears’: Waist-to-height ratio is a better screening tool than BMI for plasma cholesterol and glycated haemoglobin

Gibson S.1, Ashwell M.2,3
1Sig-Nurture Ltd, Surrey GU1 2TF, UK,
2Ashwell Associates, Ashwell, Herts SG7 5PZ, UK,
3Oxford Brooks University, Oxford OX1 0BP, UK

Introduction: We have previously shown that using BMI as a sole proxy for obesity and ignoring measures of central obesity such as waist to height ratio (WHHR) would misclassify around 10% of the whole UK population, and more than 25% of those of normal weight, as ‘not at risk’ (1).

Objective: To explore the implications of this ‘misclassification’ in screening for the cardiometabolic risk factors, total cholesterol (TC) and glycated haemoglobin (HbA1c) using data from the Health Survey for England 2009 (HSE).

Results: In HSE adults aged 16y and over (n=2917), 41% of men and 29% of women classified as ‘normal’ by BMI, have WHHR exceeding 0.5. Overall, 12% of the total population would be missed by BMI screening (non-overweight ‘apples’). When the HSE population was classified into four groups (2x2) using standard boundary values of BMI (<25kg/m²) and WHHR (<0.5), mean TC was, as expected, lowest in the group with low normal BMI and low WHHR (mean 5.1mmol/L) and highest among those with high BMI and high WHHR (mean 5.77mmol/L). Of greater interest, the group with ‘low normal BMI but high WHHR (non-overweight ‘apples’) had significantly higher mean TC than the group with high BMI but low WHHR (overweight ‘pears’) (5.73mmol/L SE 0.08 vs. 4.98mmol/L; SE 0.11; P < 0.0001). Similarly, HbA1c levels were higher among non-overweight ‘apples’ than among overweight ‘pears’ (5.62% SE 0.03 vs. 5.33% SE 0.04; P < 0.0001). These differences were also significant in both sexes.

Conclusions: This study not only supports our previous findings on the superiority of WHHR over BMI as a primary screening method for morbidty and mortality risk, but also demonstrates the potentially severe implications of misclassification by BMI alone in screening for cardiometa-bolic risk factors.

Reference:

T7:PO.054
Association between body mass index and waist circumference in 7 years old schoolchildren in bulgaria

Rangelova L.1, Duleva V.2, Petrova S.1
1National Center of Public Health and Analyses, Sofia, Bulgaria

Introduction: Obesity of children is an important health problem in Bulgaria. The aim is to study and evaluate association of the overweight (OW) and obesity with WCs and waist-to-height ratio (WHHR) in children 7-year-old.

Methods: In 2013, a cross-sectional survey on 3335 schoolchildren aged 7 years, was conducted in the frame of the WHO European Childhood Obesity Surveillance Initiative (COSI). Weigh, height and WC of the children were measured. OW and obesity were assessed by BMI, using WHO Growth Reference 2007. Prevalence of OW and obesity among children with WC>90P and WHHR were examined. The results from the study in 2013 were compared with those obtained in the COSI survey carried out in 2008 on children in the same age.

Results: The prevalence of OW among children was 15.1%, obesity-12.9%. The rate of children >90P for WC was 9.5%. The prevalence of OW and obesity among children with WC>90P was 97.8%, as 2.2% with WC>90P were with normal BMI. Of the children with obesity 62.4% had WC>90P. Of the children with OW 8.3% had WC>90P, as it was determined a significant difference in the prevalence of high WC among boys and girls (5.2% vs.11.4%). WHHR values for the children with normal BMI was 0.43; with OW was 0.47 and those with obesity 0.53. The comparison of the obtained results in 2013 with those from the COSI survey in 2008 showed close high rates of OW, obesity as well as the same associations with WC/ WHHR. The results confirm the possibility to use WHHR as appropriate criterion for OW/obesity assessment.

Conclusions: Overweight and obesity among 7-year-old children in Bulgaria are still of serious public health concern. Screening for abdominal obesity is important and has to be done even for children with BMI in the normal range, using either WC and/or WHHR.
Pai-1/adiponectin and conicity index is a moderate correlation between central obesity and inflammation in women.

**Busch Furlan C.P., Testa Carvalho L.O., Moraes A.S., Badan R.S., Maróstica Junior M.R., Garanti D.A.**

1Department of Food and Nutrition, Faculty of Food Engineering, University of Campinas (UNICAMP), Campinas-SP, Brazil.

2Obesity Study Group (GEO), Federal University of São Paulo (UNIFESP), Santos-SP, Brazil.

**Introduction:** Visceral adiposity is the key promoter of chronic subclinical inflammation characterized by obesity condition. Inflammation cytokines that are secreted by adipocyte like the plasminogen activator inhibitor-1 (PAI-1) are involved in the cardiovascular pathogenesis events. Unlike the unsaturated fatty acids, the saturated fatty acids are associated with cardiovascular diseases and increase PAI-1. This study goal is to analyze the hypothesis of convergence between inflammation marker (PAI-1), food consumption, anthropometric and body composition indicators.

**Methods:** Forty-two volunteers, 31 women, aged 23–60 years with BMI 26–48 kg/m² were selected. For nutritional assessment it was used the body mass index (BMI), conicity index and three days of food consumption alternated. Blood samples were collected after 12h overnight fasting to analyze PAI-1, adiponectin and leptin concentrations. Individuals were grouped using adjusted terciles of the PAI-1 levels.

**Results:** The first tercile of the PAI-1 level was between 18.05–10.35 ng/mL, the second tercile between 10.30–8.11ng/mL and the third tercile between 7.9–3.52 ng/mL. The ingested fat quality was lower than the recommended, saturated and unsaturated fatty acids showed similar consumption: about 10%. The third tercile showed significant (p <0.05) reduction in calories intake and circulating PAI-1. There was a moderate positive correlation between PAI-1/adiponectin ratio and conicity index (r=0.54). The prevalence of underweight 17.4%, normal weight 68.5%, overweight 12.1% and obese 2.0% were found. A total of 16.9% subjects can be used for another method to strengthen clinical subjective data.

**Conclusion:** The prevalence of abdominal obesity has been found at high levels for overweight and obese adolescents. It should be emphasized that abdominal obesity is a condition that should be considered for underweight and normal adolescents. In accordance with these results, abdominal obesity should be regularly assessed for non-obese adolescents to prevent cardiovascular risks, metabolic syndrome and other related disease.
Abstracts

Results: Results show that values of peak pressure and maximum force are greater in group 2, and significant differences are found in meta 2-5, midfoot and heel areas at each age. The values of load rate are greater in group 2, but no significant difference exists. The impulse of two groups are greater in toe 1, meta 2-5 and heel areas, and significant differences are found in meta 2-5, midfoot and heel areas at almost each age.

Conclusion: Significant differences in peak pressure and maximum force are obvious, particularly in midfoot, which reveals that obesity can contribute to a lower arch. The values of load rate are both greatest in heel area. Andrew et al.[1] found that the faster the load rate of change, the higher risk of leg injury. Therefore, the protection of heel of children is imperative. The great impulse on big toe of most children provides a potential capacity to valgus.

References:

T7.PO.059
Projection of changes in the prevalence of obesity from 2012 to 2050 in lithuania

Kriaucioniene V1, Petkeviciene J1, Divajeva D2, Knuchel-Takano A2, Webber L1
1Lithuanian University of Health Sciences, Medical Academy, Kaunas, Lithuania,
2UK Health Forum, London, UK

Introduction: Lithuania participates in the EConDA project which is funded by the EU Commission and aims to develop models to test the differential effect of chronic disease interventions in population sub-groups. One aim is to project trends in obesity forward to 2050 by different education level groups.

Methods: The data were obtained from six biennial cross-sectional nationally representative postal surveys from 2000 to 2012. In total, 5602 men and 7712 women aged 20–64 participated in these surveys. Self-reported body weight and height were used to calculate body mass index. Trends in overweight and obesity were projected using multivariate non-linear regression models by age, sex and education level.

Results: Between 2000 and 2012, the prevalence of obesity increased among less educated men from 11.8% to 19.7% and among high educated men from 10.7 to 15.8%. It remained almost stable among low and high educated women being 22.0% and 16.9% in 2012 respectively. The most remarkable increase in the prevalence of obesity was found in the oldest age group (55–64 years) of men (from 14.9% to 32.3%) and of women (from 32.9% to 41.7%). By 2050, preliminary results show the prevalence of obesity among men was projected to increase across all age groups, with the exception of 20–29 year olds, irrespective of education. In high educated women, a slightly downward trend in the prevalence of obesity was projected. The proportion of obesity in less educated women was projected to increase across all age groups, with the exception of women older than 34 years old.

Conclusion: There are educational differences in the distribution of obesity predicted to 2050 in Lithuania.

T7.PO.060
Application of the uk foresight obesity model in malta: Health and economic consequences of projected obesity trends

Cauchi D1, Gauci D2, Calleja N3, Marsh T4, Webber L1
1Department of Health Services Research and Policy, Faculty of Public Health & Policy, London School of Hygiene and Tropical Medicine, UK,
2Health Information and Research Directorate, Ministry for Energy and Health, Malta,
3UK Health Forum, UK

Introduction: There is increasing worldwide concern about the health and economic burden of obesity. The aim of this research is to project disease burden and direct healthcare costs for a number of obesity-related conditions in Malta using the model developed by the UK Health Forum for the Foresight: Tackling Obesities project.

Methods: Self-reported Body Mass Index (BMI) data was obtained from nationally representative surveys (including four Health Behaviour in School-aged Children surveys and two European Health Interview Surveys for children’s and adults’ BMI respectively). Routine data sources were used to derive incidence, prevalence, mortality and survival for twelve obesity-related disease conditions as inputs for the model. A two-stage modelling process is used to predict future BMI rates, disease prevalence and related costs in a variety of scenarios. Stage 1 employs a non-linear multivariate regression model to project BMI trends; stage 2 employs a microsimulation approach to produce longitudinal disease/cost projections, and test the impact of reductions in BMI or the effect of public health interventions upon future incidence of these disease. Related direct or indirect healthcare costs of each disease are calculated on a cost-per-case basis.

Preliminary results: Initial projections based on child BMI prevalence data show a small decrease in the percentage of overweight and obese boys aged between 11 and 15 years by 2030, even as the percentage of overweight and obese 11–15 year old girls increases significantly within this same time period. Overweight related disease costs and the impact of a number of interventions such as the introduction of a sugar sweetened beverage tax are being modelled.

Conclusion: These findings may have significant implications for policy, effectively highlighting the need for effective strategies to prevent this avoidable health and economic burden.

Acknowledgement: The authors would like to acknowledge the invaluable input of Dr. Alexandra Distefano (Clinical Performance Unit, Malta) and Dr. Kathleen England (Cancer Registry, Malta).

T7.PO.061
Dxa-derived body fat indices of properly controlled hypertensive patients are lower than those of non-properly controlled patients in korean women

Kim K.K1, Lim S.H1, Hwang I.C1, Lee K.R2
1Department of Family Medicine, Gachon University Gil Medical Centre, Incheon, Republic of Korea,
2Department of Family Medicine, Gachon University Dongsincheong Gil Hospital, Incheon, Republic of Korea

Introduction: The proper blood pressure (BP) control is important in hypertensive patients for preventing stroke and cardiovascular diseases. Obesity, defined by BMI, is not only a risk factor of hypertension but also a related factor to BP control. However, it is uncertain whether body fat itself is related to BP control.

Methods: Data of the Fourth and Fifth Korea National Health and Nutrition Examination Survey (KNHANES IV-V) were applied in this study. Of these, 2955 hypertensive subjects, who were 19 years and older with DXA data and took antihypertensive drugs more than 20 days a month, were included.

Results: The proportion of the proper BP control (systolic BP under 140 mmHg and diastolic BP under 90 mmHg) was 59.1%. In male, the serum level of total cholesterol (P < 0.001), HDL cholesterol (P = 0.031) and triglyceride (P < 0.001) were lower in properly BP controlled group than in nonproperly controlled group. However, there were no significant differences in DXA-derived body fat indices between the two groups. In female, the serum level of total cholesterol (P < 0.001) and triglyceride (P = 0.009) were lower in properly BP controlled group than in nonproperly controlled group. However, there were no significant differences in DXA-derived body fat indices between the two groups. In female, the serum level of total cholesterol (P < 0.001) and triglyceride (P = 0.009) were lower in properly BP controlled group than in nonproperly controlled group. However, there were no significant differences in DXA-derived body fat indices between the two groups in Korean hypertensive patients.
Clinical potential of 8-electrode BIA for sarcopenic obesity diagnosis and monitoring

Pietrobelli A.1,2, Zheng J.1, Jia G.1, Heymsfeld S.B.2
1Pediatric Unit, Verona University Medical School, Verona, (ITALY),
2 Pennington Biomedical Research Center, Louisiana State University System, Baton Rouge, LA, (USA).

Introduction: Sarcopenic obesity, a pathological state with excess fat and depleted skeletal muscle mass (SM), is increasingly being recognized as a phenotype associated with adverse clinical outcomes. How does 8-electrode multi-segment bioimpedance analysis (BIA) compare to dual-energy x-ray absorptiometry (DXA) as the reference for estimating SM?

Methods: Appendicular lean soft tissue (ALST; arm, leg, and total) was measured by DXA and predicted by two BIA systems, MC-780 and MC-980 (Tanita Corp, Tokyo, Japan) in 74 healthy men and women age >18 yrs varying in BMI. The MC-780 and 980 results were almost identical and findings are therefore presented only for the MC-780.

Results: Total body fat mass measured by DXA and was highly correlated with BIA estimates (R2, 0.94, p < 0.001). Arm, leg, and total ALST for DXA and BIA (kg, X ± SD) are shown for males (M), females (F), and combined M+F (T) in the table. There were no significant differences observed in the regional and total ALST measures across any of the groups and group Ds were all <1 kg. DXA and BIA total ALST correlations ranged from 0.92–0.94 (all, p < 0.001). ARM DLEG D TOTAL DDXA M 8.4 ± 1.7 20.9 ± 3.8 F 4.5 ± 1.0 14.2 ± 2.6 T 6.4 ± 2.4 17.5 ± 4.7 23.9 ± 7.0 MC-780 M 7.8 ± 1.4 F 0.6 ± 0.7 22.2 ± 3.4 1.2 ± 4.4 ± 0.7 –0.1 ± 0.6 14.5 ± 1.7 0.3 ± 1.2 ± T 6.1 ± 2.0 –0.3 ± 0.7 18.2 ± 4.7 0.8 ± 1.3 24.3 ± 6.7 ± R2 0.93 0.92 0.94

Conclusion: 8-electrode multi-segment BIA has the potential for diagnosing and monitoring sarcopenic obesity in the clinical setting.

Association of serum mir-155 and mir-146a with male subfertility and obesity

Dermitzaki E. 1, Bobjer J. 2, Katinaki M. 1, Lyroni K. 1, Margioris A.N. 1, Lundberg Giwerman Y. 1, Giwerman A.M. 2, Tsatsanis C. 1
1 Lab Clinical Chemistry, Medical School, University of Crete, Heraklion, Crete Greece, 2 Reproductive Medicine Research Group, Dept. of Clinical Sciences Malmö, Lund University, Malmö, Sweden, 3 Reproductive Medicine Centre, Skhne University Hospital Malmö, Lund University, Malmö, Sweden, 4 Molecular Genetic Reproductive Medicine, Dept. of Clinical Sciences Malmö, Lund University, Malmö, Sweden

Introduction: Micro RNAs (miRNAs) are small non-coding RNAs that regulate mRNA expression and stability. miRNAs are also present in the serum and have been identified as potential biomarkers for several disorders including inflammatory diseases. Among the different miRNAs, miR-155 and miR-146a are central regulators of inflammation and their intracellular levels are elevated in activated macrophages. Male subfertility has been associated with obesity-related Low Grade Systemic Inflammation (LGSI), as well as with androgen deficiency. Aim of this study was to determine potential association of miR-155 and miR-146a with LGSI, hypogonadism and fertility in human serum.

Methods: For this purpose, 60 subjects were randomly selected from an ongoing study on sub fertile men (hypogonadal; n=20, eugonadal; n=20 and control group n=19). Circulating miRNAs, reproductive hormone levels and inflammatory cytokines were measured in the serum.

Results: Serum levels of miR-155 were associated with levels of miR-146a, but only miR-146a was associated with inflammatory markers. MiR-155 was associated with subfertility (for subfertile group 2.23 U, 95%CI 1.7 –2.7 U vs. 1.17, 95% CI 0.98–1.4 U in controls; p = 0.001). ROC analysis indicated that miR-155 with a cutoff value of 1.77 had 60% sensitivity and 95% specificity for identifying subfertility and positive and negative predictive values of 96% and 56% respectively. When used in combination with FSH, specificity and sensitivity were 82% and 84% respectively while positive and negative predictive values were 91% and 70% respectively. No association was observed with any of these miRNAs and BMI, cholesterol, HDL or LDL.

Conclusion: These results suggest that circulating miRNAs may be used as biomarkers of subfertility.

The association of CRP with physical fitness, anthropometry and metabolic syndrome z-score in youth may differ by gender

Kjartansdottir I., Bjarnason R. 1, Arngrimsson S.A. 1, Olafsdottir A.S. 1
1 University of Iceland School of Health Sciences, 2 Department of Pediatrics, Landspitali - University Hospital, Reykjavik, 3 University of Iceland School of Education

Introduction: C-reactive protein (CRP) is a predictor of cardiovascular events in adults but in adolescents the effect is lesser known. The aim of the study was to evaluate the correlation of CRP with anthropometric measurements in adolescents. Secondly, to investigate the association of CRP with markers of glucose metabolism and metabolic syndrome score (MetS z-score) and weather physical fitness had impact on this association.

Methods: A cross sectional study of 16 year old Icelandic adolescents (113 boys and 110 girls). Parameters measured were; body composition and body fat percentage (skinfolds; %BF), blood pressure, CRP, glucose, insulin, triglycerides, HDL and physical fitness (PF) with bicycle (VO2m-
Prevalence of overweight and obesity among newly diagnosed patients with type 2 diabetes mellitus in Durres Albania

Carcani M.1, Toti F.2, Zalla B.6
1Department of Internal Medicine, Regional Hospital Durres, Albania, 2Department of Endocrinology and Diabetes, QSU Mother Teresa Tirana Albania, 6Institute of Public Health, Family Doctor

Aim: Obesity and type 2 diabetes mellitus (DM) strongly affect general health of population worldwide. Obesity is considered to be a strong risk factor for developing type 2 DM. The aim of this study was to evaluate the prevalence of overweight and obesity in newly diagnosed patients with type 2 DM.

Methods: Beginning in January 2013 until December 2014, 8000 patients with type 2 DM were consulted in our department. 1000 of them were diagnosed for the first time with type 2 DM. All these were enrolled in this study. We documented: weight, height, BMI, eating and exercise habits, personal and family history.

Results: 100 of them (10%) had normal body weight, of which 70 were females and 30 were males. 250 patients (25%) were overweight, of which 100 were females (40%) and 150 were males (60%). 650 patients (65%) were obese, of which 430 were females (66%) and 220 were males (34%). Overweight and obese patients didn't have any kind of restrain regarding food intake. They admitted having less or no physical activity.

Conclusion: 90% of newly diagnosed patients with type 2 DM were obese or overweight. This figure makes us realize about the impact that obesity and diabetes have on a patient's life, on society health budget and on what we should do to manage life with obesity and diabetes more easily, to prevent complications and to promote healthier eating and living.

The association between periodontal disease and overweight and obesity: A systematic review

Keller A.1, Rohde J.F.1,2, Raymond K.1, Heitmann B.L.1,3
1Institute of Preventive Medicine, Bispebjerg and Frederiksberg Hospital, Copenhagen, Denmark, 2The Boden Institute of Obesity, Nutrition, Exercise & Eating Disorders, The University of Sydney, Australia, 3Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark

Introduction: Periodontitis and obesity are among the most common chronic disorders affecting the world's adult populations, and recent reviews, primarily based on cross-sectional studies have suggested a potential link between obesity and periodontitis, thus eliminating the possibility to assess temporal relationships and increasing the risk of reverse causality. This review assessed the evidence from longitudinal and experimental studies.

Methods: Intervention and longitudinal studies with overweight or obesity as exposure and periodontitis as outcome were searched through Pubmed/Medline and Web of Knowledge by two researchers.

Results: Eight longitudinal and five intervention studies were included. Two longitudinal studies found a direct association between overweight at baseline and risk of developing periodontitis, and further three studies found a direct association between obesity and development of periodontitis. The 3 remaining studies did not find significant associations. Two intervention studies on the influence of obesity on periodontal treatment effects found that the response to non-surgical periodontal treatment was better among lean than obese patients, while three studies did not report treatment differences between obese and lean.

Conclusion: This systematic review suggests that overweight, obesity, weight gain and increased waist circumference may be risk factors for development or worsening of periodontal disease.

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Association between uric acid and albumin/creatinine ratio in pre-metabolic syndrome

Krajčová-Michalová A.1,2, Cifkova R.1, Wohlfahrt P.1,2,3, Brudhans J.1, Tremblay J.1, Hamet P.4
1Center for Cardiovascular Prevention, Charles University in Prague, First Faculty of Medicine and Thromayer Hospital, Prague, Czech Republic, 2Montreal University Hospital Research Center, CHUM, Montréal, Canada, 3Department of Preventive Cardiology, Institute for Clinical and Experimental Medicine, Prague, Czech Republic

Objective: Association between serum uric acid (UA) and urine albumin/creatinine ratio (ACR) has been observed in individuals with metabolic syndrome (MetS). We evaluated the cross-sectional association between UA and ACR in pre-metabolic individuals.

Methods: In a study of a representative Czech population (n=2895) aged 25–64 years, urinary albumin and creatinine excretion were determined in an early morning spot urine sample. Components of MetS were defined using the joint statement of IDF, NHBLL, AHA, WHO, IAS, and IASO. Individuals presenting with 1 or 2 components were supposed pre-metabolic. Hypertension was defined as systolic blood pressure ≥140 mmHg, or diastolic blood pressure (DBP) ≥90 mmHg, or current use of blood pressure lowering drugs. Individuals with diabetes treated with glucose lowering medication and/or current use of inhibitors of xanthine oxidase were excluded.

Results: There were 665 (25%) individuals without any component of MetS, and 1248 (46.8%) individuals with 1 or 2 components of MetS. In univariate linear regression, there was a significant correlation between UA and ln-ACR in pre-metabolic men (n=639; β 0.091; p = 0.006). We observed independent interaction of ln-ACR with hyperuricemia (p = 0.002) and DBP (0.025) in relation to UA. In individuals without any component of MetS, UA was independently associated with ln-ACR (β = 0.057; p = 0.005), age (β = −0.265; p < 0.001), gender (β = −0.502; p < 0.001), waist-to-height ratio (β = 0.241; p = 0.001), ln-triglycerides (β = 0.070; p = 0.001), estimated glomerular filtration rate (β = −0.434; p < 0.001), amount of grams of alcohol per week (β = 0.098; p < 0.001), and diuretics (β = 0.056; p = 0.006). We observed independent interaction in ln-ACR with hypertension (p = 0.002) and DBP (0.025) in relation to UA. In individuals without any component of MetS, there was no association between UA and ln-ACR.

Conclusion: We report an independent association between UA and ln-ACR in pre-metabolic individuals. This association appears to be largely modified by hypertension, specifically by DBP.
Introduction: Lack of physical activity is a major risk factor for overweight and obesity, leading the way to many other health conditions. Medical students are supposed to be best informed on this topic.

Objective: Evaluation of actual physical activity using pedometers, and sedentary behaviors among students at the University of Medicine in Tirana.

Methods: 301 students (74% females) were interviewed using a structured questionnaire regarding their physical activity level and beliefs, and sedentary behaviors. Randomly chosen students (130) were afterwards instructed to use a pedometer to count the number of daily steps, without any suggestion as for the number of necessary steps for not being sedentary.

Results: BMI average was 21.2 kg/m² (s.d 2.49) in females, and 24.5 kg/m² (s.d.4.33) in males. Among females 6.8% were overweight and 5.9% were obese. Among males 37.2% were overweight, and 6.4% were obese. Abdominal perimeter was 72.8 cm (s.d.6.6) and 88.4 cm (s.d.11) in males. 73% of the students declared that they were not engaged in any kind of physical activity.

Conclusions: We didn’t encountered a high level of obesity in this population, however a sedentary lifestyle was noted with only a small proportion of students approaching the level of non-sedentary lifestyle (>10,000 steps/day), therefore exposing them to weight gain problems in the next future.

Abdominal obesity as a risk factor for occurrence of metabolic syndrome in people with sedentary lifestyles

Simonovska V.1, Spasovski M.2
1 Department of Social Medicine, Institute of Social Medicine, Medical Faculty, University of Saint Cyril and Methodius, Skopje, Republic of Macedonia, 2Department of Social Medicine, Institute of Social Medicine, Medical Faculty, University of Saint Cyril and Methodius, Skopje, Republic of Macedonia

Introduction: The modern world faces the obesity as a serious crisis that has an epidemic character, in the health care system. Pouliot and his associates identified obesity as a probable cause for occurrence of metabolic syndrome. Goals: To determine the percentage of risk factors that define the metabolic syndrome and to determine their correlation, with a special turn on abdominal obesity as an important risk factor. Materials and methods: In this cross-sectional study 156 subjects participated, of which 101 women and 55 men. To determine the metabolic syndrome, we have used the criteria of the National Cholesterol Education Program’s Adult Treatment Panel III. Abdominal obesity was determined by a method of measurement of the waist size in centimeters. The data was statistically processed with SPSS 8.0.

Results and discussion: There is a difference between the average waist sizes of the groups, the first group, without metabolic syndrome with an average of 52.05+6.93, and the other groups with metabolic syndrome, the second group with 75.76+13.80, the third group with 84.93+12.78, and the fourth group with 97.40+8.32.

Conclusion: In the group without metabolic syndrome, there was an increased waist size in 17.7% of the subjects, whereas in the group with metabolic syndrome, with five risk factors, increased waist size was found in 20% of the subjects. The ANOVA test carried out between the referred group and the other groups with metabolic syndrome, and also just between the groups with metabolic syndrome, has shown statistically significant difference in the waist size. Key words: abdominal obesity, sedentary lifestyle, metabolic syndrome.

Acknowledgement: Simonovska Valentina, MD, MSc, Assistant of Professor, Institute of Social Medicine, Medical Faculty, University of St Cyril and Methodius, Skopje; Spasovski Mome MD, PhD, Professor, Institute of Social Medicine, Medical Faculty, University of St Cyril and Methodius, Skopje.
is a source of particular concern. Therewith the incidence of circulatory diseases increased from 380.6 to 518.5 cases per 1000 of corresponding population.

**Conclusion:** To prevent circulatory diseases a healthy eating behavior pattern of women living in rural areas is to be formed. The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University

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**T7 – Primary/secondary prevention**

**T7:PO.073**

**Nuts consumption in relation to overweight, and abdominal and general obesity**

Rashidkhani B.1

1Shahid Beheshti University of Medical Sciences

**Introduction:** Nuts are one of the components of a healthy Mediterranean diet which are often restricted in weight management programs due to their high fat content. In this study, the relationship between nuts consumption and overweight, abdominal obesity and general obesity was assessed.

**Methods:** In this cross-sectional study, 550 female adolescents aged 15–18 years were selected from Isfahan Province using a multistage cluster random sampling. Anthropometric measures were recorded and dietary intakes were evaluated using a validated semi-quantitative food frequency questionnaire. nuts are considered in the current analysis were pistachio, almond, peanut, walnut and seeds. Abdominal obesity was defined as the 75th percentile of waist circumference for Iranian children and adolescents. Overweight and obesity were defined on the basis of International Obesity Tasks Force (TOTTF) cut-points. Models are adjusted for age, total energy intake, percentage of energy from fat, and physical activity.

**Results:** The prevalence of abdominal obesity and overweight/obesity was 48.9% and 25.7%, respectively. After adjusting for potential confounders, subjects in the top quartile of the nut consumption were less likely to have overweight and obesity [OR: 0.25; 95% CI: 0.11–0.54] and abdominal obesity (OR: 0.43; 95% CI: 0.22–0.84), compared to those in the lowest quartile.

**Conclusion:** Consumption of nuts was negatively associated with lower risk of abdominal obesity, over weight and obesity. The results of this study suggested that replacing nuts into diets might help in controlling the weight. Research relating to this abstract was funded by National Nutrition and Food Technology Research Institute

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**T7:PO.074**

**Family and lifestyle factors mediate the association between socio-economic status and fat mass in children and adolescents**

Plachta-Danielzik S.1, Kehden B.1, Stärke F.1, Müller M.J.1

1Institute of Human Nutrition and Food Science, Christian-Albrechts-University of Kiel, Kiel, Germany

**Background:** The socio-economic status (SES) is a major determinant of childhood overweight. The explanation of this association is unclear. Therefore, we examined mediators of the association between SES and fat mass (FM) in children to develop selective preventive measures against childhood overweight.

**Methods:** Data of 5,352 children aged 5–16 years of the Kiel Obesity Prevention Study were used to conduct mediation analyses between SES and FM. FM was assessed by bioelectrical impedance analyses. SES was derived from the highest educational level attained by either parent (low: 18.1%; middle: 32.5%, high: 49.4%). Single parenthood, common meals, maternal smoking habits and weight status, media consumption and physical activity of the children were considered as mediators. Mediation analyses were based on sex-adjusted linear regression models. Significance of indirect effects was tested by the use of the delta method (Sobel z test).

**Results:** Prevalence of overweight was 15.6%. The correlation between SES and FM increased with age t: -0.068, -0.142 and -0.167 for 5–7, 9–11 and 13–16-year-olds, respectively (p < 0.001 for all). In 5–7-year olds, media consumption (66.9%) and maternal BMI (53.4%) completely mediated the association between SES and FM. In 9–11-year olds, media consumption (28.1%), maternal BMI (23.9), maternal smoking habits (13.1%) and physical activity (9.1%) also completely mediated the association. In 13–16-year olds, approximately 55% of the association was mediated through maternal BMI (27.0%), maternal smoking habits (12.1%), common meals (7.5%) and media consumption (6.3%).

**Conclusion:** The association between SES and FM could be explained by 53–100%. The mediators varied by age. Thus, age-specific preventive measures have to be specified.

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**T7:PO.075**

The effect of a school-based active video game intervention on children’s aerobic fitness, physical activity level, and exercise-related psychological variables: A preliminary RCT trial

Lau W.C.1, Zhang S.1, Maddison R.2

1Department of Physical Education, Faculty of Social Science, Hong Kong Baptist University, 2National Institute for Health Innovation, Medical and Health Sciences, University of Auckland. NZ

**Objectives:** To determine the effectiveness of the prescribed AVG intervention in the physiological, behavioral and psychological perspectives.

**Methods:** 40 children aged 9–10 were recruited at a local primary school in Hong Kong and were assigned randomly into control and intervention group. Children in the intervention group participated in two 60 minutes XBOX 360 gaming session per week for 12 weeks. The intervention was held in a large function room that allowed all children played at the same time and XBOX Sport Season One & Two that provided 12 different games of sports with light-to-moderate intensity were at children’s free choice. Baseline and post-tests were conducted in both groups, measuring BMI, aerobic fitness, PA level (using accelerometer), exercise-related self-efficacy, and enjoyment. ANCOVA was employed to determine the post-intervention outcomes while controlling for the baseline data, with significant level set at 0.05.

**Results:** Data analysis revealed three major results: 1) children in the intervention group significantly outperformed those in the control group at post-test in aerobic fitness and average daily total physical activity (p < 0.01 and p < 0.05, respectively); 2) children in the intervention group marginally outperformed those in the control group in average daily moderate-to-vigorous physical activity (p = 0.08); 3) no significant differences were observed between intervention and control group at post-test in BMI, exercise-related self-efficacy, and enjoyment in physical activity (p > 0.05).

**Conclusion:** The prescribed AVG intervention provided an effective alternative in promoting children’s aerobic fitness and physical activity in school setting.

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**T7:PO.076**

A dyadic focus on obesity preventive health behaviors: Opportunities for novel research

Neeling L.1, Hennessy E.1, Oh A.1, Patrick H.2, Yaroch A.3

1National Cancer Institute, Division of Cancer Control and Population Sciences, Behavioral Research Program, Bethesda, MD, USA, 2Leidos Biomedical Research Inc., Clinical Monitoring Research Program, Frederick National Laboratory for Cancer Research, Frederick, MD, USA, 3Gretchen Swanson Center for Nutrition, Omaha, NE, USA, 4LiveHealthier, Bethesda, MD, USA

**Introduction:** To provide an overview of the FLASHE study, a forthcoming public-use resource that evaluates multilevel influences on obesity preventive health behaviors (diet, physical activity, sedentary behavior, sleep, etc) among parent-teen dyads.

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Abstracts
**Methods:** FLASHE is a U.S.-based sample drawn from a Consumer Opinion Panel. Cross-sectional data were collected between April-October, 2014 using a web-based platform. FLASHE focuses on multilevel correlates of obesity among parent-teen dyads (12–17 years old) with an oversampling of Non-Hispanic Blacks. Objective physical activity was measured in a subsample of teens. Constructs include psychosocial factors (e.g. self-efficacy, motivation, emotional regulation), interpersonal factors (e.g. parenting style and parenting practices), and characteristics of the home and neighborhood environments among others (e.g. food insecurity, housing, employment).

**Results:** The FLASHE study enrolled 1944 dyads, of which 1251 were randomized to receive only the FLASHE surveys and 693 to receive the FLASHE surveys plus a physical activity monitor to be worn by teens for 7 days. Of the 1251, 86% of dyads completed all surveys. Of the 693, over 90% returned the physical activity monitor and 80% completed all surveys and returned their monitor.

**Conclusion:** FLASHE is a unique, public-use resource to evaluate research questions focused on parents, teens, and parent-teen dyads across levels of influence on obesity preventive health behaviors. Work is ongoing to expand this useful resource by adding a geospatial component and linking it with extant data resources (e.g. policy databases) providing rich research opportunities for the EASO audience.

**T7:PO.078**

**Intuitive eating is inversely associated with body weight status in a general population from the NutriNet-Santé Study**

**Camilleri G.M.1, Méjean C., Bellisle F.1, Herceberg S. 1,2,3, Péneau S.1**

1Université Paris 13, Equipe de Recherche en Epidémiologie Nutritionnelle, Centre de Recherche en Epidémiologie et Statistiques, Inserm (U1153), Inra (U1125), Cnam, COMUE Sorbonne Paris Cité, Bobigny, France,

2Unité de Surveillance et d’Épidémiologie Nutritionnelle, Institut de Veille Sanitaire, Université Paris 13 Sorbonne Paris Cité, Bobigny, France,

3Département de Santé Publique, Hôpital Avicenne, Bobigny, France

**Introduction:** Intuitive eating is an adaptive dietary behavior that emphasizes eating in response to physiological hunger and satiety cues, together with low preoccupation toward food. It has been proposed as an alternative to weight loss programs that would promote a healthier food-mind-body connection. We therefore aimed at studying the relationship between intuitive eating and weight status in a large sample of adult general population.

**Methods:** A total of 11,774 men and 40,389 women aged ≥18 y participating in the NutriNet-Santé cohort were included in this cross-sectional analysis. Intuitive eating levels were collected using the validated French version of the Intuitive Eating Scale-2. The association between intuitive eating, its subscales (categorized into quartiles) and overweight/obesity was assessed using multivariate logistic regression models.

**Results:** A higher IES score was strongly associated with lower overweight/obesity in both men and women. The strongest associations were observed in women [quartile 4 vs. 1 for overweight (excluding obesity) (OR (95% CI): 0.19 (0.17, 0.20) and obesity (OR: 0.09 (0.08, 0.10))]. Associations in men were also as follow [quartile 4 vs. 1 for overweight (excluding obesity) (OR: 0.43 (0.38,0.48)) and obesity (OR: 0.14 (0.11,0.18))]. All IES subscales were inversely associated with weight status: in particular Eating for Physical Rather than Emotional Reasons, followed by Reliance on Hunger and Satiety Cues and Unconditional Permission to Eat.

**Conclusion:** Greater intuitive eating is associated with a lower prevalence of overweight and obesity which supports the importance of eating in response to hunger and satiety signals. These data bear out the relevance to promote such behavior for obesity prevention and treatment.

**T7:PO.079**

**Sense of coherence, health perceptions and attitudes towards obesity treatment of general practitioners in Poland**

**Bąk-Sosnowska M.1, Kołodziej S.2, Gozdź K.3, Skrzypulec-Plinta V.4**

1School of Health Sciences in Katowice, Medical University of Silesia, Department of Psychology, Chair of Philosophy and Humanities, Katowice, Poland,

2Polpharma Biuro Handlowe Sp. z oo., Warsaw, Poland,

3DrKrzysztofGozdźClinic, Warsaw, Poland,

4School of Health Sciences in Katowice, Medical University of Silesia, Department of Department of Woman’s Health, Katowice, Poland

**Introduction:** Physicians’ attitude towards health may influence the use of prophylaxis in patients and their motivation to constructive health behaviors. The aim of this study was to evaluate the sense of coherence, health perception and attitude towards obesity treatment in primary care.

**Methods:** We examined 250 GPs. The mean age was 53.55 ± 0.57 yrs, mean BMI 25.53 ± 4.16 kg/m². We used: SOC-29, LZK and own questionnaire exploring the relationship to the obesity treatment.

**Results:** 60% of doctors have an average score of SOC. Subscale state has the highest score in LZK (74%). The most important criteria in LZK are: accept yourself(38%), feel happy (37%). 55.6% of respondents never or sometimes measure body weight of their patients, 88% recommend obese patients weight reduction. There is a positive relationship between SOC and LZK in category of process (p < 0.01) and purpose (p < 0.05). Doctors with longer professional experience more often explain to obese patients the possible consequences of obesity (p < 0.05). Doctors of the larger cities less often: do measurements of body weight of patients (p < 0.001),
ask obese patients about the cause of the obesity (p < 0.05), explain them the possible causes (p < 0.01), ask them about the difficulties in reducing excess body weight (p < 0.05). Doctors with a higher BMI, frequently ask obese patients about the difficulties with body weight reduction (p < 0.05). Doctors with low and average score of SOC less frequently measure the weight in their patients than doctors with high score SOC (p < 0.05).

Conclusion: GPs in Poland have a sense of coherence and perceive health the most commonly in category of status. High sense of coherence has impact on the diagnosis of overweight patients.

T7:PO.080
A comparison of a high low intensity exercise programme for sedentary middle managers
Potter J.A., James B., Everley S.C.
1Department of Physical Education, University of Chichester, Chichester, UK.

Introduction: The importance of an active lifestyle and the value of exercise in achieving and maintaining a healthy body composition are well established. Psychological as well as physical gains are very important in order to promote programme adherence. The aim of this investigation was to study the effects of two exercise types: High Intensity Interval Training (HIIT) and Low Intense Steady State (LISS) exercise, upon psychological well-being of sedentary individuals working in stressful middle management positions.

Methods: Two periods of exercise were completed utilising a cross-over design with the HIIT and LISS training: 10 participants trained over a period of 8 days using an upright cycle. HIIT training consisted of 20–30 minutes intervals of 20 seconds high intensity followed by 60 seconds rest. LISS training consisted of 30 minutes steady state cycling at 60–75% max heart rate. Psychological well-being and mood state were measured through interview and questionnaire.

Results: A series of repeated measures ANOVAs indicated that all participants recorded lower levels of tension, calmness and happiness when exercising as opposed to being sedentary however, the improvements were greater with LISS. Where LISS resulted in improved mood state scores throughout, HIIT resulted in increased depression, confusion and fatigue as well as a reduction in vigour. Interviews indicated a lack of confidence over being able to maintain a HIIT exercise programme.

Conclusion: Although HIIT training may result in physiological improvements and has the advantage of fitting into busy lives, it appears that it may not result in the same sense of psychological well-being and may in fact lead to negative mood states, and consequently unlikely to promote exercise adherence.

T7:PO.081
Preventive and educative project „with children against obesity”
Marinov Z., Marinová C., Pastucha D., Střítecká H., Ptáček R.
1Children obstesiological clinic, Department of Pediatrics, University Hospital Motol and 2nd Faculty of Medicine in Prague, Charles University Prague, Czech Republic.
2Medical Access Solutions s.r.o., Prague, Czech Republic.
3Children obstesiological clinic, Department of Sports Medicine and Cardiovascular Rehabilitation, University Hospital Olomouc, Palacký University Olomouc, Czech Republic.
4Department of Military Hygiene, Faculty of Military Health Sciences, University of Defence Hradec Králové, Czech Republic.
5Department of Psychiatry, General University Hospital and 1nd Faculty of Medicine in Prague, Charles University Prague, Czech Republic.

Introduction: Childhood obesity has become an everyday reality. Mass media has become a common part of the educational process for children. It significantly influences people’s lifestyle particularly children’s. The first specific environment interferring with the daily life of individuals, families and children is television but the web environment also influences them.

Through the web environment, they gain information that shapes knowledge, social norms and perceptions of social life.

Methods: Obesity is a serious chronic disease leading to significant changes in life quality and decreasing a life expectancy. The websites html://sde-triptrobiobitze.cz offer basic information about child obesity in the Czech Republic. Their aim is a promotion of concerted efforts to influence the child’s family in key preventive environments in childhood obesity.

Results: The preventive project is an open space for anyone who is interested or has questions about the issues of child obesity. The website with professional advice addresses five basic groups: families with children, health professionals, nutritional consultants, schools and the media, which should enable an orientation in the prevention of lifestyle diseases and obesity on the web environment.

Conclusion: The project is an original and innovative prevention website, which offers a comprehensive view of the prevention and treatment of overweight and obese children. The project offers original products that can be used in the everyday clinical practice for specific individuals who risk developing obesity, and those who have a family background of obesity.

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T7:PO.082
Li X., Hesketh T.
1University College London Institute for Global Health, London, United Kingdom

Introduction: Since 1978, when the Deng Xiaoping's reforms including “Opening up to the World” policy initiated, China has witnessed dramatic economic growth. Undergoing nutrition transition, the burden of nutritional problems has been changing from under-nutrition to over-nutrition. The prevalence of overweight/obesity among Chinese children aged 7–18 has increased dramatically, with 19.0% and 10.9% for boys and girls respectively in 2010.

Aim: This review is to explore the effectiveness of interventions for prevention and treatment of overweight/obesity among Chinese schoolchildren.

Methods: I identified primary studies published from 1980s until 2013. Details of data sources, key terms, inclusion and exclusion criteria and the whole searching process were summarized in figure1. Data on author, study location, study design, age group, sample size, interventions, duration of study, length of follow-up, and findings were extracted for comparison.

Results: 33 studies were finally identified fulfilling the inclusion criteria. 28 were conducted in school settings with 3 in community surroundings and another 2 in the family setting. The studies consisted of one or more components as health/nutrition education, diet adjustment, physical activity, behavior modification and parental involvement. The measurements of study outcome included anthropometric measures, changes in overweight/obesity rate and changes in levels of obesity-related biomedical markers. Although the methodologies used in studies varied, 23 out of 33 (69.7%) were defined as effective according to statistically significant results in outcomes.

Conclusion: Heterogeneity in many aspects of study methodologies limited the meta-analysis of effectiveness of current interventions. Comprehensive school-based interventions seem promising for preventing and treating overweight among Chinese schoolchildren. Insufficient evidence is available to support the effectiveness of community- or family-based interventions.
Muscle strength fitness are related to a high lipid–metabolic cardiovascular risk

Ramírez-Velázquez R.1, Triana-Reina H.R.1, Carrillo H.A.1, Ramos-Sepúlveda J.A.1, González-Ruíz K1, Rubio F1, Correa-Bautista J.E.1
1 Facultad de Cultura Física, Deporte y Recreación, Universidad Santo Tomás, Bogotá, D.C, Colombia,
2 Programa de Licenciatura en Educación Física y Deporte, Universidad del Valle, Melendéz, Cali, Colombia,
3 Facultad Educación a Distancia y Virtual. Institución Universitaria Antonio José Camacho, Santiago de Cali, Colombia,
4 Grupo de Ejercicio Físico y Deportes, Facultad de Salud, Programa de Fisioterapia, Universidad Manuela Beltrán, Bogotá D.C., Colombia,
5 Centro de Estudios en Medición de la Actividad Física, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá D.C, Colombia

Objective: We studied the association of lipid–metabolic cardiovascular risk index with muscle strength fitness (MSF).

Methods: Healthy young (mean age 21.2 ± 4.7 years) men (n=6,095). MSF was measured two times with a TKK analogue dynamometer (handgrip). To account for differences in body size, peak grip strength was divided by body mass and handgrip (kg/kg) was used in further analysis. Subjects were further divided into six subgroups according to BMI (normal vs. overweight/obesity) and MF (tertiles: unfit, average, fit). Fasting blood samples were collected and lipid–metabolic cardiovascular risk index (LMCRI) was derived from the levels of total cholesterol, triglycerides, low-density lipoprotein cholesterol (LDL-c), high-density lipoprotein cholesterol (HDL-c), and glucose levels. A lipid–metabolic cardiovascular risk index (LMCRI) was derived from the levels of triglycerides, low-density lipoprotein cholesterol (LDL-c), high-density lipoprotein cholesterol (HDL-c), and glucose levels.

Results: The groups with the lowest MSF had 67% higher a lipid–metabolic cardiovascular risk index than the groups with the highest MSF (P < 0.0001). In overweight/obese participants, the LMCRI (66%/84%) was higher compared with subjects with normal weight (P < 0.005, in all). In BMI and MSF subgroups, LMCRI was higher in the overweight/unfit subgroup (0.008 ± 1.104) when compared with the normal-weight/unfit subgroup (-0.362 ± 0.722; P < 0.0001) and overweight/fit and normal-weight/fit subjects (-0.422 ± 0.675 vs. 0.064 ± 0.877; P < 0.0001). Figure 1. Conclusions: Overweight and obesity are associated with serum conventional lipids and lipid–metabolic cardiovascular risk index. However, low muscular fitness levels should be avoided for primary cardiovascular disease prevention.

Impact of body size and composition on energy cost of self-paced “walking for exercise”

Byrne N.M.1,4, Hills A.P.2,4
1 Bond Institute of Health and Sport, Faculty of Health Sciences and Medicine, Bond University, Gold Coast, Australia,
2 Centre for Nutrition and Exercise, Mater Research Institute, University of Queensland, Brisbane, Australia,
3 Griffith Health Institute, Griffith University, Gold Coast, Australia,
4 Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Australia

Introduction: Walking is the primary mode of exercise for adults of all ages, and a common health promotion strategy. Previous research suggests that external work of walking is not affected by obesity over speeds of 1.8 – 6.3 kph (0.5–1.7 m/s). This study examined if body size impacts self-selected exercise pace and walking economy.

Methods: 197 adults (M=80, F=117; 21 – 64 yrs; 48 – 133 kg; 18 – 43 kg/m²) were recruited via stratification in 2 sex (male, female), 4 age (20–34.9, 35–44.9, 45–54.9, 55–65 yrs), and 3 BMI (normal weight (NW): 18–24.9 kg/m²; overweight (OW): 25–29.9 kg/m²; obese (OB): 30–45 kg/m²) groups. The self-paced walking for exercise (SPWE) speed was measured twice over 2 km on a 400m track. Energy cost of walking was determined at four speeds (SPWE-1.2 kph (~0.33 ms)), SPWE-0.6 kph (~0.1667 ms), SPWE, SPWE+0.6kph) via indirect calorimetry. Walking economy (energy cost per unit walking speed) was determined for each participant from the energy – walking speed regression analysis, with a smaller slope evidence of greater walking economy. Body composition was determined via the 4-C model.

Results: There was no main effect of age (P = 0.73), but there were main effects for gender (M>F; P < 0.001) and BMI (NW>OW>OB; P < 0.001) on SPWE speed. Energy cost of walking differed with gender (M>F) and BMI (OB>OW>NW). Accounting for body weight and walking speed, walking economy did not differ between males and females, but remained different for BMI; NW (373 W/kph) > OW (422 W/kph) > OB (486 W/kph). Accounting for body composition rather than weight, walking economy did not differ between NW and OW, but a ~10% difference remained between OB and the other groups (NW<OB and OW<OB; P < 0.01).

Conclusion: Obesity impacts self-selected exercise walking speed and walking economy at speeds spanning below and above this speed. Consequently, despite obese adults choosing slower walking speeds for exercise, there is a great relative energy cost of walking for exercise.

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Fig. 1. A lipid–metabolic cardiovascular risk according MSF and BMI groups

T7.PO.084
T7 – Policy

T7:PO.085
Building bridges between kindergartens and schools and primary health care services to reduce social inequalities

Grun G.1
1National Centre for Food, Health and Physical Activity, Bergen University College, 5020 Bergen, Norway.

Introduction: There are health inequalities between those with high education and income and those without. It is considered that these inequalities might be reduced by giving our children the same opportunities. In schools and kindergartens all children can be reached, including those who need extra follow-up and motivation. The Ministry of Education and Research and the Ministry of Health and Care Services in Norway have created a National Centre for Food, Health and Physical Activity to be a national resource centre for interdisciplinary work promoting the importance of good health in all children and young people. The Centre’s aim is to promote and communicate the relationship between health and children’s learning and education with an emphasis on healthy meals, good food experiences, and physical activity, and further pass on knowledge about adaptive measures for children and young persons with chronic illnesses and disabilities, within the framework of an inclusive society by experiencing belonging and mastering.

Methods: The Centre’s target groups are primary audience in kindergartens, schools, child health centres, school health services; authorities, owners, managers and staff, and universities and colleges of further education of relevant educational programmes.

Results: The Centre undertakes targeted communications, counselling and guidance based on results from research, R&D work, and is developing examples of good practice and support materials that are predominantly presented Net-based.

Conclusion: The Centre is assigned tasks associated with national initiatives in health and education related to quality development and skills development, linked to the primary objectives within the two sectors from a political long-term perspective.

T7:PO.086
Family intervention targeting obese children: Treatment cost differences of two standardized programs

Halsteinli V.1,2, Odegård R.1,4, Lekhal S.4, Hjelmesæth J.4,5, Benestad B.4
1St Olav Hospital, Trondheim University Hospital, 2Department of Public Health and General Practice, Norwegian University of Science and Technology, 3Department of Laboratory medicine, Children’s and Women’s Health, Norwegian University of Science and Technology, 4The Morbid Obesity Centre (MOC), Vestfold Hospital Trust, South-Eastern Norway Regional Health Authority, 5Department of Endocrinology, Morbid Obesity and Preventive Medicine, Institute of Clinical Medicine, University of Oslo, Norway

Introduction: Incremental lifetime medical costs of an obese child are estimated to be 16 100 Euro (Finkelstein et al, 2014). This estimate reflects the potential cost saving of an intervention succeeding to prevent an obese child from persistent obesity. In Norway a family intervention has been performed (Trial Registry: www.clinicaltrials.gov; NCT01110096). We report treatment costs in the light of potential cost savings.

Methods: In a two-year randomized controlled trial a program (A) consisting of a two-week family treatment camp and four subsequent weekend camps was compared with (B) a four day out-patient lifestyle education program. The target group was children 7–12 years with a BMI ≥ iso-BMI 30 and at least one parent with BMI ≥ 30. Both alternatives include two days of hospital follow-up. Treatment cost per participating individual was calculated by multiplying the number of treatment days by average daily cost. Treatment cost per child was the sum of family member costs. Descriptive statistics and nonparametric methods will be used.

Results: Results based on a total of 76 children/families will be presented: Treatment costs according to three time periods 0–3 months, 4 to 12 months and 13 – 24 months. Cost variation within the two groups might be due to family size and families partly absent from the standard number of treatment days.

Conclusion: We presume a substantial cost difference between the two programs because of different number of treatment days. When comparing treatment cost to the estimated incremental life-time cost we must take intervention success rate and long term effects into consideration. Preliminary results indicate clinically meaningful effects of family based treatment.

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T7 – New analytical approaches in epidemiology

T7:PO.087
Waist circumference vs. waist-to-height ratio in estimation of central obesity in Slovak adults

Csongavž M.1, Gurecký R.1, Koborová I., Volkovová K., Gajdoš M.1, Šebeková K.1
1Institute of Molecular Biomedicine, Faculty of Medicine, Comenius University in Bratislava, Bratislava, Slovakia, 2Medical Faculty, Slovak Medical University, Bratislava, Slovakia

Background: Central obesity (CO) is a major risk factor for cardiovascular and metabolic disorders. Waist circumference (WC) and the waist-to-height ratio (index of central obesity, ICO) are the most widely used methods; however, if compared a certain level of discrepancy in the classification occurs.

Aim: We studied the degree of discrepancy between the WC and the ICO methods in classification of CO in the population of adults in Slovakia.

Methods: In secondary analysis of data from 3 cross-sectional studies in 18–63 year-olds, 2137 males and 2531 females, CO was classified as WC >93 cm and 80 cm, respectively; and ICO>0.50. Matching or discrepancy of the results was analyzed according to SD of height, or decades of age.

Results: According to WC 718 (34%) male and 859 (34%) females presented CO, employing ICO 987 (46%) males and 711 (28%) females were CO. In males height averaged 179 ± 7 cm; in –3 SD and –2 SD subgroups CO was underrated by WC in comparison with ICO in 35%, in the subgroup –1 SD and average height by 10% and 19%, respectively; while in tall subjects (height +2 SD and +3 SD) WC overrated CO in 5% and 12% of probands, respectively. Females’ height averaged 166 ± 6 cm; WC underrated CO in short females (-3 SD and –2 SD) by 16% and 5%, respectively; and overrated CO in all other subgroups starting from –1 SD of height by 4%, 10%, 15% and 26%. WC and ICO correlated significantly with age in both genders; however, discrepancy between WC and ICO classification did not differ significantly in age group-decades in either gender.

Conclusion: In Slovak adults WC method to classify CO underestimates CO in shorter subjects, in males shorter than 180 cm and in females <160 cm, while it overrates CO in tall subjects (in males from 187 cm and in females from 167 cm of height).
T7:PO.088
Reliability and precision of a segmental multi-frequency BIA scale for the assessment of body composition in the elderly

Tognon G.1, Mehlig K.1, Freyer E.1, Malmros V.2, Bosaeus I.2, Lissner L.1
1Section for Epidemiology and Social Medicine, Department of Public Health and Community Medicine, University of Gothenburg, Gothenburg, Sweden,
2Department of Clinical Nutrition, University of Gothenburg, Gothenburg, Sweden

Introduction: Segmental bioimpedance analysis (sBIA) is a common tool to estimate body composition (body fat mass (FM), fat-free mass (FFM) and skeletal muscle mass (SMM)). sBIA is less expensive than dual X-ray absorptiometry (DXA) and has the advantage of portability. In the elderly the superiority of sBIA in estimating FM compared to anthropometry, is in a formative stage and reliability is not established. Therefore, our aim was to determine if a multi-frequency sBIA is more accurate measure of FM than BMI, waist circumference and waist-to-height ratio (WtHR). The second aim was to determine the accuracy of sBIA compared to DXA.

Methods: Weight, height and waist circumference were measured in 92 healthy subjects (53 women) aged 80–81 years from the H70 Gerontological and Geriatric study in Gothenburg. WtHR was calculated dividing waist (cm) by height (cm). Total and segmental FM, FFM and SMM were estimated by DXA and MC-180MA TANITA sBIA scale. The estimations from these techniques were compared by Bland-Altman plots and by linear regression of DXA values vs. the predicted values from sBIA, BMI, waist circumference and WtHR.

Results: sBIA- and DXA-based estimates were highly correlated. The associations between total and trunk FM by sBIA and DXA were not greater than those between BMI and DXA. sBIA underestimated FM, particularly trunk FM and FFM. SMM was greatly overestimated by sBIA, although highly correlated with DXA lean soft tissue. Good levels of agreement between the two techniques were found in men, whereas very low agreement rates were found in women (Figure 1). The presence of metal prosthesis did not influence the results.

Conclusions: sBIA is not an accurate measure of body composition in the elderly; moreover it was not superior to BMI in predicting FM.

Acknowledgement: We thank the Department of Psychiatry and Neurochemistry, Unit of Psychiatric Epidemiology, Mölndal, Sweden for their contribution to the H70 study.

Fig. 1. Bland-Altman plots depicting means vs differences of DXA and sBIA estimates for FM (panel A) and SMM (panel B) in women. Horizontal lines are drawn at the position of the mean difference and at mean value 2SD.

T7:PO.089
Resting oxygen consumption and predictive equations for resting metabolic rate among bariatric surgical candidates

Crisp A.H.1, Revelli M.N.1, Verlengia R.2, Rasera-Jr I.3, Marques de Oliveira M.R.1,4
1Post-graduate Program in Food and Nutrition - Nutritional Sciences, São Paulo State University, Faculty of Pharmaceutical Sciences (UNESP-FcFar), Araraquara-SP,
2Methodist Universiade of Piracicaba (UNIMEP), Piracicaba-SP,
3Center of Gastroenterology and Surgery of Obesity - Bariatric Clinic, Sugarcane Suppliers Hospital, Piracicaba-SP,
4Biosciences Institute of the São Paulo State University (IB-UNESP), Botucatu

Metabolic equivalent (MET) is based in a universal value of resting oxygen consumption (VO2) of 3.5 mL/kg/min. Recent studies suggested the correction of 1 MET by equation of Harris-Benedict to provide more accurate values. On the other hand, controversies also exist between predictive equations to estimate resting metabolic rate (RMR), especially in severely obese individuals. This study measured resting VO2 and RMR by indirect calorimetry (IC) and compared the accuracy predictive equations to estimate RMR and 1 MET standard value among women undergoing bariatric surgery. Cross sectional analysis was conducted in 44 severely obese women candidates to bariatric surgical. RMR was measured by using indirect calorimeter CCM express (MedGraphics). The predictive equations used for estimate RMR were: Female Brazilian Population (FBP), Mifflin-St Jeor (MSJ), Henry & Rees (HR), Harris-Benedict (HB), FAO/WHO/UNU and Schofield (S). The RMR value measure by
IC was 1759 ± 36 kcal/day. In kcal/day, the MJS (1817 ± 22; mean difference [MD] = −58.3) and FBP (1826 ± 21; MD = −66.5) equations estimated the closest values (p > 0.05). Whereas HR (1886 ± 19; MD = −126.7), HB (1887 ± 18; MD = −127.4), FAO/WHO/UNU (1987 ± 35; MD = −227.9) and S (1954 ± 36; MD = −194.4) equations overestimated significantly (p < 0.01) RMR. Resting VO2 values ranged 1.47–2.92 mL/kg/min among obese women with mean value of 2.22 ± 0.00 mL/kg/min. The measured resting VO2 values were 36.4 ± 1.2% less than 1 MET standard value (3.5 mL/kg/min). Conclusion: In Brazilian severely obese women, MJS and FBP were the more precise equations to provide estimation of RMR. Additionally, the standard 1 MET value overestimate the measured resting VO2 and cannot be applicable to bariatric patients.

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T2 – De novo lipogenesis

T2.PO.001

Resveratrol mediated changes in rat adipose tissue microRNAs expression related to fatty acid synthase

Gracia A.,1 Miranda J.1,2, Fernández-Quintela A.1,2, Aguire L.1,2, Milagro F.I.1,2, Portillo M.P.1,2

1Nutrition and Obesity Group. Dpt. Nutrition and Food Science, Faculty of Pharmacy. University of the Basque Country (UPV/EHU), Vitoria (Spain),
2CIBERobn Physiopathology of Obesity and Nutrition, Instituto de Salud Carlos III (ISCIII) (Spain).

Introduction: The involvement of epigenetics as an anti-obesity molecule has not been addressed so far. The aim of the present study was to assess changes produced by resveratrol in microRNA (miRNA) related to de novo lipogenesis, specifically to fatty acid synthase (fasn), in adipose tissue from rats fed an obesogenic diet supplemented with resveratrol. Methods: Sixteen male Wistar rats were divided into two groups, a control group and a group treated with resveratrol (30 mg/kg bw/d), both fed a diet high in sucrose and fat, for 6 weeks. MiRNAs involved in de novo lipogenesis were selected by checking the miRWalk Database and by revising the literature. MiR-539-5p, mir-1224 and fasn gene expressions were assessed by qRT-PCR. Protein expression of Sp1 transcription factor (SP1) and sterol regulatory element-binding protein 1 (SREBP1) were measured in epididymal fat tissue from rats fed an obesogenic diet supplemented with resveratrol. Results: Resveratrol treatment reduced adipose tissue size. In rats treated by western blot. Statistical analysis was carried out by using Student’s t test. Results: Resveratrol treatment reduced adipose tissue size. In rats treated with this polyphenol, protein expression of SP1 and SREBP1, two transcriptional factors acting synergistically in the regulation of fasn expression, were significantly decreased (P < 0.05). In accordace, gene expression of fasn was also reduced (P < 0.05). The expression of mir-539-5p and mir-1224, two miRNAs involved in the regulation of Sp1, were up-regulated by resveratrol (P < 0.05). Conclusion: The inhibition of de novo lipogenesis induced by resveratrol in adipose tissue is mediated by miR-539-5p and mir-1224, which shows the involvement of epigenetic mechanisms in the anti-obesity effect of this polyphenol.

T2 – Mitochondrial functions

T2.PO.002

Cd36 does not directly participate in mitochondrial fatty acid transport and oxidation.

Hepialarova K.1, Pravenev M.1, Zidek V.1, Landa V.1, Kazdová L.1, Vrbáček M.1, Drahotá Z.1, Mráček T.1, Housťek J.1

1Institute of Physiology Academy of Sciences of the Czech Republic, Prague, Czech Republic,
2Center for Experimental Medicine, Institute for Clinical and Experimental Medicine, Prague, Czech Republic

Introduction: CD36/FAT permease of plasma membrane is the key transmembrane transport protein for long chain fatty acids (FA). In the last years, conflicting results have been published regarding the localization of CD36 in mitochondria and its direct role in mitochondrial FA transport and oxidation.

Methods: We used the spontaneously hypertensive rat (SHR) that harbors mutant CD36 and transgenic SHR expressing wild type CD36 (SHR-Cd36) and compared parameters of lipid metabolism in brown adipose tissue (BAT).

Results: CD36 protein in BAT was high, comparable to heart and present mostly in a glycosylated form. Of all tissues the Cd36 transcript was the highest in BAT (2.9 x higher than heart). Most of the Cd36 signal was in mitochondrial fraction and only traces in mitochondria, most likely due to contamination. We also compared palmitate transport and oxidation in BAT and in primary cultures of brown adipocytes from SHR and SHR-Cd36 to test whether palmitate transport and oxidation is affected by mutant CD36. The import of palmitate into BAT was reduced in the SHR when compared to SHR-Cd36 rats (24.1 ± 0.8 vs. 29.0 ± 1.6 nmol palmitate/mg prot/2h, P < 0.05), confirming that FA transport across plasma membrane mediated by mutant CD36 is less effective. In contrast, there was no significant difference in palmitate oxidation in BAT from SHR and SHR-Cd36 rats (2.1 ± 0.1 vs. 2.1 ± 0.1 nmol palmitate/mg prot/2h), suggesting that CD36 is not important for FA transport into mitochondria.

Conclusion: Our results demonstrate important role of Cd36 in transport of long chain FA across plasma membrane but not into mitochondria. We were not able to detect a significant amount of CD36 in isolated mitochondria and Cd36 does not seem to directly participate in mitochondrial FA transport and oxidation.

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T2.PO.003

All-trans retinoic acid induces oxidative phosphorylation and mitochondria biogenesis in adipocytes

Ribot J.1, Tourniaire F.2,3, Musinovic H.1, Gourguin E.2,4, Astier J.2,4, Marcotorchino J.2,4, Arreguin A.1, Bernot D.1, Palou A.1, Bonet M.L.1, Landrier J.F.2,4

1Laboratory of Molecular Biology, Nutrition and Biotechnology, Universitat de les Illes Balears, and CIBER of Fisiopatologia de la Obesidad y Nutrición (CIBERObn), ES-07122 Palma de Mallorca, Spain,
2INRA, UMR 1260, F-13385 Marseille, France,
3INSERM, UMR 1062, « Nutrition, Obésité et Risque Thrombotiques », F-13385 Marseille, France,
4Aix-Marseille Université, Faculté de Médecine, F-13385 Marseille, France,
5Assistance Publique-Hôpitaux de Marseille, CHU La Timone, F-13385 Marseille, France.

A positive effect of all-trans retinoic acid (ATRA) on white adipose tissue (WAT) oxidative and thermogenic capacity has been described and linked to an in vivo fat loosening effect of ATRA in mice. However, little is known about the effects of ATRA on mitochondria in white fat. Our objective has been to characterize the effect of ATRA on mitochondria biogenesis and oxidative phosphorylation (OXPHOS) capacity in mature white adipopo-
cytes. Transcriptome analysis, oxygraphy, analysis of mitochondrial DNA (mtDNA) and flow cytometry-based analysis of mitochondria density was performed in mature 3T3-L1 adipocytes after 24 h incubation with ATRA (2 μM) or vehicle. Selected genes linked to mitochondria biogenesis and function and mitochondria immunostaining were analysed in WAT tissues of ATRA-treated as compared to vehicle-treated mice. ATRA up-regulated the expression of a large set of genes linked to mtDNA replication and transcription, mitochondrial biogenesis and OXPHOS in adipocytes, as indicated by transcriptome analysis. Oxygen consumption rate, mtDNA content and staining of mitochondria were increased in the ATRA-treated adipocytes. Similar results were obtained in WAT depots of ATRA-treated mice. We conclude that ATRA impacts mitochondria in adipocytes, leading to increased OXPHOS capacity and mitochondrial content in these cells.

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T2 – Remodeling, fibrosis and inflammation

T2.P0.005
Impact of aging on immune cell distribution in brown and white adipose tissue depots

Bochicci C. 1, Schulz T.J. 1
1 German Institute of Human Nutrition, Potsdam-Rehbruecke, Germany

Introduction: Age-related changes of adipose tissue mass and function are associated with an elevated risk to develop metabolic diseases like obesity and insulin resistance. Obesity is accompanied by a chronic low-grade inflammation with increased adipose tissue infiltration of immune cells. The correlation of inflammation and insulin resistance during obesity is well established. However, little is known about the impact of aging on immune cell distribution and activation in different depots and types of fat. The concept of ‘Inflamm-aging’ proposes that increased cytokine levels produced by immune cells could negatively affect metabolic function.

Methods: Assessment of immune cell gene expression patterns and flow cytometric analysis of immune cell distribution was conducted in interscapular brown adipose tissue (iBAT), epididymal and subcutaneous white adipose tissue of mice aged 8 weeks, 15 months, and 25 months.

Results: The distribution of immune cell subsets differs between individual fat depots and during aging, and is in some aspects distinct from the effects observed during obesity. For instance, no increase in total number of macrophages per depot was found during aging, whereas aging, like obesity, is accompanied by a shift from alternatively activated M2 towards classically activated M1 macrophages. This is also confirmed by increased expression of pro-inflammatory cytokines in freshly isolated macrophages. In summary, iBAT contains fewer immune cells and is more resistant to age-induced pro-inflammatory processes.

Conclusion: These findings show distinct sensitivities of different adipose depots to the age-related pro-inflammatory shift and suggest that functional changes in aged immune cells may contribute to metabolic dysfunction.

T2.P0.006
Age-related changes of extracellular matrix composition affect the metabolic homeostasis of adipose tissue

Steinbring J. 1, Gohlke S. 1, Bochicci C. 1, Graja A. 1, Lau A.M. 1, Schulz T.J. 1
1 Department of Adipocyte Development (ADE), German Institute of Human Nutrition, Potsdam-Rehbruecke, Germany

Introduction: The composition of the extracellular matrix (ECM) is an important part of the cellular microenvironment that affects the mechanisms involved in stem cell homeostasis and tissue regeneration. In brown and white adipose tissue, similar to many other organs, a population of fibroblast-like progenitors is considered to be the major source of ECM components, such as collagens and integrins. In our in vitro tests, the ability to undergo brown adipogenic differentiation strongly depended on the maturation status of the ECM-producing cells; while immature progenitor cells produced matrix that supported brown adipogenesis, ECM produced by differentiating progenitors or mature adipocytes inhibited expression of brown adipocyte marker proteins such as UCP1. Of note, the ability to retain regulatory growth factors also differed between matrices from different sources.
Conclusion: These findings taken together suggest that changes in ECM composition with age might promote the development of metabolic dysfunction by affecting the adipogenic potential of tissue-resident progenitor cells.

T2.PD.007
Differential expression of glucocorticoid target genes in cell types of white adipose tissue from corticosteroid binding globulin deficient mice (cbg-/-) submitted to a hyperlipidic diet
Ledda A.1, Gulfo J.1, Fernández-López J.A.1,2,3, Grasa M.1,2,3, Esteve M.1,2,3
1Department of Nutrition and Food Science, Faculty of Biology, University of Barcelona, Barcelona, Spain, 2Institute of Biomedicine, University of Barcelona, Barcelona, Spain, 3CIBEROBN, Spain

Introduction: Glucocorticoids are implicated in the body weight regulation. Scientific evidences suggest that CBG may have an active role modulating glucocorticoid action. Ours aims were to investigate whether white adipose tissue (WAT) from cbg-/- mice showed an altered proportion of cell types compared with cbg+/+ mice and to characterize the expression of glucocorticoid target genes in each cellular fraction.

Methods: Male mice (C57BL/6) cbg+/+ and cbg-/- were submitted during twelve weeks to a control (C) or a hyperlipidic diet (HL). The epidydimal WAT was digested with collagenase and adipocytes and stromal vascular fraction (SVF) obtained. Total, M1 and M2 macrophages were quantified by FACS. Gene expression was determined by RT-PCR.

Results: The abundance of cells from SVF and total macrophages tended to be lower in cbg-/- mice than in cbg+/+ with a C diet. Both parameters increased similarly in both genotypes when HL diet was consumed. The ratio M1/M2 was higher in cbg-/- than in cbg+/+ mice fed a C diet. HL diet increased the ratio M1/M2 in cbg+/+ but decreased it in cbg-/- mice. About half of 11βHSD1 expression in epidydimal WAT occurred in SVF in cbg+/+ mice, whereas in cbg-/- more than 80% of this expression was found in adipocytes. Total WAT 11βHSD1 expression was decreased by HL diet in both genotypes, but in cbg-/- mice were at expense of expression in SVF. DUSP expression prevailed in SVF but was much lower in cbg-/- than cbg+/+ mice fed a C diet. HL diet decreased DUSP expression in cbg+/+ but increased it in cbg-/- mice.

Conclusion: The lack of CBG alters the expression of genes regulated by glucocorticoids in different cell types from WAT. The cells in stromal vascular fraction seem specially affected.

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T2.PD.008
Gelatinase a (mmp-2) promotes adipo genesis
Rauters D.1, Scroyen I.1, Van Hul M.1, Lijnen H.R.1
1Center for Molecular and Vascular Biology, KU Leuven, Leuven, Belgium

Introduction: The gelatinase subgroup of the matrix metalloproteinase (MMP) family (gelatinase A and B, or MMP-2 and -9) is known to play a pivotal role in adipose tissue biology. They are secreted by adipocytes and their activity is modulated during adipose tissue development. In the present study, we have evaluated the role of both gelatinases in adipogenesis.

Methods: Gene shRNA-mediated knockdown (Kd), or overexpression was performed in murine 3T3-F442A preadipocytes to evaluate the effect on differentiation into mature adipocytes. For de novo adipogenesis, nude athymic BALB/c mice were subcutaneously injected with genetically modified 3T3-F442A cells, and kept on a high fat diet for 4 weeks.

Results: Stable Mmp2 Kd was confirmed by i) 90% decreased mRNA expression ii) 4-fold reduced antigen levels and iii) 60% reduced gelatinolytic activity. Loss of MMP-2 significantly decreased preadipocyte differentiation, as demonstrated by Oil Red O staining (reduction by 65%) and mRNA expression of the adipogenic markers aP2, PPARY and adiponectin. In contrast, overexpression of MMP-2 resulted in enhanced differentiation. Upon selective Mmp9 Kd, no differences in adipogenesis were observed as compared to control cells. De novo fat pads derived from 3T3-F442A cells with/without Mmp2 Kd, did not significantly differ in mass or adipocyte size and density. Expression of adipogenic markers was, however, significantly decreased with Mmp2 Kd. Similar experiments were performed in wild-type and MMP-2 knockout mice (C57Bl/6N). Absence of de novo fat pads suggests successful clearance by the host immune system. Additional experiments to prevent rejection are ongoing.

Conclusion: Our data indicate that MMP-2 is a key player in early preadipocyte differentiation.

Acknowledgement: Skillful technical assistance by A. De Wolf, I. Vorsters and C. Vranckx is gratefully acknowledged.

T2.PD.009
Immunological targeting of neoepitopes of osteopontin exposed after thrombin and matrix metalloproteinase-cleavage reduces osteopontin-induced cell adhesion
Juret A.1, Stein G.1, Neuhof A.1, Leitner L.1, Tardelli M.1, Staffler G.1, Zeyda M.1, Stulnig T.M.1
1Christian Doppler Laboratory for Cardio-Metabolic Immunotherapy and Clinical Division of Endocrinology and Metabolism, Department of Medicine III, Medical University of Vienna, Vienna, Austria, 2Affiris AG, Vienna, Austria

Introduction: Osteopontin has been shown to be involved in immune cell migration, adhesion, and promoting inflammatory cytokine production. Its central region consists of a canonical RGD integrin binding sequence and a contiguous, cryptic integrin-binding site that is unmasked by thrombin or matrix metalloproteinase cleavage and is bound by α5β1, α4β1 and α9β1integrins expressed, e.g., by leukocytes and other inflammatory cells. We targeted this region with monoclonal antibodies or sera induced by peptide immunization of mice to prevent cellular adhesion in vitro.

Methods: Reombinant human OPN in full length or truncated forms was immobilized on the surface of V-well microtiter plates to induce adhesion of fluorescence-labeled HEK 293 cells as a model system for OPN-induced immune cell adhesion.

Results: Induction of HEK 293 adhesion was markedly stronger by the truncated OPN forms as compared to full-length OPN. Using post-immune sera or monoclonal antibodies, we could specifically block the adhesion to OPN fragments corresponding to the thrombin and matrix-metalloproteinase-cleaved form.

Conclusion: Cell adhesion to OPN strongly depends on protease cleavage and can be immunologically targeted. These results are a step forward to an immunotherapeutic approach to target obesity-induced adipose tissue inflammation and insulin resistance.

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T2.PD.010
Potential mediatory role of macrophages in air pollution-related adipocyte dysfunction: Differential effect of two diesel exhaust particles samples
Got R.1, Pecht T.1, Bashan N.1, Rudich Y.1, Schauer J.J.1, Rudich A.1,4
1Ben-Gurion University of the Negev, Beer-Sheva, Israel, 2The Weizmann Institute of Science, Rehovot, Israel, 3University of Wisconsin-Madison, USA, 4National Institute of Biotechnology in the Negev, Beer-Sheva, Israel

Introduction: Exposure to fine particulate matter (PM) air pollution negatively affects human health, but a possible connection with obesity-associated morbidity remains uncertain. Beyond the lungs, PM-derived...
compounds may activate resident or circulating immune cells that could then engage in an immune-metabolic interaction with adipocytes. Here we assessed whether macrophages exposed to water extracts of two standard diesel exhaust particles (DEP) samples could induce a conditioned medium (CM) that would affect adipocyte function.

**Methods:** RAW264.7 macrophages were treated with water extracts of 2 standard DEPs with high/low organic compounds content (SRM-1650/2975). CM was collected, and used to expose adipocytes for 6h.

**Results:** Adipocytes exposed to CM of untreated macrophages exhibited a decreased insulin-stimulated p-Akt/T-Akt and p-Gsk/T-Gsk, and elevated basal lipolysis, compared to control adipocytes. When CM was prepared from macrophages pre-treated with SRM-2975, but not SRM-1650, a further decline in insulin responsiveness was observed. Lipolysis was not further altered. In search of potential macrophage-derived mediators, we considered altered secretion of TNFa, IL-10, IL-6 and additional cytokines using specific ELISAs and a multiplex assay. So far, differential secretion of these factors has not been consistently evident, suggesting alternative cytokines or non-cytokine mediators.

**Conclusion:** Results indicate: i. a potential mediatory role for macrophages in the induction of PM-related adipocyte insulin resistance; ii. different samples from one type of environmental source may induce different endocrine outcomes. The specific PM components, as well as the macrophage-derived mediators for PM-related adipocyte dysfunction have yet to be identified.

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**T2.PO.011**

**Gene expression levels of wnt5a and sfrp5 in visceral adipose tissue of obese subjects are related to inflammation**

Catalán V.,1,5,6 Gómez-Ambrosi J.,1,5,6 Rodríguez A.,1,5,6 Pérez-Hernández A.J.,1 Ramírez B.,1,5,6 Garbundo J.J.,1 Rotellar E.,2,5,6 Valentín V.,2,5,6 Moncada R.,2,5,6 Silva C.,2,5,6 Salvador J.,1,5,6 Frühbeck G.1,4,5,6

1Metabolic Research Laboratory, Clínica Universidad de Navarra, Spain, 2Department of Surgery, Clínica Universidad de Navarra, Spain, 3Department of Anesthesia, Clínica Universidad de Navarra, Spain, 4Department of Endocrinology & Nutrition, Clínica Universidad de Navarra, Pamplona, Spain, 5CIBER-Fisiopatología de la Obesidad y la Nutrición, ISCIII, Spain, 6Obesity and Adipobiology Group. Instituto de Investigación Sanitaria de Navarra (IDISNA), Pamplona, Spain.

**Introduction:** Wingless-type MMTV integration site family (WNT)-5A is a secreted glycoprotein involved in the regulation of the inflammatory response and secreted frizzled-related protein (SFRP)-5 has emerged as an anti-inflammatory adipokine binding and sequestering WNT5A. **Objective:** The aim was to evaluate the involvement of WNT5A and SFRP5 in obesity and obesity-associated type 2 diabetes (T2D) as well as to explore their role in visceral adipose tissue (VAT) inflammation.

**Methods:** Ninety subjects were included in the study. Visceral adipose tissue (VAT) gene expression levels as well as circulating concentrations of WNT5A and SFRP5 were analysed. The effect of tumour necrosis factor (TNF)-a and lipopolysaccharide (LPS) on the expression levels of WNT5A and SFRP5 in cultures of human differentiated adipocytes was also explored. We also investigated whether WNT5A itself can activate an inflammatory response in human differentiated adipocytes.

**Results:** Concentrations of WNT5A were significantly increased (P < 0.01) in normoglycaemic (NG) and T2D obese patients compared to lean subjects. In this regard, increased (P < 0.01) expression levels of WNT5A together with decreased (P < 0.05) mRNA levels of SFRP5 in NG and T2D obese patients were found in VAT. WNT5A expression was significantly enhanced (P < 0.01) by TNF-a and LPS, while no effects were found in SFRP5 gene expression levels. Furthermore, WNT5A treatment significantly enhanced (P < 0.05) the mRNA levels of IL6, IL1B, MMP2, MMP9 and SPP1 in adipocytes.

**Conclusions:** Activation of non-canonical Wnt signalling through the upregulation of WNT5A and downregulation of SFRP5 may promote a proinflammatory state in visceral adipose tissue contributing to the development of obesity-associated comorbidities.

**Acknowledgement:** CIBERobn is an initiative of the ISCIII, Spain.

**T2.P0.012**

**Increased gene expression of s6k1 in human visceral adipose tissue in obesity is related to inflammation and insulin resistance**

Ramírez B.,1,5,6 Catalán V.,1,5,6 Gómez-Ambrosi J.,1,5,6 Rodríguez A.,1,5,6 Rotellar E.,2,5,6 Valentín V.,2,5,6 Moncada R.,2,5,6 Silva C.,2,5,6 Salvador J.,1,5,6 Frühbeck G.1,4,5,6

1Metabolic Research Laboratory, Clínica Universidad de Navarra, Pamplona, Spain, 2Department of Surgery, Clínica Universidad de Navarra, Pamplona, Spain, 3Department of Anesthesia, Clínica Universidad de Navarra, Pamplona, Spain, 4Department of Endocrinology & Nutrition, Clínica Universidad de Navarra, Pamplona, Spain, 5CIBER-Fisiopatología de la Obesidad y la Nutrición, ISCIII, Spain, 6Obesity and Adipobiology Group. Instituto de Investigación Sanitaria de Navarra (IDISNA), Pamplona, Spain.

**Introduction:** The ribosomal protein S6 kinase 1 (S6K1), a component of the insulin signalling pathway, has been proposed as a key molecular factor in insulin resistance development under conditions of nutrient overload. The aim was to evaluate the involvement of S6K1 in obesity as well as to explore their association with visceral adipose tissue (VAT) inflammation.

**Methods:** Forty females were included in the study (9 lean and 31 obese). Real-time PCR analyses were performed to quantify gene expression levels of S6K1 as well as representative players involved in signalling pathways related to S6K1 and inflammation in VAT. We also explored the effect of the stimulation with insulin in human visceral adipocytes.

**Results:** Increased expression levels of S6K1 in obese patients in VAT were observed (P < 0.05). Moreover, a positive association (P < 0.05) of S6K1 expression with different markers of insulin resistance was observed. S6K1 mRNA levels in human visceral adipocytes were significantly increased (P < 0.01) after insulin stimulation. Finally, S6K1 gene expression levels were positively correlated with VAT gene expression levels of the inflammatory markers CCL2, CD68, MMP2, MMP9, VEGFA and CHI3L1 as well as with mRNA levels of MTO and MAPK8 (JNK).

**Conclusion:** These data show that S6K1 is upregulated in human VAT in obesity, suggesting its role in the dysfunctional adipose tissue via a close association with insulin resistance and inflammation development.

**Acknowledgement:** CIBERobn is an initiative of the ISCIII, Spain.

**T2.P0.013**

**Adipose tissue stiffness evaluated by non-invasive elastometry (adiposcan) associates with structural and molecular actors of extracellular matrix**

Liu Y.,1,2 Aron-Wisnewsky J.1,2 Pelloux V.1,2,3 Tarcivizza A.4, Sasso M.1, Miette V.1, Tordjman J.1,2 Clément K.1,2

1Institute of Cardiometabolism and Nutrition (ICAN), Pitié-Salpêtrière Hospital, Paris, France, 2Inserm UMR U116: UPMC, Nutriomique, France, 3Echosens, Paris, 4Department of Surgery, Assistance Publique-Hôpitaux de Paris, Pitié-Salpêtrière hospital.

**Introduction:** Extracellular matrix remodelling is a hallmark of adipose tissue (AT) pathologic alterations in obesity. It relates to metabolic abnormalities and associates with AT stiffness, for which we have recently developed a non-invasive method – the Adiposcan (Echosens, Paris) – based on vibration-controlled transient elastography (VCTE). Our aim was to
identify how the VCCTE (VS) relates to metabolic characteristics and components of AT ECM structure and functions in morbid obesity.

**Methods:** 119 obese subjects (age 39.4 ± 10.8yr, BMI 46.2 ± 6.5kg/m², female 68.1%) candidates for bariatric surgery (BS) were recruited and their phenotypes were determined according to several bioclinical characteristics. AT stiffness (VS) was measured by Adiposcan in the periumbilical region before BS. We obtained per-operative subcutaneous AT samples for fibrosis quantification by histochemistry (picrosirius red). Using PCR-ARRAY, we examined the expression of genes related to AT ECM structure and function in a subset of non-diabetic women.

**Results:** We confirmed that AT stiffness (VS) is positively associated with pericellular fibrosis (rho=0.28, p = 0.02) and with blood fasting glucose, HbA1c, liver transaminases and triglycerides whereas negatively with fat mass% (DXA). We here show that VS is positively associated with expression of genes encoding profibrotic proteins (SPPI, THBS1, TGFBI), matrix fibers (COL6A1, COL6A2), basement membranes (COL4A2, LAMC1, LAMB3), adhesion molecules (SELE, ICAM, CD44) and metalloproteinase inhibitors (TIMP1). VS is also positively associated with integrins involved in mechanotransduction (ITGB2, ITGA5, ITGA8) and transcription factors controlling fibrosis and inflammatory genes (NFkB1, CEBPB).

**Conclusion:** Physical measure of AT stiffness is associated with molecular actors of ECM structure and function and need to be confirmed at the protein level. This study illustrates the interest of developing non-invasive tools to phenotype the adipose tissue.

**Acknowledgement:** We would like to thank Prof. Gustavo Leone, Department of Molecular virology and Genetics, College of Medicine and Public Health, Ohio state University, Ohio, USA for the E2F1-KO and WT- MEFs.

T2.PD.015

**High-intensity resistance exercise assuage the deleterious effects of obesity on mmp-2 and oxidative stress in left ventricle of rats**

Lino A.D.S.1, Aquino Júnior A.E.1, Castro C.A.1, Leite R.1, Fina Speretta G.F.1, Fabrizii F.1, Moraes G.1, Selistre Araújo H.S.1, Duarte A.C.G.O.1

1Laboratory of Nutrition of Metabolism Applied of Exercise, Department of Physical Education and Human Motor, Centro of Biological and Health Sciences, UFSCar, SP/Brazil; 2Laboratory of Physical Exercise, UFSCar, 3Laboratory of Biochemistry and Molecular Biology, UFSCar, 4Laboratory Of Adaptive Biochemistry, Department of Genetics, UFSCar, 5Department of Physiology and Pathology, School of Dentistry, Universidade Estadual Paulista-UNESP, SP/Brazil, 6Department of Physical Education, Federal University of Maranhão, São Luís, MA, Brazil, 7Optics Group from Institute of Physics of São Carlos (IFSC) University of São Paulo, SP/Brazil

**Objective:** to evaluate the effects of eight-week resistance training (RT) on body mass (BM), activity of Metalloproteinase-2 (MMP-2), antioxidant enzymes, lipid peroxidation, Citrate synthase (CS) and total lipid content in the left ventricle (LV) of obese rats.

**Methods:** Sixty Wistar rats was distributed into six experimental groups (n=10/each): fed with standard diet: Control (CT), Sedentary (SED) and trained (RT) groups, and fed with high-fat diet (CT-Ob), Sedentary (SED-Ob) and trained groups (RT-Ob). RT protocol was conducted with 4–9 climbs of a vertical ladder with weights attached to their tails. Sessions were carried out every 72 hours.

**Results:** The three weeks obesity-induction period induced higher BM, LV mass, activity of MMP-2, lipid peroxidation and lower CS activity compared to CT (p < 0.05). After eleven weeks of high-fat diet, the SED-Ob presented a higher BM compared to SED. The consumption of high-fat diet (SED-Ob) was able to promote lower Total Super Oxide Dismutate (Total-SOD) and Mitochondrial Super Oxide Dismutate (Mn-SOD) and higher Glutathione (GSH) activity. The BM was lower to the RT-Ob compared to SED-Ob, even though higher compared to RT-Ob (p < 0.005). In the RT-Ob of MMP-2 activity was higher (p < 0.003) compared to RT, but lower (p < 0.04) compared to SED-Ob. The RT protocol promoted greater CS activity (p < 0.03), Total-SOD (p < 0.001) and Mn-SOD (p < 0.03) and lower activity of GSH (p < 0.01) in RT-Ob. There was no alterations on TBARs level in the LV of the RT-Ob. However, we observed increased lipid content (p < 0.04).

**Conclusion:** RT, in obese rats, could be a no pharmacological tool able to positively modulate the activity of MMP-2 and some antioxidant enzymes. These effects are important for the maintenance of heart health, relieving the deleterious effects on obesity-related on LV.

**Acknowledgement:** Financial support was provided by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Brazil.

T2.PD.016

**CD56 bright nk cells are enriched in adipose tissue and may contribute to local obesity-induced inflammation**

Turk Wensveen T.1, Klobučar Majanović S.1, Mendrila D.1, Franjić N.1, Želić M.1, Jurjić Erzen D.1, Wensveen F. M.1, Polić B.1, Stimac D.1

1Department of Internal Medicine, University Hospital Rijeka, Rijeka, Croatia, 2Department of Surgery, University Hospital Rijeka, Rijeka, Croatia, 3Department of Histology and Embryology, Faculty of Medicine, University of Rijeka, Rijeka, Croatia

**Introduction:** An important underlying cause of obesity-induced IR is chronic systemic inflammation derived from progressive inflammation in visceral adipose tissue (VAT). In this study we characterized the mononu-
clear immune cells in peripheral blood (PB), visceral and subcutaneous adipose tissue (SAT) of humans.

Materials and methods: Human samples were obtained during laparoscopic surgery of patients undergoing elective cholecystectomy. Exclusion criteria: age>65 yrs, active infection, current treatment with antiinflammatory or immunosuppressive drugs, malignant disease, acute or chronic kidney and liver disease, heart failure (NYHA III or IV), thyroid disease, use of weight loss drugs, alcohol abuse. All patients signed an informed consent before tissues were isolated. Statistics. Student's t test, Mann-Whitney and ANOVA tests, with Bonferroni’s postest Correction for multiple comparisons, were used. P < 0.05 was considered statistically significant.

Results: We find that T cells are a dominant immune cell subset in both VAT and SAT. Compared to PB, adipose tissue (AT) contains relatively more CD8T cells. Markedly, we found that AT contains more NK cells than PB. In particular CD56Bright cells, which produce high levels of IFNγ, were 2–4 fold increased in AT compared to PB. When NK cell numbers were correlated to BMI, we observed a clear positive correlation in AT, but not in PB, even though our sample size was too small to reach statistical significance. In addition, we observed that VAT, but not SAT expresses activating ligands for the NK cell receptor NKP46. NKP6 ligand expression was also positively correlated with BMI.

Conclusion: Our study identifies NK cells as an important immune cell subset in AT. The positive correlation of NK cells and activating NK cell ligands in AT with BMI might indicate that this pro-inflammatory immune cell subset may play an important role in the development of VAT-inflammation and contribute to the development of IR.

T2.P0.017
Oral administration of trans10?cis12 conjugated linoleic acid (CLA) in mice induces a reversible inflammatory and fibrotic signature in adipose tissue.

Pini M.1, Touch S.1, Niett L.1, Poirier H.1, Drurant C.1, Delzenne N.1, Tap J.1, Clément K.2, André S.3, Guerre-Millo M.4

1Inserm UMR-S1166-ICAN, Paris, France; Université Pierre et Marie Curie-Paris6, Sorbonne University, Paris, France; Institute of Cardiometabolism and Nutrition (ICAN), Pitie-Salpetriere Hospital, Assistance Publique-Hôpitaux de Paris, Paris, France,
2Inserm UMR U866, Dijon, France; Université de Bourgogne, Dijon, France,
3Université Catholique de Louvain, Louvain Drug Research Institute, Brussels, Belgium,
4Inra-AgroParisTech, UMR 1319 MICALIS, Centre de Recherche de Jouy-en-Josas, Jouy-en-Josas, France

Oral administration of trans10?cis12 conjugated linoleic acid (CLA) provokes an accumulation of macrophages in the adipose tissue (Poirier et al, Diabetes 2006). Here, we used this model to assess the components of this immune response in adipose tissue and to test whether the compound affects gut immunity, permeability and microflora composition. Immune cell abundance and phenotype were assessed by flow cytometry, immunohistochemistry and flow cytometry in adipose tissue, jejunum and colon of mice receiving daily gavage of CLA for 7 days. Collagen deposition and fibrosis-related genes were assessed in adipose tissue. Microbiota composition was determined by 16S RNA analysis. Macrophages and to a lesser extent T-lymphocytes accumulated in adipose tissue with CLA treatment. Phenotypic analysis revealed the prevalence of M2 anti-inflammatory macrophages. This was accompanied by marked collagen deposition. Immune cell infiltration and extracellular matrix accumulation were fully reversible after 7 days with no gavage. In contrast to adipose tissue, both jejunum and colon displayed no alteration in the expression of macrophage and T-lymphocyte markers. However, a decreased expression of genes encoding tight junction proteins (claudin and occludin) and a significant switch in microbial community were observed. In conclusion, we show that adipose tissue response to acute oral CLA administration is more adaptive that pathological, as suggested by the reversibility of both CLA-induced cellular and structural alterations. These observations enlighten an unexpected resilience of adipose tissue in response to a nutritional stressor. Part of the effects of CLA could be mediated by CLA-induced increased intestinal permeability and microbiote alteration.

Acknowledgement: GLN and FRM

T2.P0.018
Inflammatory macrophage infiltration in human obese adipose tissue increases tryptophan degradation toward kynurenine pathway

Favennerc M.1, Hennart B.2, Pattou F.3, Leloin A.4, Yengo L.5, Arredouani A.1, Marre M.4, Balkau B.6, Chinietti G.7, Staels B.8, Guillet G.9, Allorge D.10, Froguel P.11, Pouilain-Godefroy G.12

1CNRS UMR 8199, Lille, France, 2EA 4483 & CHRU, Lille, France, 3INSEAD UMR 859, Lille, France, 
4QBI, Doha, Qatar, 5INSERM U872, Paris, France, 6INSERM UMRs 1018, Villejuif, France, 7INSEAD UMR 1011, Lille, France, 
8Neuroinflammation group, Macquarie University, NSW, Australia, 9DGCS, Imperial College, London, United Kingdom

Introduction: Indoleamine2,3dioxygenase1 (IDO1) catalyzes the degradation of tryptophan to kyn (Kyn) which in turn is metabolized via the kynurenine pathway (KP), to yield bioactive metabolites (collectively, kynurenines (KPs)). Tryptophan catabolism is induced by inflammation, suggesting that it could likewise be triggered in obesity. The aim of our study was to determine whether serum KPm levels and KP enzyme expression in the human adipose tissue are altered in obesity.

Methods: We assessed serum KPm levels in 836 individuals from a prospective cohort of French Europeans, and in 100 morbidly obese women who underwent bariatric surgery. Gene expression of KP enzymes was analyzed in visceral and subcutaneous adipose tissue from obese women, in human primary adipocytes and in monococyte-derived pro-inflammatory M1 and anti-inflammatory M2 macrophages.

Results: Increased levels of Kyn were associated with BMI (P = 4.7×10−19) in the prospective cohort. Moreover, Kyn, kynurenic acid and quinolinic acid levels were positively associated with BMI (P < 0.05) in obese women. The gene expression of several KP enzymes (IDO1, KYNU, KMO and CCB2) was increased in visceral adipose tissue of obese women as compared to lean controls (P < 0.05). In vitro stimulation by pro-inflammatory cytokines of primary adipocytes induced the expression of these enzymes in these cells (P < 0.05) except KMO that was never expressed in these cells. In addition, IDO1, KYNU, KMO and CCB2 expressions were higher in M1 than in M2 macrophages (P < 0.05).

Conclusion: Obesity is associated with increased serum KPm levels and higher expression of KP enzymes in adipose tissue from obese women that may result from pro-inflammatory macrophages and from adipocytes in response to inflammatory cytokines.

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T2.PO.019
Chronic resistance training decrease inflammation in intra-abdominal adipose tissue of ovariectomized rats
Stotzer U1, Duarte FO1,2, Gatto C1, Cury MF3, Domingues MM, Duarte ACGO1, Perez SEA4, Seliste Araújo HS4
1Laboratory of Nutrition of Metabolism Applied of Exercise, Department of Physical Education and Human Motricity, Center of Biological and Health Sciences, UFSCar, SP/Brazil,
2Laboratory of Physical Exercise, Center of Biological and Health Sciences, UFSCar, SP/Brazil,
3Laboratory of Biochemistry and Molecular Biology, Center of Biological and Health Sciences, UFSCar, SP/Brazil

Introduction: Chronic Inflammation is an obesity hallmark and body mass reduction decreased it. However, ovariectomized (OVX) mice showed visceral adipose tissue (VAT) inflammation and reduced insulin sensitivity even without increased adiposity. So we aimed to test if resistance training (RT) was able to decrease chronic inflammation in VAT of ovx rats.

Methods: Sprague-Dawley rats were divided into (n=6): sham-sedentary (S-SED), ovariectomized (OVX)-SED, S-resistance trained (RT), OVX-RT, S-acute-RT (A) and OVX-acute RT groups. Surgery was performed at 10 weeks of age. After three weeks, TR groups started a 10-week climbing program in a ladder with progressive overload, S-A and OVX-A performed one bout session. Mesenteric AT was used for RNAm analysis

Results: OVX-SED rats had higher body mass than SHAM SED rats and chronic RT partially abrogate it. VAT of OVX-SED rats displayed evidence of immune infiltration and inflammation because had increased expression of macrophage chemoattractants (Osteopontin, Rantes and MCP-1), macrophage infiltration (F4/80 and CD11b), inflammatory cytokines (IL-1β, IL-6 and TNF-α) and Th1 cytokine IFN-y. M2 macrophage arginase-1 was increased but IL-10 decreased. Acute RT increased all these genes but also increased IL-10 in non-ovx rats and increased only osteopontin, CD11b and IL-1β in ovx rats. Chronic-RT reversed these changes caused by ovarian hormone loss or by the acute-RT in non-ovx animals.

Conclusion: Inflammation in VAT induced by ovarian hormone loss is restored by chronic-RT even reducing body mass only partially. Non regular exercise may also induce immune infiltration and inflammation in non-ovariectomized rats.

T2 – Oxygen tension
T2.PO.020
Chronic adipose tissue hypoxia and dysfunction in subjects with obstructive sleep apnoea
Thorn CE1,2, Knight BA1, McCulloch L1, Patel B1, Shore A.C.1,2, Kos K.1,2
1Diabetes and Vascular Medicine, University of Exeter Medical School, Exeter, UK,
2NIHR Exeter Clinical Research Facility, University of Exeter Medical School, Exeter, UK,
3Diabetes and Obesity Research Group, University of Exeter Medical School, Exeter, UK,
4Department of Respiratory Medicine, Royal Devon and Exeter NHS Foundation Trust, Exeter, UK

Background: Many subjects with morbid obesity suffer from obstructive sleep apnoea (OSA). Obesity and OSA are independently associated with increased cardiovascular disease (CVD) risk. Adipose tissue (AT) dysfunction of obesity contributes to CVD risk, yet it is unclear if AT is affected by the reduction in arterial oxygenation in OSA or hyperventilation.

Methods: In 16 obese men with OSA and 15 BMI matched men without OSA (controls), the delivery of oxygen to AT was measured in: 1) arterial blood by finger pulse oximetry (SaO2) 2) blood in abdominal AT microcirculation by reflectance spectroscopy (SATO2) along with AT blood flow (ATBF) 3) abdominal AT itself with Clarke-type electrode (pATO2). Abdominal AT biopsies were analysed for gene expression.

Results: SaO2 was lower in awake OSA subjects compared to controls (95.3 ± 1.3% (mean±SD) vs 97.5 ± 1.4%, t-test, p < 0.009, n=10) yet within the abdominal AT neither SATO2 (62.5 ± 18.9 vs 72.5 ± 7.3%, ns, n=12) nor pATO2 (49.2 ± 7.5 vs 49.4 ± 13.9mmHg, ns, n=8) were significantly different. Interestingly ATBF was higher in OSA subjects (109.6 ± 23.25 vs 78.9 ± 24.9au, p < 0.005, n=12). In controls higher ATBF was associated with increased pATO2 (Spearman’s p=0.75, p = 0.02, n=9) but not in OSA. Biopsy mRNA expression was significantly higher in OSA for HIF-1alpha (48%, p = 0.04), MCP-1 (54%, p = 0.02) and TGFbeta (49%, p = 0.01).

Conclusions: Respiratory hypoxia reduces mean SaO2 in awake OSA subjects compared to controls but does not further increase AT hypoxia associated with obesity. Changes in gene expression in OSA suggest chronic hypoxic tissue dysfunction, perhaps as a result of intermittent hypoxia. Increased ATBF with OSA may represent an adaptive compensatory mechanism to limit the confounding effect of respiratory hypoxia on AT hypoxia.

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T2 – Ectopic fat
T2.PO.021
Appendicular and central fat storage is negatively related to self-perceived fatigue and muscle performance in obese boys and girls.
Van tiergem S1, Proyn S2, Treesignie I1, Bautmans I2
1Experimental Anatomy, 2Frailty In Ageing

Introduction: Maximal strength is an important factor to perform daily activities, especially in obese persons whose muscles must carry heavier loads, which can induce higher levels of fatigue. Excess weight consists mainly of fat mass but also lean mass which can influence the muscle performance positively in non-weight bearing activities. Studies correlating grip strength with segmental and total body composition (using DXA) in obese children are scarce. This study explores the relation between self-perceived fatigue, body composition and muscle performance in obese adolescents

Methods: 140 girls and 97 boys (15 ± 2 years) were examined for body composition (BC) (DXA), muscle performance (grip strength (GS), fatigue resistance and grip work) and self-perceived fatigue (Multidimensional Fatigue Inventory, MFI-20).

Results: Girls showed no difference in absolute muscle performance compared to boys, but when corrected for lean arm mass girls performed significantly better than boys. No significant difference was found between the sexes for absolute fat mass, but girls showed significantly higher fat percentage and lower lean mass than boys. GS showed good correlations with lean mass (expressed in absolute and relative values) in as well for appendicular segments as for total BC, and a negative correlation was found for fat% in both sexes. Worse self-perceived fatigue was related to higher fat mass and lower lean mass. No relations were found between grip performance and self-perceived fatigue.

Conclusion: Based on our results we conclude that self-perceived fatigue and handgrip performance are significantly related to segmental and total body composition. Further studies are necessary to evaluate whether self-perceived fatigue can be improved by weight loss interventions.
Danish childhood obesity chronic care treatment reduces 1H-mrs measured ectopic fat content in liver and muscle

Forng C.E., Chabanova E., Ohrt J.D., Nielsen L.A., Pedersen O.J., Hansen T., Thomsen H.S., Holm J.C.
1The Children’s Obesity Clinic, Department of Pediatrics, Copenhagen University Hospital Holbæk, Denmark,
2The Novo Nordisk Foundation Center for Basic Metabolic Research, Section of Metabolic Genetics, Faculty of Medical and Health Sciences, University of Copenhagen, Denmark,
3Department of Diagnostic Radiology, Copenhagen University Hospital Herlev, Denmark

Introduction: Ectopic fat deposition in non-adipose tissue (including liver and muscle) is an important predictor of cardiovascular disease. Hepatic and muscular steatosis are both common in obese children, which underlines the need for an effective treatment of these conditions, especially in childhood obesity.

Methods: Forty-one overweight children and youths, enrolled in The Children’s Obesity Clinic Treatment protocol, Holbæk, Denmark, were assessed by anthropometry, fasting blood samples (glucose, insulin, HbA1c, and lipids), and liver and muscle fat content (MFC) by magnetic resonance spectroscopy, at enrolment and after intervention.

Results: The baseline median body mass index (BMI) standard deviation score (SDS) was 2.80 (range: 1.49–3.85) with a median age of 14 years (10–20). During 12 months of intervention, the 41 children and youths (22 girls) decreased their BMI SDS by 0.22 (95% CI: [0.08; 0.43], p = 0.002) accompanied by reductions in liver and muscle fat percentages of 1.0% (95% CI: [0.1; 3.5], p = 0.02) and 2.3% (95% CI: [0.4; 3.9], p = 0.02), respectively. The prevalence of hepatic steatosis decreased from 29% to 22% and the prevalence of muscular steatosis decreased from 76% to 46%. Linear regression showed that changes in liver fat associated with changes in HbA1c (p = 0.04), changes in MFC (p = 0.04), and baseline levels of liver fat (p < 0.0001), while changes in MFC associated with baseline levels of MFC (p < 0.0001) and changes in visceral adipose tissue volume (p = 0.04), independent of age, sex, duration of treatment, baseline degree of obesity and pubertal developmental stage.

Conclusion: Reductions in magnetic resonance spectroscopy measured liver and muscle fat are possible in childhood obesity treatment and suggest a decrease in cardiovascular disease risk.

Heart fat infiltration in subjects with and without coronary artery disease

Mazzali G., Zoico E., Faccioni S., Pedrotti M., Rizzatti V., Micciolo R., Cinti S., Zamboni M.
1Department of Medicine, Geriatric Section, University of Verona,
2Department of Psychology and Cognitive Sciences, University of Trento,
3Institute of Human Morphology, University of Ancona

Background and Aims: Fat may accumulate around the heart in epicardial adipose tissue or inside the heart as lipid droplets (LD). The aims were to compare the myocardial steatosis between subjects with and without coronary artery disease (CAD), and to identify in which cells LD are contained.

Methods and Results: We studied male subjects undergoing cardiac surgery either for coronary bypass grafting (CAD, n = 23) or for valve replacement (non-CAD, n = 18). Body mass index, waist circumference, glucose, insulin, HOMA index, leptin, adiponectin and Hs-CRP were evaluated. Biopsies were collected from right atrial myocardium during appendix incannulation. Immunohistochemistry for perilipin (PLIN) 1 and 2 was used to characterize LD and their localization respectively in adipocytes or myocardial cells. Both PLIN1 and PLIN2 resulted to be significantly higher in subjects with CAD than in those without (respectively: 0.35 ± 0.04 OD vs 0.28 ± 0.05 OD; p = 0.004; 0.27 ± 0.05 OD vs 0.22 ± 0.05 OD; p < 0.004). PLIN 1 was significantly associated with leptin and Hs-CRP and negatively with adiponectin, whilst PLIN 2 with BMI, waist circumference, leptin and negatively with adiponectin. After taking into account absence/presence of hypertension and CAD/nonCAD, adiponectin was inversely associated with PLIN 1 (R2 0.523), while both waist circumference and adiponectin were positively associated with PLIN 2 (R2 0.399).

Conclusion: Myocardial steatosis is significantly greater in subjects with CAD than in those without, depending on both metabolically active adipocytes interspersed among cardiomyocytes, and higher fat deposition inside cardiomyocytes; serum adiponectin and waist are independent predictors of myocardial steatosis.
Sex-dependent differences in rat hepatic mitochondrial biogenesis and fat metabolism in response to rosiglitazone treatment


1Grupo de Metabolismo Energético y Nutrición, Dept. Bioquímica y Biología de la Salud y IUNICS, Universitat de les Illes Balears, Palma de Mallorca, Spain.
2Grup de Investigación Biomédica en Red Fisiopatología de la Obesidad y la Nutrición (CIBERobn, CB06/03/0043), Instituto de Salud Carlos III, Palma de Mallorca, Spain.
3Centro de Investigación Biomédica en Red Fisiopatología de la Obesidad y la Nutrición (CIBERobn, CB06/03/0043), Instituto de Salud Carlos III, Palma de Mallorca, Spain.

**Introduction:** High caloric intake is linked to hepatic steatosis in which mitochondrial dysfunction seems to play a key role, impairing fat homeostasis. Rosiglitazone (Rsg), a PPARy agonist that ameliorates insulin sensitivity and mitochondrial function, may play a role in mitochondrial biogenesis, a process that includes both proliferation and differentiation. The aim of this study was to define sex-related differences in mitochondrial biogenesis and fat homeostasis in response to Rsg treatment.

**Methods:** Eight-week-old male and female Wistar rats were fed a high-fat diet (HFD, 23% fat) for 16 weeks. Half of the animals were supplemented with Rsg (100mg/kg) during the last two weeks of HFD feeding. Markers of mitochondrial biogenesis and fat metabolism were analysed.

**Results:** Rsg treatment induced an increase in PGC1α expression leading to an increase in mitochondrial proliferation (mtDNA) in both sexes. Male rats maintained mitochondrial differentiation (COX IV, TFAM, UCP2) while females decreased it. In parallel, hepatic triglycerides diminished more strongly in males, in accordance with the stimulation of fatty acid oxidation (PPARα) and inhibition of de novo lipogenesis (SREBP-1c) in this sex.

**Conclusions:** In a fatty liver context, Rsg treatment improves mitochondrial function through an increase in mitochondrial proliferation and maintenance of mitochondrial differentiation in male rats leading to an improvement of hepatic fat homeostasis. The lower degree of steatosis reached by HFD females may explain the minor hepatic changes observed in response to Rsg treatment in both mitochondrial differentiation and fat metabolism.

**Abstracts**

Effect of the Exposure of Persistent Organic Pollutants on in vitro model of adipocytes in relation to a higher risk of diabetes mellitus type II


1Department of Public Health Medicine, The Faculty of Medicine in Pilsen, Charles University in Prague, Czech Republic.
2Department of Biology, The Faculty of Medicine in Pilsen, Charles University in Prague, Czech Republic.
3Department of Histology and Embryology, The Faculty of Medicine in Pilsen, Charles University in Prague, Czech Republic.
4Department of Biochemistry, The Faculty of Medicine in Pilsen, Charles University in Prague, Czech Republic.

**Introduction:** In humans, organochlorine persistent organic pollutants (POPs) are associated in epidemiological studies with a higher risk of diabetes mellitus type II. However, the specific mechanism of POPs action is not yet known. These lipophilic pollutants are stored primarily in adipose tissue. To examine the effect of POPs on adipocyte metabolism, we prepared an in vitro model of adipocytes from human mesenchymal stem cells derived from adipose tissue (hMSC). To study the effect of POPs, it was necessary to characterize the process of differentiation of adipocytes at first. The ongoing process of differentiation was described by quantitative assessment of the expression of selected genes using RT real-time PCR with LNA probes. These genes are involved in the processes of implementing the undifferentiated phenotype of adipocytes - OCT4, NANOG and SOX2, or direction of differentiation in adipocytes - PPARy, PPARα, C1B and PLIN2.

**Methods:** We prepared a model of adipocytes from human mesenchymal stem cells derived from adipose tissue (hMSC). The differentiation of adipocytes was performed in the presence and without of dichlorodi-phenyldichloroethylenne (DDE). During 28 days from the point when differentiation was initiated, the samples were taken every 3 days. The pattern of expression will be presented. Process of differentiation was analysed by quantitative assessment of expression of the following genes: OCT4, NANOG, SOX2, PPARy, PPARα, C1B and PLIN2. Also we analyzed a panel of control genes (GAPDH, beta-actin, GUSB, HPRT, TBP, YWHAZ) and found GUSB, HPRT and YWHAZ to be most relevant.

**Results:** During differentiation of adipocytes in the presence of DDE, we observed silencing of the expression of markers of differentiation (PLIN2, PPARα and PPARα C1B and PLIN2). We also observed a decrease in the expression of the genes involved in adipocyte differentiation - OCT4, NANOG and SOX2.

**Conclusion:** The results of the assessment of expression of selected genes indicate that DDE could inhibit adipocyte differentiation. Impact on metabolic pathways is now being investigated.

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Sexual dimorphism in cardiac adiponectin signalling in rats on high fat diet induced obesity: Role of sex hormones


1Grupo de Metabolismo Energético y Nutrición, Dept. Biología Fonamental i Ciències de la Salut and IUNICS, Universitat de les Illes Balears, Palma de Mallorca, Spain.
2Centro de Investigación Biomédica en Red Fisiopatología de la Obesidad y la Nutrición (CIBERobn, CB06/03/0043), Instituto de Salud Carlos III, Palma de Mallorca, Spain.

**Introduction:** Adiponectin is an adipokine that increases cardiac insulin sensitivity thus exerting an important effect on myocardial function which is lost during the development of diabetic cardiomyopathy. Rosiglitazone (Rsg) is an antidiabetic drug that increases systemic insulin sensitivity through the enhancement of adiponectin synthesis. Previous results from our research group show that 17beta-estradiol (E2) activates adiponectin signalling in both skeletal muscle and liver. We also observed silencing of expression of selected genes using RT real-time PCR with LNA probes. These genes are involved in the processes of implementing the undifferentiated phenotype of adipocytes - OCT4, NANOG and SOX2, or direction of differentiation in adipocytes - PPARy, PPARα, C1B and PLIN2.

**Methods:** We prepared a model of adipocytes from human mesenchymal stem cells derived from adipose tissue (hMSC). The differentiation of adipocytes was performed in the presence and without of dichlorodi-phenyldichloroethylenne (DDE). During 28 days from the point when differentiation was initiated, the samples were taken every 3 days. The pattern of expression will be presented. Process of differentiation was analysed by quantitative assessment of expression of the following genes: OCT4, NANOG, SOX2, PPARy, PPARα, C1B and PLIN2. Also we analyzed a panel of control genes (GAPDH, beta-actin, GUSB, HPRT, TBP, YWHAZ) and found GUSB, HPRT and YWHAZ to be most relevant.

**Results:** During differentiation of adipocytes in the presence of DDE, we observed silencing of the expression of markers of differentiation (PLIN2, PPARα and PPARα C1B and PLIN2).

**Conclusion:** The results of the assessment of expression of selected genes indicate that DDE could inhibit adipocyte differentiation. Impact on metabolic pathways is now being investigated.

Acknowledgement: This work was supported by grant of the Ministry of Health of the Czech republic, IGA MZ NT 14330-3/2013.

**Results:** HFD male rats had a lower p-AMPK to t-AMPK ratio value than females. Rsg induced an increase of both p-AMPK to t-AMPK and Akt to t-Akt ratios that were more pronounced in females. Moreover, T reduced the p-AMPK to t-AMPK ratio in adiponectin treated H9c2 cells.

**Conclusion:** In male rats, HFD had a higher deleterious effect on cardiac adiponectin pathway activation, the response of which to Rsg was lower compared to that of females. Consequently, insulin sensitivity was improved in response to Rsg only in female rats. Our in vitro results suggest that T could be involved in the sex dimorphism observed in vivo with Rsg treatment.
**T2 – Lipid Metabolism**

**T2:PO.027**

**Characterization of hypodermic adipose tissue in obese mice**

Begey A.1, Nguyen-Tu M.S.1,2, Geloen A.1, Sigaudo-Roussel D.1

1UMR 5305 CNRS, 69367 Lyon cedex 07, France; University of Lyon 1, 69367 Lyon cedex 07, France,

2University of Lyon 1, CARMEN INSERM U1060, INSA Lyon, F-69621, Villeurbanne, France

**Introduction:** In obesity, hypodermic adipose tissue grows at the expense of surrounding tissues. The aim of the present study was to characterize the hypodermic adipose cells compared to other adipose tissues in a mouse diet-induced obesity model.

**Methods:** C57Bl6 male mice were randomly assigned to a control or a high-calorie diet for 4 or 12 weeks (HCD4 or HCD12). We studied the changes in mice adipose tissue weights and in adipose cell size distribution in hypodermic (hWAT), subcutaneous (scWAT), retroperitoneal (rWAT), and epididymal (eWAT) using multisizer IV (Beckman Coulter). The lipolytic response was investigated measuring the glycerol produced. We also examined in vitro insulin sensitivity of hWAT compared to the other adipose tissues.

**Results:** In HCD4 and HCD12, the body weight of obese mice was increased compared to non-obese (p < 0.001). hWAT lipolytic response was lower than the other tissues responses in HCD4 mice, but was higher than eWAT and scWAT responses in HCD12 mice. The bimodal distribution of adipose cell sizes of hWAT was not observed in HCD4 mice compared to the other tissues whereas it was observed in HCD12 mice. In HCD4 mice, adipocyte cell size rose only in eWAT and rWAT while in HCD12 mice, adipocyte cell size increased in all adipose tissues.

**Conclusion:** This study suggests that adipose tissue from hypodermis layer behaves the same than other tissues in HCD12 mice but not in HCD4 mice.

**T2:PO.028**

**Saturated fatty acids in human visceral adipose tissue are associated with increased 11-β-hydroxysteroid-dehydrogenase type 1 expression**

Petrus P.1, Rospivist F.1, Edholm D.1, Meljert N.1, Arner P.1, Dahlman I.1, Rydén M.1, Sundbom M.2, Risérus U.2

1Department of Medicine, Karolinska Institutet, Karolinska University Hospital, Huddinge, Stockholm, Sweden,

2Clinical Nutrition and Metabolism, Department of Public Health and Caring Sciences, Uppsala University, Uppsala, Sweden,

3Department of Surgical Sciences, Uppsala University Hospital, Uppsala University

**Background:** Visceral fat accumulation is associated with metabolic disease. It is therefore relevant to study factors that regulate adipose tissue distribution. Recently overeating saturated fatty acids promoted greater visceral fat storage than unsaturated fatty acids (Rospivist et al. Diabetes 2014;63:2356–2368). Visceral adiposity is observed in states of hypercortisolism, and the enzyme 11-β-hydroxysteroid-dehydrogenase type 1 (11β-hsd1) is a major regulator of cortisol activity by converting inactive cortisone to cortisol in adipose tissue. We hypothesized that tissue fatty acid composition regulates body fat distribution through local effects on the expression of 11β-hsd1 and its corresponding gene (HSD11B1) resulting in altered cortisol activity.

**Findings:** Visceral- and subcutaneous adipose tissue biopsies were collected during Roux-en-Y gastric bypass surgery from 50 obese patients (45 women, BMI; 40 ± 4 kg/m2). The fatty acid composition of each biopsy was measured and correlated to the mRNA levels of HSD11B1. 11β-hsd1 protein levels were determined in a subgroup (n=12) by western blot analysis. Our main finding was that tissue saturated fatty acids were associated with increased 11β-hsd1 gene- and protein-expression in visceral but not subcutaneous adipose tissue.

**Conclusions:** The present study proposes a link between HSD11B1 and saturated fatty acids in visceral, but not subcutaneous adipose tissue. Nutritional regulation of visceral fat mass through HSD11B1 is of interest for the modulation of metabolic risk and warrants further investigation.

**Acknowledgement:** We would like to thank Siv Tengblad for analysing fatty acids at the laboratory at Uppsala University, and Elisabeth Dungner and co-workers at the Lipid laboratory at Karolinska University Hospital for excellent technical support. We would also like to thank Jakob Hedberg and Eduardo Sima and the surgical team at Uppsala university hospital for assistance with biopsy collection.

**T2:PO.029**

**Acetylation of malate dehydrogenase 1 promotes adipogenic differentiation via activating its enzymatic activity**

Kim W.K.1, Kim J.S.1, Min J.K.1, Han B.S.1, Lee S.C.1, Roe K.H.1

1Functional Genomics Research Center, KRIIBB, Daejeon 305-806, Republic of Korea

Acetylation is one of the most crucial posttranslational modifications that affect protein function. Protein lysine acetylation is catalyzed by acetyltransferases, and acetyl-CoA functions as the source of the acetyl group. Additionally, acetyl-CoA plays critical roles in maintaining the balance between carbohydrate metabolism and fatty acid synthesis. Here, we sought to determine whether lysine acetylation is an important process for adipocyte differentiation. Based on an analysis of the acetylyome during adipogenesis, various proteins displaying significant quantitative changes were identified by LC-MS/MS. Of these identified proteins, we focused on malate dehydrogenase 1 (MDH1). The acetylation level of MDH1 increased up to 6-fold at the late stage of adipogenesis. Moreover, overexpression of MDH1 in 3T3-L1 preadipocytes induced a significant decrease in the number of cells undergoing adipogenesis. The introduction of mutations to putative lysine acetylation sites showed a significant loss of the ability of cells to undergo adipogenic differentiation. Furthermore, the acetylation of MDH1 dramatically enhanced its enzymatic activity and subsequently increased the intracellular levels of NADPH. These results clearly suggest that adipogenic differentiation may be regulated by the acetylation of MDH1 and that the acetylation of MDH1 is one of the cross-talk mechanisms between adipogenesis and the intracellular energy level.

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Deuterium labeling and 2H-NMR technique to assess triglyceride re-esterification rate in epididymal white adipose tissue of mice

Zouhar P1, Jones JG2, Flachs P1, Svobodova M1, Janovska P1, Kopecky J1
1Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic
2Biocent. Centre for Neuroscience and Cell Biology, University of Coimbra, Coimbra, Portugal

Introduction: futile cycling of triglycerides (TG) and non-esterified fatty acids in white adipose tissue (WAT) may represent an important energy-consuming process and could contribute to metabolic flexibility and lipid homeostasis. In current experiment, we tested if different re-esterification rate in WAT may reflect different propensity to obesity between obesity-resistant A/J and obesity-prone C57BL/6J (B6) mice.

Methods: A/J and B6 male mice were held and dissected at thermoneutral temperature (control animals), or exposed to cold for 2 or 7 days. 2 or 4 days prior to dissection, all mice were injected with a bolus of 2H2O; also 5% of their drinking water was replaced by 2H2O for the rest of the experiment in order to obtain stable 5% 2H2O concentration in body water. Glycerol of TG produced after 2H2O injection was enriched by 2H2O. Therefore, 2H content in TG isolated from epididymal WAT, measured by 2H-NMR, reflected rate of fatty acid re-esterification.

Results: 2H-enrichment of glycerol moiety of TG was slightly increased after first 2 days in cold. However, only prolonged cold exposure resulted in a strong (up to 4-fold) rise in TG production, while re-esterification rate was significantly higher in A/J mice. However this inter-strain difference became apparent only in the mice injected with 2H2O 2 days but not 4 days before the dissection.

Conclusion: Here we present a newly established technique for assessment of the re-esterification rate in WAT in vivo. This rate can be increased several-fold in response to prolonged cold exposure. In comparison to B6 animals, futile cycling in A/J mice is more flexible, which could be possibly linked to the lean phenotype of these mice (see Flachs et al at this meeting).

Doses of quercetin in the range of serum concentrations exert depilidating effects in 3T3-L1 pre-adipocytes

Eseberri L1,2, Miranda A1,2, Lasa A1,2, Churruca I1,2, Portillo M1,2
1Nutrition and Obesity Group, Department of Nutrition and Food Science, Faculty of Pharmacy and Lucio Lascaray Research Institut, University of Pais Vasco (UPV/EHU), Vitoria (Spain)
2CIBERObn Physiopathology of Obesity and Nutrition, Institute of Health Carlos III, Spain

Introduction: Quercetin (Q) intake in the diet is higher than that of other polyphenols and a wide range of biological effects, such as prevention of oxidation, inflammation and cancer, have been attributed to this molecule. Nevertheless, data concerning its depilidating effect are scarce. The purpose of the present study was to determine whether doses of Q in the range of serum concentrations (around 2 μM) exert any effect on triacylglycerol (TG) accumulation in maturing pre-adipocytes and mature adipocytes. The influence on the expression of adipogenic markers and on the activity of enzyme involved in TG metabolism were assessed.

Methods: 3T3-L1 pre-adipocytes were treated with low doses (0.1–10 μM) of Q at different phases (early and late stages of adipogenesis and the whole adipogenic process). TG content was measured by spectrophotometry. Peroxisome proliferator-activated receptor γ2 (PPARγ2) and sterol regulatory element-binding factor 1 (SREBP1) protein expression were assessed by Western-Blot at whole adipogenic process for 1 and 10 μM doses.

Results: During whole adipogenesis, Q reduced TG content at all tested doses. At the early state of adipogenesis, doses of 1, 2 and 5 μM reduced TG content, but during the late state only doses of 5 and 10 μM were effective in decreasing TG content. 1 μM of Q reduced SREBP1c mature protein levels. 10 μM of Q reduced PPARγ2 and SREBP1c expression.

Conclusion: Quercetin, in the range of serum concentrations, is able to inhibit adipogenesis, but depending on the dose the mechanisms of action seems to be different.

Lipidomic and proteomic profiling reveals possible biomarkers of brown adipose tissue aging

Gohlke S1, Japtok L1, Kleuser B1, Schulz TJ1
1German Institute of Human Nutrition,記
2University of Potsdam

Background: Ageing is a risk factor for the development of metabolic diseases such as insulin resistance and obesity. Recent studies suggest that these pathologies could be exacerbated by an age-related decline of brown adipose tissue mass and function could at least in part be due to changes of lipid composition and metabolism during ageing.

Methods: 161
1Department of Biología Experimental, Facultad de Medicina; Instituto de Investigación e Innovación en Saúde, Instituto de Biología Molecular e Celular (IBMC), Universidade do Porto, Portugal
2Faculdade de Ciências da Nutrição e Alimentação, Universidade do Porto, Portugal
3Department of Anatomy, Multidisciplinary Unit for Biomedical Research (UMIB), Institute for Biomedical Sciences Abel Salazar (ICBAS), University of Porto, Portugal
4Department of General Surgery, Centro Hospitalar de Entre o Douro e Vouga, Santa Maria da Feira, Portugal

Introduction: TGF-β is a pleiotropic cytokine with major roles in adipose tissue regulating adipogenesis and inflammation. It signals through phosphorylation of receptor-activated Smads, but also crosstalk with many others signaling pathways, including ERK1/2 and AKT. Increased plasma levels of TGF-β associates to human adiposity but data regarding TGF-β signaling in human adipose tissue is lacking. In this context, we aim to characterize the TGF-β expression and signaling in adipose tissue from normoponderal and overweight/obese patients.

Methods: Adipose tissue samples from subcutaneous and visceral depots were collected from subjects with BMI ranging from 20 to 50 kg/m2 un-


Introduction: Free fatty acids receptors (FFAR), whose function in the cell surface plays a significant role in the regulation of cell function, are involved in many physiopathological processes, such as metabolic disorders like obesity. The aim of this protocol was to analyze the expression of FFARs (41, 43, and GPR120) in abdominal and subcutaneous dysfunction-adipose tissues.

Methods: Obesity was induced in male Wistar rats, with hypercaloric diet (30% sucrose in drinking water) and standard chow ad libitum during 20 weeks. Dissection of visceral fat (abdominal and subcutaneous) was performed for analyzing the relative expression by RT-PCR.

Results: The expression of FFAR 43 and 41 was lower in fat tissues in obese rats, in contrast to the normocaloric diet group. The expression of FFAR 43 and 41 was significantly reduced in obese rats compared with the control group.

Conclusion: The current expression of FFAR 43 and 41 yields significant statistical differences among the groups, showing a reduction in the total presence of RNAm in abdominal and subcutaneous dysfunctional adipose tissues. The GPR120 did not show differences in the relative expression when the obesity is present. Further comparative methods are in progress for analyzing the relative expression by RT-PCR.

Expression of Free Fatty Acid Receptors (FFAR) in subcutaneous and abdominal adipocytes in an obesity rat model with hypercaloric diet

T2.P0.034

Expression of Free Fatty Acid Receptors (FFAR) in subcutaneous and abdominal adipocytes in an obesity rat model with hypercaloric diet

Meza-Cuenca E1,2, Bautista de Lucio Victor M1, Bautista-Hernandez Luis A1, Buentello-Valente B1, Colada-Velasquez J1, Medina-Contreras J1, mauzzle-Salinas P1, Bravo G1

1. College of Pharmacy and BK21PLUS R-FIND Team, Dongguk University-Seoul, 32 Dongguk-Il, Ilsan-dong-gu, Goyang, Gyeonggi-do 410-820, Republic of Korea
2. Microbiology department, Instituto de Oftalmología ‘FAP Conde de Valenciana

Introduction: Obesity is associated with increasing risks of life-threatening pathologies such as diabetes, hypertension, and heart disease, while weight loss has been reported to ameliorate these associated conditions. Due to the previous reports regarding anti-adipogenic activity of mangosteen extracts in vitro experiments, we investigated the effects of long-term supplementation with mangosteen extract (50 and 200 mg/kg/day p.o. for 80 days) in mice with established obesity (3-month high-fat diet). Untreated obese mice showed a weight gain of 30.1% compared with mice fed a normal diet. Therefore, the objective of this study was to investigate the effects of mangosteen extract on the metabolic disorder states in high-fat diet (HF)-fed mice and the underlying mechanisms related to adipogenesis. Mangosteen extract supplementation produced a marked and sustained decrease in body weight compared to the HF group. The levels of serum GOT, GPT, glucose, triglyceride, total cholesterol, low-density lipoprotein cholesterol, and free fatty acid were markedly elevated in HF mice, whereas in the 200 mg/kg of mangosteen extract-treated group, these levels were significantly reduced (GOT –28.2%, GPT –21.2%, glucose –25.7%, total cholesterol –24.8%, free fatty acid –23.0% vs. HF group). Although mangosteen extract did not modify high-density lipoprotein cholesterol, it significantly reduced low-density lipoprotein cholesterol (LDL, –63.8%) and, notably, increased the HDL/LDL ratio (9.4 vs. 3.7 in HF group). Also 200 mg/kg of mangosteen extract treatment activated the hepatic AMP-activated protein kinase (AMPK) and Sirtuin 1 and suppressed PPARy expression in vivo system. Thus, our results suggest that mangosteen extract exerts anti-obesity effects by regulating energy metabolism and hepatic lipid homeostasis in HF-induced obese mice.

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Association of plasma lipids fatty acid composition with metabolic profile of Czech adolescents

T2.P0.036

Association of plasma lipids fatty acid composition with metabolic profile of Czech adolescents

Hlavaty P1,2, Tvrzicka E1, Stankova B1, Zamrazilova H1, Sedlackova B1, Dusatkova L1, Kunesova M1

1. Institute of Endocrinology, Prague, Czech Republic
2. 4th Department of Internal Medicine, 1st Faculty of Medicine of Charles University in Prague and General University Hospital, Prague, Czech Republic

Background: Obesity in childhood increases the risk of obesity in adulthood, and is predictive for the development of metabolic disorders. The fatty acid composition is associated with obesity and obesity-associated disorders. We investigated relationship between serum fatty acids composition, adiposity, lipids profile, parameters of glucose metabolism and leptin. Design: The study subjects were 380 adolescents aged 15.0 – 17.9 years. The study’s variables included anthropometric measurements, serum lipids and hormonal parameters. Individual FA were determined in plasma by gas-liquid chromatography and desaturase activities were estimated from product/precursor ratios.

Results: Percentage of body fat was significantly positively correlated with palmitoleic acid (16:1n-7, PA) content, SCAD activity and omega-3 fatty acids content. PA content positively correlated with serum total, HDL and LDL cholesterol and triglycerides levels, C peptide and HOMA-R. SCAD activity and PA level had a positive significant correlation with leptin.

Conclusion: Plasma PA content has a significant positive relation with adiposity in obese adolescents. Higher levels of PA may be due activation of SCAD. PA content and SCAD activity are associated with insulin resistance and dyslipidemia.

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Obesity Facts 2015;8(suppl 1):1–247

Garcinia mangostana extract attenuates the metabolic disorders of high-fat-fed mice through activation of ampK pathway

Kim YM1, Chin YW1

1. College of Pharmacy and BK21PLUS R-FIND Team, Dongguk University-Seoul, 32 Dongguk-Il, Ilsan-dong-gu, Goyang, Gyeonggi-do 410-820, Republic of Korea

Obesity is associated with increasing risks of life-threatening pathologies such as diabetes, hypertension, and heart disease, while weight loss has been reported to ameliorate these associated conditions. Due to the previous reports regarding anti-adipogenic activity of mangosteen extracts in vitro experiments, we investigated the effects of long-term supplementation with mangosteen extract (50 and 200 mg/kg/day p.o. for 80 days) in mice with established obesity (3-month high-fat diet). Untreated obese mice showed a weight gain of 30.1% compared with mice fed a normal diet. Therefore, the objective of this study was to investigate the effects of mangosteen extract on the metabolic disorder states in high-fat diet (HF)-fed mice and the underlying mechanisms related to adipogenesis. Mangosteen extract supplementation produced a marked and sustained decrease in body weight compared to the HF group. The levels of serum GOT, GPT, glucose, triglyceride, total cholesterol, low-density lipoprotein cholesterol, and free fatty acid were markedly elevated in HF mice, whereas in the 200 mg/kg of mangosteen extract-treated group, these levels were significantly reduced (GOT –28.2%, GPT –21.2%, glucose –25.7%, total cholesterol –24.8%, free fatty acid –23.0% vs. HF group). Although mangosteen extract did not modify high-density lipoprotein cholesterol, it significantly reduced low-density lipoprotein cholesterol (LDL, –63.8%) and, notably, increased the HDL/LDL ratio (9.4 vs. 3.7 in HF group). Also 200 mg/kg of mangosteen extract treatment activated the hepatic AMP-activated protein kinase (AMPK) and Sirtuin 1 and suppressed PPARy expression in vivo system. Thus, our results suggest that mangosteen extract exerts anti-obesity effects by regulating energy metabolism and hepatic lipid homeostasis in HF-induced obese mice.

Acknowledgement: This study was supported by a grant from the GRC program of Geoyeong province [GRGC DONGGUK2014-803, Development of functional food to alleviating metabolic syndromes and circulatory disorders]
T2 – Adipokines

T2:PO.037
Monocyte chemotactic protein-1 is associated with intramuscular adipose tissue area independently of the visceral fat area
Hoom J.1, Kim M.1, Kim Y.1, Koo H.1, Seo N.1, Kim H.1
1CHA Bundang Medical Center, CHA University, Seongnam, Republic of Korea

Introduction: Ectopic fat is lipid accumulated in tissues that typically do not store large amount of fat, such as liver, vessels and skeletal muscle, and is a major risk factor for metabolic disorders. Adipokines such as leptin and monocyte chemotactic protein 1 (MCP-1) are secreted from adipose tissue and have roles in lipid and glucose metabolism. It has been shown that visceral fat significantly contributes to the development of cardiovascular diseases and insulin resistance. Emerging evidence suggests that intermuscular fat is also a risk factor for insulin resistance, but the underlying mechanism still remains unclear. In this study, we investigated whether the levels of leptin, adiponectin and MCP-1 are related to intramuscular fat area in obese Korean women.

Methods: A cross-sectional study was performed on 77 obese subjects. Intramuscular fat area and intramuscular fat area were measured by multi-slice computed tomography scan. Correlation between the levels of adipokines and the fat areas was assessed using Pearson correlation and covariate-adjusted multivariable regression.

Results: Leptin levels were positively correlated with the body fat percentage (r = 0.480, P < 0.001) and abdominal subcutaneous fat area (r = 0.452, P < 0.001). MCP-1 levels were positively correlated with the intramuscular fat area (r = 0.483, P < 0.01). After adjustment for age, height, and other body composition metrics, serum levels of leptin were still related to subcutaneous fat area (β = 0.376, P = 0.001). The serum levels of MCP-1 were associated with intramuscular fat area (β = 0.447, P = 0.001) after adjustment for visceral fat area.

Conclusion: Intramuscular adipose tissue area was associated with the levels of MCP-1, suggesting its role in the development of insulin resistance.

Acknowledgement: We are grateful to the participants in this study.

T2:PO.038
Adipokines and the risk of metabolic disorders at the different types of obesity in women
Karapetyan A.R.1, Selyatitskaya V.G.1, Pinkhasov B.B.1, Dobrovolskaya N.P.1, Dvurechenskaya O.V.1
1Siberian Branch of Russian Academy Medical Sciences, Scientific Centre of Clinical and Experimental Medicine, Novosibirsk, Russia

Introduction: The purpose of this study was to research the adiponectin and leptin contribution to the development of metabolic disorders in women with android and gynoid types of fat distribution.

Methods: The study included 101 women aged 40 to 65 years. The anthropometric examination was conducted, value of the waist-to-hip circumference ratio (WHR) less than 0.85 in women with pre-obese and obese referred to the group with gynoid type of fat distribution (GTFD), while values of WHR 0.85 and above - to the group with android type (ATFD). Serum concentrations of triglycerides, HDL cholesterol, glucose, insulin, leptin and adiponectin were determined. Insulin resistance HOMA-IR and visceral obesity VAI indexes were calculated.

Results: At the similar degree of accumulation of excess adipose tissue in women with GTFD severity of hormonal-metabolic disorders was lower than that in women with ATFD whose index of HOMA-IR also indicated the presence of insulin resistance. VAI index value was not significantly higher in women with ATFD compared to normal body weight (NBW) women, but it was 2.4 times higher in women with ATFD. The concentra- tion of leptin was higher in women with GTFD and ATFD compared with women with NBW, which is characterized for obesity, but the concentration of adiponectin was significantly lower in ATFD and has not differed at GTFD compared with women with NBW.

Conclusion: For women with ATFD characterized by high VAI, hypoadiponectinaemia, insulin resistance and metabolic disorders, defining high risk of cardiovascular diseases and type 2 diabetes. In women with GTFD obesity is associated with normal adiponectin levels and low VAI, and its hormonal and metabolic features can be characterized as «metabolic healthy» obesity.

T2:PO.039
General and central obesity measurement associations with markers of chronic low-grade inflammation and type 2 diabetes
Miller S.R.1, Perry L.J.1, Phillips C.M.1
1Department of Epidemiology & Public Health, University College Cork, Ireland.

Introduction: Inflammation has been shown to be a possible mechanism linking adiposity with type 2 diabetes. Central obesity indicated by waist circumference (WC) measurement is thought to be a greater risk factor for chronic low-grade inflammation compared to general obesity characterised by body mass index (BMI). However, evidence for this association is still equivocal. In this study we compare biomarker relationships with BMI and WC measures and type 2 diabetes. We examine a range of pro-inflammatory cytokines, acute-phase response proteins, coagulation factors, white blood cell counts and a combination of these markers to determine which measurement is more strongly associated with diabetes-related inflammation.

Methods: This was a cross-sectional study involving a random sample of 2,002 men and women aged 50–69 years. Correlation and logistic regression analyses were used to explore general and central obesity measurement relationships with non-optional biomarker levels, biomarker combinations and type 2 diabetes.

Results: When compared with BMI, WC was more strongly related to a majority of inflammatory markers, adverse biomarker clustering and type 2 diabetes. In multivariable analysis, only WC remained significantly associated with type 2 diabetes (OR: 2.96, 95% CI: 1.93–4.55) after adjusting for BMI (OR: 0.73, 95% CI: 0.49–1.10) four or more markers (OR: 4.67, 95% CI: 2.64–8.27) and other potential confounders.

Conclusion: These data suggest that central obesity is a greater risk factor for type 2 diabetes and associated chronic inflammation than BMI. However, our results also demonstrate that the relationship between obesity and diabetes-related inflammation cannot be completely accounted for by surrogate adiposity measures.

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T2:PO.040
Autocrine effects of transgenic resistin reduce palmitate and glucose oxidation in brown adipose tissue
Šilhavý J.1, Pravenc M.1, Židek V.1, Landa V.1, Mlejnek P.1, Šimáková M.1, Eigner S.1,4, Eigner Henke K.1, Kadzová L.1, Škop V.1, Malinská H.2, Drabotá Z.1, Mráček T.1, Housítek J.1
1Institute of Physiology, Academy of Sciences of the Czech Republic, Prague, Czech Republic, 2Institute for Clinical and Experimental Medicine, Prague, Czech Republic, 3Nuclear Physics Institute, Academy of Sciences of the Czech Republic, Hluboké Třebová, Czech Republic, 4Faculty of Pharmacy, Charles University in Prague, Hradec Králové, Czech Republic

Introduction: Resistin has been identified as an adipokine that links obesity to insulin resistance in mice. In our previous studies in spontaneously

Abstracts

Obesity Facts 2015;8(suppl 1):1–247

163
hypertensive rats (SHR) expressing a nonsecreted form of mouse resistin (Retn) transgene specifically in adipose tissue (SHR-Retn), we observed an increased lipolysis and serum free fatty acids, ectopic fat accumulation in muscles and insulin resistance. Recently, brown adipose tissue (BAT) has been suggested to play an important role in the pathogenesis of metabolic disturbances by its ability to dissipate energy excess.

**Methods:** In the current study, we analyzed autocrine effects of transgenic resistin on BAT glucose and lipid metabolism and mitochondrial function in the SHR-Retn versus SHR controls.

**Results:** We observed that BAT isolated from SHR-Retn transgenic rats when compared to SHR controls showed a lower relative weight (0.71 ± 0.05 vs. 0.91 ± 0.08 g/100 g body weight, P < 0.05), significantly reduced both basal and insulin stimulated incorporation of palmitate into BAT lipids (658 ± 50 vs. 856 ± 45 and 864 ± 47 vs. 1086 ± 35 nmol/g/2h, P<0.01, respectively), and decreased palmitate oxidation (37.6 ± 4.5 vs. 57 ± 4.1 nmol/g/2h, P = 0.007) and glucose oxidation (277 ± 34 vs. 458 ± 38 nmol/g/2h, P = 0.001). In addition, in vivo microPET imaging revealed reduced 18F-FDG uptake in BAT induced by exposure to cold in SHR-Retn transgenic versus control SHR controls (232 ± 19 vs. 334 ± 22 kBg/cc*ccm, P < 0.05). In addition, we observed reduced expression of Ucp1 and Cidea genes in SHR-Retn versus SHR rats which suggests lower differentiation status of BAT in transgenic rats.

**Conclusion:** These results provide compelling evidence that autocrine effects of resistin in BAT might play an important role in the pathogenesis of insulin resistance in the rat.

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**T2.PO.042**

**Spirulina maxima reduces blood pressure, oxidative stress and improves parameters associated with insulin resistance in obese hypertensive patients.**

**Szulinska M.**, **Pupek-Musialik D.**, **Musialik K.**, **Lis I.**, **Stepien M.**, **Suliburska J.**, **Bogdanski P.**

1. Department of Education and Obesity Treatment and Metabolic Disorders, University of Medical Sciences, Poznan, Poland,
2. Department of Internal Medicine, Metabolic Disorders and Hypertension University of Medical Sciences, Poznan, Poland,
3. Department of Human Nutrition and Hygiene, Poznan University of Life Sciences, Poznan, Poland

Spirulina maxima (SM) consumption is known to be associated with enhanced cardiovascular and metabolic health. The purpose of this study is to examine the hypothesis that supplementation with SM alters insulin resistance and associated cardiovascular risk factors in obese, hypertensive patients. In a double-blind, placebo-controlled trial, 50 obese, hypertensive subjects were randomized to receive a daily supplement of 4 capsules that contained each either 0.5 g of SM extract or a matching placebo, for 3 months. At baseline and after 3 month of treatment, the anthropometric parameters, blood pressure, plasma lipid levels, glucose levels, total antioxidant status (TAS) levels, interleukin 6 (IL 6) levels, and insulin levels are assessed. Insulin sensitivity was evaluated by the euglycemic hyperinsulinemic clamp technique. After 3 months of supplementation, both systolic and diastolic blood pressure had significantly decreased in the SM group as compared with the placebo group (p < 0.044). Considerable (p = 0.002) reduction in low-density lipoprotein cholesterol level was observed in the SM group when compared with the placebo group. Supplementation also contributed to significant (p < 0.031) increases in the TAS level and (p < 0.043) insulin sensitivity ratio. In conclusion, daily supplementation with 2 g of SM favorably influences blood pressure, insulin sensitivity, oxidative stress, and lipid level in patients with obesity-related hypertension.

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**T2.PO.043**

**Sleep duration affects theserum adiponectin level of obese women undergoing weight loss intervention.**


1. Department of Psychosomatic Medicine, Graduate School of Medical Sciences, Kyushu University,
2. School of Health Sciences Fukuoka, International University of Health and Welfare

**Background:** Adiponectin, secreted from adipose tissue, is an adipokine that is involved in various cellular processes such as energy metabolism and inflammation. Although the serum adiponectin level is inversely correlated to BMI and closely associated with obesity and related diseases, neither the impact of weight loss on the adiponectin level nor the factors that influence the levels of adiponectin during weight loss intervention are known.

**Objective:** We assessed the changes in the serum adiponectin level of obese women during seven months of weight loss intervention. In addition, in order to determine factors that affect the serum adiponectin level, various clinical variables were evaluated, including objective sleep parameters.

**Methods:** Ninety overweight and obese women aged 25 to 65 years completed a seven-month weight loss intervention. Serum levels of adiponectin, body fat rate, depression, anxiety, and objective sleep parameters assessed by actigraphy were measured at baseline and at the end of the intervention.

**Results:** The mean values of weight loss and reduction of body fat rate were 10.3 ± 4.8 kg and 4.8 ± 3.2%, respectively. The serum adiponectin level was significantly increased after weight loss intervention (P < 0.001). In a multiple regression analysis, the change of the adiponectin level was correlated to BMI and closely associated with obesity and related diseases.
positively associated with the magnitude of body fat loss ($\beta = -0.306$, $P = 0.0015$) and increase of sleep minutes ($\beta = 0.205$, $P = 0.0319$).

**Conclusion:** An increase in objective sleep duration was related to a significantly increased serum adiponectin level, independent of the change of body fat rate during the weight loss intervention. Improvement of sleep duration may be important as a component of weight loss interventions for obese people.

**Acknowledgement:** This study was supported by a Research Grant (23–3) for Nervous and Mental Disorders from the Ministry of Health, Labour and Welfare of Japan and a Grant-in-Aid for Scientific Research (25460902) from the Japan Society for the Promotion of Science. The authors thank Junko Sakaguchi and Akemi Kugimaru, national registered nutritionists, for nutritional guidance.

**T2.P0.044**

**Relationship between serum osteoprotegrin concentration (sOPG) and inflammatory process in group of patients with metabolic syndrome (ms).**

**Musialik K.1, Pupérek-Musialik D.1, Bogdanski P.1, Hen K.1**

1Department of Education and Obesity Treatment and Metabolic Disorders, University of Medical Sciences, Poznan, Poland
2Department of Internal Medicine, Metabolic Disorders and Hypertension University of Medical Sciences, Poznan, Poland

MS increase risk of atherosclerosis (A) and frequency of cardiovascular diseases. Taking into account the fact that, underlying cause of a A is an inflammatory process, the correlation between high sensitivity CRP and serum osteoprotegrin (sOPG) concentration seems to be very interesting. Aim of the study was to evaluate sOPG concentration. The relationship between sOPG, anthropometric parameters, insulin resistance and chronic inflammatory process were analyzed.

**Material:** 70 patients with MS vs control group = 20 healthy volunteers.

**Methods:** Anthropometric parameters such as BMI, WHR were determined. At the same time the percentage of body fat (% FAT) was assessed applying HOMA index. Serum insulin concentration was determined by ELISA method.

**Results:** Patients with MS were characterized by high values of anthropometric parameters (BMI, WHR), higher concentration of insulin, hsCRP, HOMA index and sOPG. We have observed the significant correlation between sOPG and body weight, WHR, hsCRP, insulin and HOMA index.

**Conclusions:** 1) Concentration of sOPG and insulin resistance were significantly higher in group of patients with MS. 2) The insulin resistance plays significant role in development of A. Close correlation between sOPG and HOMA index may suggest that sOPG could be involved in process of development of A. 3) Inflammatory process plays a role in development of A. The significant correlation between hsCRP and sOPG can also confirm the role of OPG in this process.

**T2.P0.045**

**Macrophage migration inhibitory factor (mif) and adipokines in severe obese women with normal and impaired glucose tolerance**

**Sumarac-Dumanovic M.S.1, Micic D.D.1,2, Stamenkovic-Pejkovic D.H.2, Polovina S.2, Cijnovic G.1,2, Gligic A.B.1, Jeremic D.3**

1School of Medicine, University of Belgrade, Belgrade, Serbia
2Clinic for Endocrinology, Diabetes and Diseases of Metabolism, Center of Obesity, Clinical Center of Serbia, Belgrade, Serbia

Macrophage migration inhibitory factor (MIF) is implicated in the pathogenesis of several inflammation related diseases, including obesity and type 2 diabetes (T2D). MIF is elevated in obesity. Hyperglycemia could increase plasma visfatin in patients with T2DM. This increase gets more prominent as the glucose intolerance worsens. The aim of the study was to determine level of MIF and adipokines (plasma visfatin, adiponectin and leptin) in obese women with normal and impaired glucose tolerance. Ten obese women (age: 35.46 ± 2.21yrs, BMI 34.11 ± 0.75 kg/m²) with normal glucose tolerance (NGT) and 10 age and BMI matched obese women (age: 35.80 ± 2.54 yrs, BMI 36.98 ± 1.66 kg/m²) with normal fasting and impaired glucose tolerance (OGTT-75 gr of glucose) (IGT) were included in the study. Fasting MIF (ELISA, ng/l), plasma visfatin (ELISA Phoenix, ng/ml), adiponectin (Linco RIA, ng/ml), leptin (Linco RIA, ng/ml) and insulin (RIA Inep, mU/l), were measured. Insulin sensitivity (M index: mg/kgBW/min) was determined using euglycemic 2hr clamp. There was no difference in fasting visfatin between NGT and IGT (72.66 ± 4.11 vs. 69.80 ± 5.55, p > 0.05), fasting leptin (33.53 ± 2.98vs.30.70 ± 3.88, p > 0.05) fasting adiponectin (8.64 ± 1.61vs.9.65 ± 4.59, p > 0.05) and plasma MIF (2456.75 ± 428.91 vs. 2344.80 ± 481.80, p>0.05). Insulin sensitivity was reduced in obese women with IGT (6.55 ± 0.51vs.2.74 ± 0.38, p < 0.05). There were no significant correlations among investigated parameters neither with insulin sensitivity index. No significant differences among investigated adipokynes were found in women with IGT in comparison with women with NGT. In conclusion, our data suggest that impairment in insulin sensitivity precede change in adipokynes and MIF during development of type 2 diabetes in obesity.

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**T2.P0.046**

**Circulating betatrophin concentrations and adipose tissue expression in type 2 diabetes and obesity**

**Flehming G1, Klötting N1, Kern M1, Schön M.R.2, Dietrich A.2, Lohmann T3, Dreßler M1, Fasshauer M1, Stumvoll M1, Blüher M1**

1Department of Medicine, University of Leipzig, Leipzig, Germany
2FB ObesityDiseases, Junior Research Group Animal Models, University of Leipzig, Leipzig, Germany
3Städtisches Klinikum Karlsruhe, Clinic of Visceral Surgery, Karlsruhe, Germany
4Department of Surgery, University of Leipzig, Leipzig, Germany
5Municipal Clinic Dresden-Neustadt, Dresden, Germany

**Context:** Recently, the hormone betatrophin has been proposed to promote pancreatic β-cell proliferation in mice. Even though the results of studies in humans are controversy and the mode of action is still unclear, an association of betatrophin to obesity, lipid metabolism, and glucose tolerance is beyond dispute.

**Objective:** Thus, we tested the hypothesis that betatrophin serum concentrations and Betatrophin adipose tissue expression are related to parameters of obesity and metabolic abnormalities.

**Design and Methods:** Betatrophin serum concentrations and mRNA expression in paired omental and subcutaneous adipose tissue samples were studied in 2 cross-sectional studies of 882 individuals. Additionally we investigated a subgroup of 115 volunteers who underwent bariatric surgery.

**Results:** Higher betatrophin serum and mRNA expression levels were measured in individuals with T2D. We found relationships between betatrophin serum concentrations and age, gender, body fat, FPG, HbA1c, TG, ALAT, ASAT, and gGT. Despite the relationships to FPG and HbA1c remained all correlations significant after adjusting for BMI, gender and age. The Betatrophin mRNA expression was correlated to BMI, body fat, FPG, HbA1c, FFA, ALAT, ASAT, leptin, adiponectin, but not to FPI and lipid metabolism in sc AT, and to BMI, HbA1c, ALAT, ASAT in omental AT. After adjustment for age, gender and BMI only the correlation to FPG kept significant. Weight loss caused no significant reduction in circulating serum betatrophin but in Betatrophin mRNA expression.

**Conclusions:** Our data support the hypothesis that betatrophin may play a role in linking obesity to type 2 diabetes. The associations between circulating betatrophin and metabolic disorders are partly related to Betatrophin expression in adipose tissue.
Introduction: The aim of the study was to assess the associations between TNF system activity and plasma RBP4 levels depending on nutritional status and PCOS occurrence.

Methods: A cross-sectional study involving 86 PCOS (47 obese) and 69 Non-PCOS women (38 obese). Anthropometric parameters and body composition were measured. In the fasting state serum concentrations of glucose, insulin, androgens, FSH, LH, SHBG and plasma TNF-α, sTNFs and RBP4 levels were assessed.

Results: There were no differences in plasma TNF-α, sTNFR1 and RBP4 between PCOS and Non-PCOS group. Plasma sTNFR2 levels were significantly higher in PCOS than Non-PCOS group. Regardless of higher TNF-α levels in both obese than in normal weight groups, no differences between corresponding PCOS and Non-PCOS subgroups were found. Plasma sTNFR1 levels were higher in obese than normal weight PCOS subgroups and no differences were shown between obese and normal weight Non-PCOS subgroups. In addition sTNFR1 levels were higher in obese PCOS than Non-PCOS subgroups, with no difference between normal weight subgroups. In turn, plasma sTNFR2 levels were similar in normal weight and obese PCOS and higher in normal compared with obese Non-PCOS as well as normal weight and obese PCOS than obese Non-PCOS subgroups. Plasma RBP4 levels were higher in normal weight than obese PCOS, and lower in normal weight Non-PCOS than in both obese subgroups. In addition RBP4 levels were higher in normal weight PCOS subgroups and lower in obese PCOS than Non-PCOS. The negative correlation between plasma RBP4 and TNF2R levels in all study group and Non-PCOS group was shown.

Conclusions: It seems that changes in plasma sTNFR2 and RBP4, but not TNF-α and sTNFR1 are associated per se with the occurrence of PCOS. Although nutritional status is a factor modifying the direction of these changes. Circulating RBP4 levels seems to be modified by the concentration of circulating sTNFR2 regardless of the PCOS occurrence.

Acknowledgement: Research relating to this abstract was funded by Medical University of Silesia.
Introduction: Patients with MO have a high risk for cardiovascular (CV) morbidity, mortality and diabetes. The only effective method to reduce weight and the associated risks is bariatric surgery. Omentin, a novel adipokine, – preferentially produced by visceral adipose tissue - was found to be associated with insulin resistance and obesity. Thus it was of interest to evaluate Omentin levels in patients with MO before and after weight loss induced by gastric bypass.

Methods: We included 81 patients with MO (69 women, BMI 47 ± 7 kg/m² and 39 healthy controls (BMI 26 ± 3 kg/m²). All patients were investigated before and one year after gastric bypass surgery. Apart from weight and CV risk-markers, an oral glucose tolerance test (oGTT) was performed and insulin resistance (IR) was calculated by using HOMA. Omentin levels were determined in serum samples by an ELISA.

Results: Omentin levels were significantly decreased in MO vs healthy controls: 461 ± 153 vs 619 ± 196 ng/ml; p < 0.001. After weight loss induced by bariatric surgery Omentin levels significantly increased (461 ± 153 vs 515 ± 177 ng/ml; p = 0.003). Delta Omentin levels (pre minus post) were significantly associated with fasting plasma glucose (p = 0.032), one hour (p = 0.002) and two hours (p = 0.007) plasma glucose levels in the OGGT.

Conclusion: This is the first study demonstrating (a) decreased Omentin levels in patients with MO compared to healthy controls and (b) a significant increase of Omentin levels after dramatic weight loss induced by gastric bypass. Since Omentin was shown to be associated with insulin sensitivity and glucose metabolism, the observed significant increase in Omentin after dramatic weight loss might help to understand the beneficial effects of gastric bypass surgery.

T2.PO.052
Children’s psychosocial stress and emotional eating: A role for leptin?
Michels N.1, Sioen I.1, De Henauw S.1
1Department of Public Health, Ghent University, Belgium

Introduction: An important public health threat is that stress has been associated with a higher energy intake due to emotional or reward-based eating. One hypothesis is the effect of stress-induced cortisol changes on leptin, an anorexigenic adipokine that decreases reward-related behaviors.

Methods: In 254 Belgian children (5–12y), serum leptin levels were examined on their association with stress and emotional eating. Stress was measured by the Strengths and Difficulties Questionnaire (emotional, conduct and peer problems) in 2010 and 2012 and by salivary cortisol (4/day) in 2010. Emotional eating was measured with the DEBQ. Longitudinal linear mixed models were adjusted for age, sex, body fat and pubertal stage and leptin was tested as mediator or moderator in the stress – emotional eating relation.

Results: Stress data, more specific emotional problems, were longitudinally related to higher leptin levels but only in girls (beta=0.11). Also a higher daily cortisol output was associated with higher leptin levels in girls (beta=0.14). Leptin levels were cross-sectionally but not longitudinally associated with more emotional eating (beta=-0.24). Leptin was no mediator but a moderator in the relation between stress and emotional eating.

Discussion: Both self-reported and objectively measured stress increased girls’ leptin levels. Moreover, we have confirmed the moderating effect of leptin: only in the presence of high leptin, stress increased emotional eating. These results are in agreement with the hypothesis that stress leads to increased leptin levels but that the body might become resistant to leptin and as a consequence the reward-lowering effect of leptin might be lost in stressed people. Consequently, stress is often causing emotional eating, also in children.

Abstracts

IL-6 serum levels. In case of the ‘Nutritional status’ construct important variables were BMI, waist circumference, and to a less extent insulin resistance. Additionally, the residual correlation between those two constructs was also statistically significant.

Conclusion: The structural equation modeling provided support for the existence of a link between visfatin/NAMPT level, nutritional status and inflammation. This indicates that, fat depot, especially the visceral one, is the important source of circulating visfatin/NAMPT in elderly population.

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T2 – Recruitment of adipocytes

T2.PO.053
Adipose tissue inflammation and function in non-obese type 2 diabetics


Department of Medicine Huddinge, Karolinska Institutet, Stockholm, Sweden

Introduction: White adipose tissue (WAT) resident cell populations and adipocyte morphology are affected by obesity. Proinflammatory macrophages have been associated with increased WAT inflammation observed in obesity. Altered adipogenesis has been suggested to affect adipocyte morphology. We aimed to characterize WAT-resident cell populations in non-obese type 2 diabetics and matched healthy controls.

Methods: The stromal vascular fraction of WAT biopsies was isolated from a metabolically well-characterized cohort consisting of non-obese healthy (n=13) and type 2 diabetic patients (n=14). Fluorescence-activated cell sorting (FACS) with a 13-color antibody panel was used to determine frequencies of adipose progenitor cells, endothelial cells, CD4+ and CD8+ T cells, Tregs, B cells, tissue resident M1 and M2 macrophages in SAT. Fractions of CD45-/CD31-/CD34+ progenitor cells, CD45+/CD14+/CD206+/CD11c+ M1-WAT macrophages, CD45+/CD14+/CD206+/CD11c+ M2-WAT macrophages, and CD45+/CD14+/CD3+/CD4+ T-cell fraction was sorted for RNA extraction. Gene expression analysis of adipogenesis markers was performed by qPCR in progenitor cell fraction.

Results: Lean type 2 diabetic patients exhibit enlarged adipocyte size, 587 ± 117 pl p < 0.01** compared to healthy controls 451 ± 109 pl p < 0.01**. No difference in cell fraction frequencies between healthy controls and type 2 diabetic patients were observed. The M1-M2 macrophage ratio in SAT correlates positively to adipocyte size (ρ=0.445, p = 0.026**) and to TNFα secretion (ρ = 0.495, p = 0.009*). Gene expression analysis on the impairment of adipogenesis is currently under evaluation.

Conclusion: Adipocyte size is the primary culprit potentially underlying diabetes and complications caused by WAT inflammation. The M1-M2 macrophage ratio correlated with adipocyte size and TNFα secretion, suggesting that M1-macrophages might be involved in generating a proinflammatory phenotype in non-obese human WAT.

T2 – White, beige and brown Adipocytes

T2.PO.054
Selection of aptamers for mature white adipocytes by cell selex using flow cytometry

Han B.S., Kim J.S., Min J.K., Kim W.K.

1Functional Genomics Research Center, KRIIB, Daejeon 305-806, Republic of Korea

Adipose tissue, mainly composed of adipocytes, plays an important role in metabolism by regulating energy homeostasis. Obesity is primarily caused by an abundance of adipose tissue. Therefore, specific targeting of adipose tissue is critical during the treatment of obesity, and plays a major role in overcoming it. However, the knowledge of cell-surface markers specific to adipocytes is limited. We applied the CELL SELEX (Systematic Evolution of Ligands by EXponential enrichment) method using flow cytometry to isolate molecular probes for specific recognition of adipocytes. The aptamer library, a mixture of FITC-tagged single-stranded random DNAs, is used as a source for acquiring molecular probes. With the increasing number of selection cycles, there was a steady increase in the fluorescence intensity toward mature adipocytes. Through 12 rounds of SELEX, enriched aptamers showing specific recognition toward mature 3T3-L1 adipocyte cells were isolated. Among these, two aptamers (MA-33 and 91) were able to selectively bind to mature adipocytes with an equilibrium dissociation constant (Kd) in the nanomolar range. These aptamers did not bind to preadipocytes or other cell lines (such as HeLa, HEK-293, or C2C12 cells). Additionally, it was confirmed that MA-33 and 91 can distinguish between mature primary white and primary brown adipocytes. These selected aptamers have the potential to be applied as markers for detecting mature white adipocytes and monitoring adipogenesis, and could emerge as an important tool in the treatment of obesity.

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T2.PO.055
Secoisolariciresinol diglucoside inhibits adipogenesis in 3T3-L1 adipocytes

Kang J., Jeong M., Kim H., Park J., Jung Y., Yoon D., Um J., Kim D., Hong S.

1College of Korean Medicine, Institute of Korean Medicine, Kyung Hee University, 1 Hoegi-Dong, Dongdamun-Gu, Seoul, Republic of Korea
2Department of Oriental Pharmacy, College of Pharmacy, Wonkwang-Oriental Medicines Research Institute, Wonkwang University, Jeonbuk 570-749, Republic of Korea

Introduction: Obesity is a metabolic disorder characterized by chronic inflammation and dyslipidemia and is a strong predictor for the development of hypertension, diabetes mellitus, and cardiovascular disease. Secoisolariciresinol diglucoside (SDG) is a Lignan which belongs to the phytoestrogen family. This component exists abundantly in flaxseeds, therefore can be isolated from flaxseeds commonly. Flaxseeds are used for treating type 2 diabetes, fatty liver, hyperlipidemia, and obesity in Traditional Korean Medicine. However, anti-obesity effect of SDG has not been reported to date. Thus, the aim of this study was to examine anti-obesity functions of SDG by assessing differentiation of adipocyte, adipogenesis-related gene expressions and protein expressions.

Methods: The cellular lipid content in 3T3-L1 adipocytes was assessed by Oil Red O staining. Expressions of peroxisome proliferators activated receptor-γ (PPAR-γ) and CCAAT/enhancer-binding protein (C/EBP) were determined by real-time RT-PCR. Protein expressions of AMP-activated protein kinase a (AMPKα), liver kinase B1 (LKB1) were performed by western blotting.
Results: SDG suppressed the differentiation of 3T3-L1 adipocytes by down-regulating cellular induction of PPAR-y, and up-regulating the AMPKa. Furthermore, SDG successfully activated phosphorylations of AMPKa/LKB1. These results demonstrate that SDG has a potent anti-obesity effect in 3T3-L1 cells due to the inhibition of adipogenesis.

Conclusion: Our results demonstrate that SDG inhibits adipogenesis in 3T3-L1 adipocytes. SDG may be beneficial in the treatment of obesity and can be used as a safe natural promoter of health.

T2:PO.056
Saikosaponin A, an active component of Bupleuri Radix, regulates brown adipocyte differentiation via activation of SIRT1-AMPKa axis

Youn D.1 Um J.1
1Department of Pharmacology College of Korean Medicine, Institute of Korean Medicine, Kyung Hee University

Introduction: Saikosaponin A (SSA) is a major triterpenoid saponin isolated from Bupleuri Radix, a widely used Chinese traditional medicine to treat various inflammation-related diseases. Brown adipocytes play an important role in regulating energy balance, and there is a good correlation between obesity and the amount of brown adipose tissue. In spite of several studies confirming the various effects of SSA including anti-inflammatory and anti-cancer, its effect on brown adipocytes has not been reported to date. Therefore, this study examined the regulatory action of SSA in brown adipogenic differentiation using primary brown preadipocytes.

Methods: Expressions of uncoupling protein 1 (UCP-1) and peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC-1a) were determined by real-time RT-PCR. Western blot was used to assess the protein levels of silent mating type information regulation 2 homolog 1 (SIRT1), AMPKa and p-AMPKa.

Results: Our results clearly showed that expressions of brown adipocyte-related genes, such as UCP-1 and PGC-1a were dramatically up-regulated by treatment with SSA. In addition, SSA increased the expression of SIRT1, suggesting its effect on the SIRT1-AMPKa axis, which plays a key role in metabolism. As expected SSA successfully activated the phosphorylation of AMPKa. Our study shows that SSA is capable of increasing differentiation of brown adipocytes via activation of p-AMPK, suggesting its potential therapeutic application in the treatment or prevention of obesity.

Conclusion: Our results show that SSA induces brown adipocyte differentiation via activation of SIRT1-AMPKa axis. Therefore, SSA may be beneficial in the treatment of obesity and can be used as a safe natural promoter of health.

T2:PO.057
Effects of all-trans retinoic acid (ATRA) on white adipose tissue (WAT) in a model of obesity-related type 2 diabetes (T2D)

Hasan S.1, White R.1, Hamel F.G.4, Desouza C.V.1,2, Bennett R.G.2
1University of Nebraska Medical Center,
2VA Nebraska Western Iowa

Obesity-related T2D is characterized by WAT dysfunction including adipocyte hypertrophy, low grade inflammation and few beige adipocytes in WAT. We investigated the effect of ATRA on inflammation and remodeling of WAT in 3 month old db/db mice (10/group) treated with vehicle (corn oil) or ATRA 0.6 mg/day; 5 days/wk for 12 wks by voluntary oral feeding. We monitored a subset of mice for further 8 wks after tx cessation. ATRA caused a significant reduction in white adipocyte size which was maintained in the post tx phase (washout) (8229 ± 165 μm² CTRL vs 5775 ± 285 μm² ATRA vs 5405 ± 571 μm² post tx, p < .0001). ATRA increased UCP1 gene and protein expression in visceral WAT (1.4 ± 0.47 CTRL vs 13.42 ± 5.0 ATRA), which was not retained post tx. Obesity is characterized by adipose tissue macrophage infiltration, which is the source of inflammatory cytokines associated with insulin resistance (IR).

WAT was examined for the presence of macrophages using the protein marker F4/80. ATRA resulted in a significant decrease in the frequency of F4/80+ crown-like structures (CLS), which was sustained post tx (1.02 ± 0.24 CLS/um² CTRL vs 0.15 ± 0.55 ATRA vs 0.32 ± 0.23 post tx, p < .05). The expression of inflammation-related genes (MCP-1, PAI-1, and TNF α) were not reduced immediately after tx, however, they were significantly suppressed in the post tx phase. We have shown that long-term ATRA tx promotes the remodeling of WAT and induces UCP1-positive beige adipose in WAT. Further, ATRA attenuates inflammation by reducing macrophage infiltration and suppressing the expression of the inflammation-related genes. This suggests that ATRA may be useful for obesity-related T2D by inducing the beige phenotype to promote weight loss, while simultaneously reducing inflammation to improve WAT function and IR.
Tamoxifen: How it influences adipocyte biology in vivo

Hesselbarth N., Pettinelli C., Kunath A., Boege E., Kern D., Kern M., Kloeting N.

Tamoxifen is a selective oestrogen receptor modulator (SERM): it can activate the oestrogen receptor (ER) in some tissues acting as an oestrogen agonist, while inhibits it in others, behaving as an antagonist. This drug is commonly used in two important fields: in chemotherapy as endocrine treatment of choice for metastatic ER-positive tumours in women and in genetic engineering as a widespread activation system of inducible Cre-mediated recombination technology. However, effects of Tamoxifen treatment on adipose tissue are not well characterized in literature. Therefore, this study had the aim to investigate how Tamoxifen influences adipocyte biology in vivo.

To analyse the role of the drug on adipose tissue biology in vivo, inbred male mice (C57Bl/6NTac) were treated with Tamoxifen and analysed in terms of adipocyte biology, energy homeostasis, insulin sensitivity and lipid profile. In this study we obtained that Tamoxifen treatment leads to:

1. Different body composition (II) increased insulin sensitivity (III) higher Triglyceride level in serum (IV) browning effects in subcutaneous adipose tissue and (V) an increased Ki67 mRNA expression. In conclusion, Tamoxifen has significant effects on adipose tissue biology, body composition and glucose metabolism, which need to be considered when using Tamoxifen as a tool to generate inducible knockout mouse models. Our data further suggest that Tamoxifen treated control mice should always be characterized in addition to the transgenic models to avoid misinterpretation of data related to Tamoxifen effects.

Adipose tissue site-related differences in lactate production from glucose by isolated rat adipocytes


Male Wistar rats kept under standard conditions were killed under anesthesia and samples of subcutaneous inguinal (SC), mesenteric (ME), epididymal (EP) and retroperitoneal (RP) adipose tissue were dissected. Adipocytes were isolated with collagenase; adipocyte number, integrity and cell size were calculated using direct microscopic observation and Image J. The cells were incubated at 37°C and 5% CO2 in DMEM media, supplemented with 3% serum albumin, 3% FBS and varying concentrations of glucose (0.5, 5, 11.22 and 30 mM). EP and RP cells were larger than in ME. SC cell size was more variable. After 48 h incubation, cell viability was well maintained in normoxia. Data for glucose consumption, and release to the medium of lactate, were expressed as pmol/cell and day. Maximal glucose uptake was observed at values >11 mM, and was highest in EP, followed by ME, RP and SC (a 7x difference between sites). Lactate production was maximal in EP, RP and MS and minimal in SC. The proportion of glucose converted to lactate was highest in RP, followed by ME and PG, and low in SC. The results show a considerable difference in the use of glucose, with RP, EP and ME taking up more glucose than SC, but delivering a large proportion of it as lactate as has been found in vivo and in cultured cells. The possible importance of this active glucose wasting is thus, specifically related to adipose tissue site.

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trigger this process. Alongside this question, it is still under discussion if the browning effect is rather caused by transdifferentiation or direct conversion of differentiated adipocytes.

Methods: Human preadipocytes were isolated from subcutaneous adipose tissue, differentiated for 8 days, and treated from day 8 to 12 with 20 μM of the n-3 PUFAs eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), the n-6 PUFAs arachidonic acid (ARA) or BMP4. Adipogenic state and gene expression markers were analysed via RT-PCR, Western Blot and Oil Red O Staining.

Results: Assessing general adipogenesis, PPARγ mRNA expression and HSL protein abundance did not show any notable change in response to PUFAs or BMP4. Oil Red O Staining was significantly elevated through overall PUFA treatment, but not after BMP4 treatment. As expected, adiponectin was upregulated via the n-3 PUFAs EPA and DHA, BMP4, which is known to promote browning in the early stage of adipogenesis, was not able to enhance expression of the brite/brown marker UCP1 and the mitochondrial marker CPT1B, when applied in the late stage of adipogenesis. Most importantly, exclusively EPA lead to an increase in mRNA levels of UCP1 and CPT1B. In contrast to EPA, the n-6 PUFA ARA elevated mRNA expression of the white adipocyte marker TCF21.

Conclusion: EPA treatment of differentiated adipocytes leads to a “brite” phenotypic shift, indicated by enhanced UCP1 and CPT1B mRNA levels. This browning effect at a late stage of adipogenesis cannot be triggered by BMP4, suggesting a major relevance for dietary n-3 PUFAs.

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T2:PO.062

Evaluation of reference genes for gene expression studies in human brown adipose tissue

Taube M.1, Andersson-Assarsson J.C.1, Pereira M.J.2, Eriksson J.W.2, Svensson P.A.1
1Institute of Medicine, The Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden,
2Department of Medical Sciences, Uppsala University, Uppsala.

Introduction: Human brown adipose tissue (BAT) has during the last five years been subjected to an increasing research interest, due to its putative function as a target for future obesity treatments. The most commonly used method for molecular studies of human BAT is the quantitative polymerase chain reaction (qPCR). This method requires normalization to a reference gene (genes with uniform expression under different experimental conditions, e.g. similar expression levels between human BAT and WAT), but so far no evaluation of reference genes for human BAT has been performed.

Methods: Two different microarray datasets with samples containing human BAT were used to search for genes with low variability in expression levels. Seven genes (FAM96B, GNB1, GNB2, HUWE1, PSMB2, RING1 and TPT1) identified by microarray analysis, and eight commonly used reference genes (18S, B2M, GAPDH, LRP10, PPIA, RPLP0, UBC, and YWHAZ) were selected and further analyzed by quantitative PCR in both BAT containing perirenal adipose tissue and subcutaneous adipose tissue. Results were analyzed using two different algorithms (Normfinder and geNorm).

Results: Most of the commonly used reference genes displayed acceptably low variability (geNorm M-values <0.5) in the samples analyzed, but the novel reference genes identified by microarray displayed an even lower variability (M-values <0.25).

Conclusion: Our data suggests that PSMB2, GNB2 and GNB1 are suitable novel reference genes for qPCR analysis of human BAT and we recommend that they are included in future gene expression studies of human BAT. The use of reference genes with low variability will increase the fidelity in qPCR results from human BAT.

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T2:PO.063

In the rat, adipose tissue lactate levels correlate with lactate dehydrogenase gene expression and activity

Ariarad S.1, Agnelli S.1, Sabater D.1,2, Remesal X.3,4,5, Fernández-López J.L.1,2,4, Alemany M.1,2
1Department of Nutrition and Food Science, Faculty of Biology, University of Barcelona, Barcelona, Spain,
2Institute of Biomedicine of the University of Barcelona, Barcelona, Spain,
3CIBEROBN, Spain

Female and male adult Wistar rats were fed standard chow or a simplified cafeteria diet for one month. Then, the rats were killed and the white adipose tissue (WAT) in four sites: perigonadal, retroperitoneal, mesenteric and subcutaneous (inguinal) were sampled and frozen, measuring also the full size of each WAT site. Gene expression analysis of lactate dehydrogenase, and key lipogenic and glucose metabolism enzymes were analysed. The levels of lactate in tissue and plasma lactate as well as the WAT activity of lactate dehydrogenase were measured. Lactate gradients (differences in molal concentration) between WAT and plasma were estimated. The influence of sex and diet (and indirectly WAT mass) on lactate levels and their relationships with lactate dehydrogenase activity and gene expressions were measured. There was a high production of lactate by WAT, practically irrespective of site, diet or sex. Tissue lactate levels (and molal gradients) were a direct correlate of lactate dehydrogenase activity in the tissue. Lactate dehydrogenase activity was directly correlated with the expression of the genes Ldhα and Ldhβ for this enzyme when all sites, and sex/diet groups were taken in consideration. The ability of WAT to produce lactate was not directly dependent of WAT metabolic state. The data suggest that there were no post-translational modifications of lactate dehydrogenases (both heart and muscle types, which distribution is similar in this rat tissue) elicited by sex or diet, with no site differences either. These data agree with a role for WAT lactate dehydrogenase as an 3C outlet for excess glucose.

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T2:PO.064

Effects of Hyperthyroidism on Amount and Activity of Brown Adipose Tissue in Humans.

Breuning P.1,2, Gormsen L. C.1, Pedersen S. B.1,2, Richelsen B.1,2
1Department of Clinical Medicine, Aarhus University, Aarhus, Denmark,
2Aarhus University Hospital, Aarhus, Denmark,
3Department of Nuclear Medicine & PET-Center, Aarhus University Hospital, Denmark

Background: The large majority of knowledge on BAT is derived from studies in rodents and very little is known about the amount and effect on the metabolism in humans. In rodents thyroid hormones are known to increase amount and activity in BAT but two recently published studies in humans reach contradictory conclusions. AIM: To investigate the effects of thyroid hormones on the amount and activity of BAT in humans.

Methods: 10 patients with thyreotoxicosis (T3 > 3 nmol/L and suppressed TSH) will be investigated at diagnosis and after 3–6 months of euthyroidism induced by antithyroid treatment. The patients will all be over the age of 50 due to the radiation given by the scans (requested by the local Ethical Committee). All will be scanned for active BAT by the integrated FDG PET-CT before and after treatment. BAT is activated by means of crushed ice placed under the feet in individualized intervals during the scan procedure. Indirect calorimetry is done to determine the basal metabolic rate of 50 due to the radiation given by the scans (requested by the local Ethical Committee). All will be scanned for active BAT by the integrated FDG PET-CT before and after treatment. BAT is activated by means of crushed ice placed under the feet in individualized intervals during the scan procedure. Indirect calorimetry is done to determine the basal metabolic rate.
Conclusions: Results from rodent studies cannot be directly transferred to humans. BAT is scarce and the amount varies greatly between human individuals. In the present study the presence of BAT seems minor even though these patients initially had elevated levels of thyroid hormones. These findings may be due to the age of these patients since it is shown that there is an inverse association between age and the presence of BAT in humans. We plan to have the complete study including adipose tissue examination ready within the next months.

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T2:PO.065
Adipose tissue natriuretic peptide receptor dysregulation in obesity and type 2 diabetes
Kovacova Z1, Collins S2, Pratley R1,2
1Translational Research Institute for Metabolism and Diabetes, Florida Hospital, Orlando, Florida, USA,
2Diabetes and Obesity Research Center, Sanford-Burnham Medical Research Institute, Orlando, Florida, USA

Introduction: Natriuretic peptides (NP), atrial and B-type NP stimulate lipolysis and energy expenditure in adipocytes via NP receptor-A (NPRA). Both peptides bind also to NP receptor-C (NPRC) promoting NP clearance. Thus, NP receptor ratios determine the strength of NP signaling.

Methods: We measured expression of the NP receptors in human adipose tissue in: i) a cross-sectional study of 50 subjects with wide range of BMI and glucose tolerance; and ii) a randomized study of 19 subjects with type 2 diabetes (T2DM) treated for 12 weeks with pioglitazone or placebo.

Results: The NPRA/NPRC mRNA ratio in adipose tissue of obese was lower compared to lean subjects (p≤0.001). Independently of BMI, NPRA/ NPRC was reversed in T2DM comparing to subjects with normal and improved glucose metabolism (p≤0.01) and strongly correlated with insulin sensitivity (r=0.5824, p≤0.001). Similarly, at the protein level we observed a significant reduction of NPRA and increase of NPRC in the obese and T2DM subjects relative to the lean. Expression of PGCG1α-a, a target of NP signaling, was also lower in obese vs. lean (p ≤ 0.0001) and strongly correlated with insulin sensitivity. In a 12-week trial with pioglitazone, improvements in insulin sensitivity correlated with increases in adipose tissue NPRA/NPRC ratio, PGC-1α and UCP1 expression (p≤0.01).

Conclusions: These data indicate that dysregulated expression of NP receptors in adipose tissue is associated with obesity and T2DM, while improving insulin sensitivity resulted in a net higher NPRA/NPRC ratio, the mechanisms underpinning their reciprocal regulation remains to be understood.

T2:PO.066
All-trans retinoic acid promotes browning of white adipose tissue in adult mice
Arreguin A1, Bonet M.L.2, Landrier J.F.2,3,4, Palou A1, Ribot J1
1Laboratory of Molecular Biology, Nutrition and Biotechnology, Université de les Illes Balears, and CIBER de Fisiopatología de la Obesidad y Nutrición (CIBERObn), ES-07122 Palma de Mallorca, Spain,
2INRA, UMR 1260, F-13385 Marseille, France,
3INSERM, UMR 1062, «Nutrition, Obésité et Risque Thrombotique», F-13385 Marseille, France,
4Aix-Marseille Université, Faculté de Médecine, F-13385 Marseille, France.

The role of brown adipose tissue in the regulation of energy balance and maintenance of body weight is well known in rodents. Recently, interest in this tissue has re-emerged due to the realization of active brown-like adipose tissue in adult humans and inducible brown-like adipocytes in white adipose tissue depots in response to appropriate stimuli (“browning process”). A positive effect of all-trans retinoic acid (ATRA) on white adipose tissue (WAT) oxidative and thermogenic capacity has been described and linked to an in vivo fat loosening effect of ATRA in mice. However, little is known about the effects of ATRA on induction of brown-like adipocytes (beige/BRITE) in white adipose tissues. In this study, changes in the expression of Slc27a1, CD137, Tmem26, Hoxc9 and trx1 genes recently described as beige/BRITE-related genes (Wu et al. Cell 2012 and Walden et al., AIP 2012) were analyzed in WAT depots of adult NMRI male mice acutely injected with ATRA or vehicle, together with biometric and blood parameters. The treatment triggered an up-regulation of the mRNA levels of CD137 in all adipose depots of ATRA-treated mice and an up-regulation of Slc27a1, HOXC9 and TBX1 in some adipose depots (mainly visceral) of ATRA-treated mice in accordance with the previously published results showing that ATRA favors the acquisition of brown adipose tissue-like properties in WAT (Ribot et al. Obesity Res. 2001 and Mercader et al. Endocrinology 2006). The results indicate that ATRA favors the acquisition of beige/BRITE markers in WAT. Understanding the mechanisms and effectors involved in the remodeling of WAT can contribute to new avenues of prevention and treatment of obesity and type 2 diabetes.

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T2:PO.067
Effects of fgf21 gene invalidation on brown and white adipose tissue pathophysiology
Quesada T1, Planavila A1, Ribas F1, Cairò M1, Iglesias R1, Giralt M1, Villarroya F1
1Department of Biochemistry and Molecular Biology, and Institute of Biomedicine (IBUB), University of Barcelona, and CIBERObn. Barcelona, Catalonia, Spain.

Introduction: Experimental increases in the endocrine factor FGF21 protect against diabetes and obesity in rodents. However, obese patients and rodent models of obesity show a paradoxical increase in blood FGF21. We undertook a “loss-of-function” approach to get insight in the role of FGF21 on adiposity.

Methods: Male FGF21-KO and wild-type mice were sacrificed. Interscapular BAT, inguinal and epididymal WAT were collected. Metabolites, hormones and cytokines were determined by spectrophotometry, ELISA or Multiplex. Gene expression was determined by qRT-PCR. Cell morphology was assessed by optical microscopy. Cell precursors from fat depots were differentiated to adipocytes in culture, and 14C-glucose oxidation was determined.

Results: FGF21-KO mice did not show major changes in adipose depots size; glyceria and insulinemia were increased, and adiponectin levels were reduced. The expression of marker genes of carbohydrate and lipid metabolism, adipogenesis and “browning” was essentially unaltered in adipose depots. Increased expression of inflammation and macrophage infiltration markers (e.g. Nos2, TNfa, Arg1) was found in BAT from FGF21-KO mice; opposite changes were found in inguinal WAT. Morphological differentiation “in vitro” of brown and white adipocytes lacking FGF21 was unaltered, whereas the expression of marker genes of “browning” (e.g. UCP1, Sir3, Bmp8b, UCP3) was reduced. Glucose oxidation in FGF21-KO brown and white adipocytes was significantly reduced.

Conclusions: In vivo, the lack of FGF21 causes minor effects in adipose tissues, with the exception of altered local inflammation status. However, the impaired glucose oxidation due to the lack of FGF21 found in adipocytes support the notion of an autocrine role of adipose tissue FGF21 on glucose homeostasis.

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T2 – Angiogenesis

T2:PO.068

Effect of 17β-estradiol on 3T3-L1 adipocytes differentiation and on VEGFA expression

Fatima L.1, Campello R.S.1, Machado U.F.1
1Department of Physiology and Biophysics, Institute of Biomedical Sciences, University of São Paulo, São Paulo, Brazil.

Introduction: Adipogenesis and angiogenesis are two closely related processes. In this context, the VEGFA plays an important role, since changes on its expression and on the expression of its signaling machinery components regulate the angiogenesis and may affect the development of obesity and insulin resistance. Estradiol (E2) is considered a protector against obesity and a regulator of the VEGFA gene. Thus, our hypothesis is that VEGFA may be involved in E2-mediated adipogenesis/insulin sensitivity.

Methods: 3T3-L1 mouse preadipocytes were treated with 17β-estradiol during the differentiation. We analyzed the mRNA expression of some adipogenesis markers including Pparg, Cebpα and Slc2a4 and GLUT4 protein. In addition, the expression of VEGFA mRNA and protein was analyzed during the differentiation process, and in full differentiated cells treated with 17β-estradiol.

Results: Levels of Pparg, Cebpα and Slc2a4/GLUT4 are progressively increased during the conversion from 3T3-L1 preadipocytes to adipocytes. In addition, on day 8 of differentiation, cells exposed to E2 presented a significantly increase in GLUT4 protein, Slc2a4 mRNA, and Cebpα mRNA as compared to control cells, while Pparg and Vegfa did not change. However, when differentiated cells were treated for 24 hours with E2, Vegfa mRNA and VEGFA protein expression were increased as compared to control.

Conclusion: Results suggest that estradiol promotes adipogenesis enhancing expression of adipogenesis markers, such as Cebpα and Slc2a4/GLUT4. Moreover, the increasing VEGFA production induced by E2 in mature adipocytes can improve angiogenesis, protecting the adipose tissue from obesity-induced hypoxia, and consequently, from inflammation, which leads to insulin resistance in this tissue.

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T2 – Systemic consequences of adipose tissue metabolism

T2:PO.069

Diagnosis of visceral obesity by using imaging methods

Kharamanova Y.1, Samoylova Y.G.1, Susyaeva N.M.1, Oleynik O.A.1, Zavadovskaya V.D.1, Kashmeleva M.V.1, Rotkank M.A.1, Soboleva I.N.1, Budnikova O.B.1
1Siberian State Medical University, Tomsk, Russia.

Introduction: evaluate the significance of radiological methods of diagnosis of visceral obesity in patients with obesity and metabolic syndrome (MS).

Methods:examined 78 obese patients with MS, mean age 45.9 ± 15.5 years, including 38 men and 40 women. Comparison group: 20 obese patients with varying degrees (8 males, 12 females, mean age of 48.2 ± 9.3 years) without having criterion MS. The control group included 25 people (10 males and 15 females, mean age 46.3 ± 4.1 years) with no obesity. Diagnosis of MS accounted indicators anthropometric data, lipid and carbohydrate metabolism, blood pressure and insulin resistance. Methods used computer (CT) and magnetic resonance imaging (MRI), ultrasonography (USG) visceral obesity (VO).

Results: Radiation exposure during CT, significant time spent in the performance of MRI in conjunction with the economic burden justify the appropriateness of including in the scheme of studies of patients with obesity ultrasound to determine VO as an indicator of MS. Standard ultrasound technique identified during a highly informative, comparable (r = 0.66 at p = 0.0005) with tomographic methods (CT, MRI). Her performance (visceral adipose tissue - VAT, visceral adipose tissue /subcutaneous adipose tissue- VAT / SAT) highly correlated with indicators of disorders of carbohydrate (glucose, insulin, insulin resistance index) and lipid metabolism (LDL, VLDL). Threshold VAT above which diagnosed in, according to the standard ultrasound in patients with MS was 109.11 mm.

Conclusions: Ultrasonography can be used for screening of patients with obesity, including -in children, adolescents and pregnant women in order to diagnose visceral obesity as a risk factor for MS.

T2:PO.070

Klk7 plays a role in body weight regulation, insulin sensitivity and glucose metabolism

Kunath A.1,2, Kern M.1, Stumvoll M.1, Blüher M.1,3, Klöting N.1,3
1Department of Internal Medicine, Neurology and Dermatology, Clinic for Endocrinology and Nephrology, University of Leipzig, Leipzig.
2Molecular Diabetology & DZD-Paul Langerhans Institute Dresden, TU Dresden, Dresden.
3Integrated Research and Treatment Center (IFB) AdiposityDiseases, University of Leipzig, Leipzig.

Background: Previous studies showed that beneficial effects on glucose metabolism of vaspin are at least in part mediated through inhibition of the protease Kallikrein 7 (Klk7). Based on these findings, we investigated the physiological relevance of the Klk7-vaspin system in mice with a targeted whole-body disruption of Klk7 in vivo.

Methods: We generated a whole-body Klk7 knockout mouse (Klk7-/-) and systematically characterized the consequences of Klk7 deficiency on body weight, fat mass, serum concentrations of leptin, basal metabolism, food intake and parameters of glucose and lipid metabolism.

Results: Klk7 deficiency causes significant changes in body fat content, basal metabolism, spontaneous activity, food intake as well as leptin serum concentrations. At an age of 30 weeks, Klk7-/- mice have significantly lower body fat (7.2 ± 2.9%) than the controls (9.9 ± 2.7%) (p < 0.05). Moreover, Klk7-/- mice have significantly lower serum leptin concentration (25.9 ± 6.2 ng/ml) in relation to the controls (42.3 ± 5.2 ng/ml) (p < 0.05). In female Klk7-/- mice, food intake (4.3 ± 0.5 g/day) was significantly lower compared to the controls (4.7 ± 0.3 g/day, p < 0.05). Although glucose tolerance was indistinguishable between Klk7-/- and control mice of both genders, male Klk7-/- mice display a significant improved insulin sensitivity compared with littermate controls at an age of 24 weeks (p < 0.05). Both genders of Klk7-/- mice showed a different basal energy expenditure at day and night phase compared with controls.

Conclusion: Our data indicate that Klk7 plays a previously unrecognized role in body weight regulation, food intake, insulin sensitivity as well as basal- and glucose metabolism. The mechanisms, how Klk7 disruption affects these traits need to be explored in further studies.

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T2.PO.071
Gip as a new biomarker of metabolic complications in obese patients
Malczewska-Molec M,1 Goralska J,1 Kiec-Wilk B,1 Razny U,1 Zdzieciak A,1 Solnica B,1 Dembinska-Kiec A.1
1Department of Clinical Biochemistry, Jagiellonian University, Medical College, Krakow, Poland
2Department of Metabolic Diseases, Jagiellonian University, Medical College, Krakow, Poland

Introduction: The altered GIP secretion and action was recently linked to obesity-related metabolic disorders but the underlying mechanisms are not well understood. The objective of this study was to compare the pattern of GIP secretion and correlation with metabolic risk markers in obese subjects during fasting and postprandial state.

Methods: In obese and non-obese patients fasting and postprandial plasma GIP, glucose, insulin, lipids, glutathione peroxidase, IL-6, E-selectin, MCP-1, leptin, adiponectin, visfatin were measured in five different time points during oral lipid tolerance test and glucose tolerance test.

Results: A total of 114 obese patients and 37 control non-obese subjects, were randomized into the study. Fasting GIP levels differed between obese (32.22 pg/ml) and control (24.27 pg/ml) subjects (p < 0.05) and correlated with glucose, triglycerides, total- and LDL-cholesterol, as well as E-selectin, MCP-1, visfatin and leptin/adiponectin ratio (p < 0.05). The levels of GIP at 120 min after high fat meal were significantly higher than those measured at 120 min after glucose ingestion both in obese (365.93 pg/ml vs 156.4 pg/ml, p < 0.05) as well as control subjects (381.09 pg/ml vs 154.94 pg/ml, p < 0.05). Enhanced postprandial GIP response to fat or glucose challenge (AUC) was positively correlated with glucose AUC, TG AUC, FFA AUC and negatively with glutathione peroxidase activity (p < 0.05). In patients with the highest fasting GIP concentrations (3rd tertile), increased E-selectin (p < 0.05) and MCP-1 blood levels (p(0.05) were observed.

Conclusions: We suggest, that GIP is a putative early biomarker of metabolic consequences of obesity and associated proinflammatory state.

T2.PO.072
The risk for weight regain after weight loss is related to weight loss-induced cellular stress in the adipose tissue
Roumans N.1, Camps S, Renes J,1 Bouwman F,1 Westerterp K.1, Marinman E.1
1Department of Human Biology, Faculty of Nutrition and Translational Research in Metabolism, Maastricht University, Maastricht, The Netherlands

Introduction: Weight loss results in increased lipolysis in adipocytes, which lose their fat and shrink (You et al. 2006). However, after returning to a stable energy balance, adipocytes rapidly prepare for re-storing fat. This metabolic adaptation appears related to an increased stress response to a stable energy balance, adipocytes rapidly prepare for re-storing fat.

Methods: Twenty-five healthy subjects started with a very low energy diet for 8 weeks with a 10-month follow-up period. Participants were categorized in groups depending on weight loss during the diet period and on weight maintenance or regain during follow-up. Before, after the diet and after 10 months follow up, abdominal subcutaneous adipose tissue biopsies were obtained. Levels of stress proteins in biopsies were determined by Western blotting.

Results: Weight regainers showed increased level of β-actin, calnexin, HSP60 and HSP70 expression during the weight loss period. BIP, HSP27, SOD1 and SOD2 did not change significantly during this period. Correlation analysis showed that changes of β-actin, HSP70 and HSP27 are linked via changes in HSP60. Significantly increased levels of β-actin and HSP60 were also seen after 4 days glucose restriction of mature adipocytes.

Conclusion: Subjects regaining weight after dieting have increased levels of cellular stress and structural support proteins in their adipose tissue, most likely residing in the adipocytes. We conclude that accumulating cellular stress in adipose tissue during weight loss is a risk factor for weight regain.

Acknowledgement: We thank Dr. Ping Wang for helpful discussions and advice.

T2.PO.073
Effect of secretome from obese and lean rat adipose tissue on the proliferative capacity and the cancer-related gene expression of a normal mammary epithelial cell line
Cabia B,1 Amil M.2, Andrade S.1,2, Couselo M.C.1,2, Casanueva F.E.1,2, Crujeiras A.B.1,2
1Department of Molecular and Cellular Endocrinology, Instituto de Investigacion Sanitaria (IDS), Complejo Hospitalario Universitario de Santiago (CHUS/ SERGAS) and Santiago de Compostela University (USC), Santiago de Compostela, Spain.
2CIBER de Fisiopatología, Obesidad y Nutrición (CIBERobn), Madrid, Spain.

Introduction: Obesity is associated with higher risk for breast cancer. This work evaluates the effect of secretome obtained from obese or lean rat adipose tissue on the proliferative capacity of a normal human mammary cell line, MCF10A, as well as the expression of some genes related to pro-carcinogenic events.

Methods: Three week-old female Sprague-Dawley rats were fed a high fat diet (DIO: 60% Kcal/g fat, n=12) or standard diet (LEAN: 5.5% Kcal/g fat, n=11) for 10 weeks. Retroperitoneal (RPAT) and subcutaneous (SAT) adipose tissues were extracted and cultured for secretome collection. MCF-10A cell line was exposed for 24 hours to a 1% of secretomes from each group and proliferation was measured. Furthermore, genes associated with cell proliferation (ALDH3A1), antioxidant protection (SIRT1) and tumor suppression (PTEN, TGFB) were quantified by qRT-PCR.

Results: RPAT secretome from obese rats induced a significant increase in cell proliferation (2.12 ± 0.13 a.u) with respect to lean animals (1.17 ± 0.05 a.u; p-value<0.001). No statistically significant differences were observed after treatment with SAT secretome from lean (0.89 ± 0.03 a.u) or obese rats (0.85 ± 0.02 a.u). Interestingly, gene expression fold change of PTEN (0.91 ± 0.07), TGFB (0.81 ± 0.07) and SIRT1 (0.66 ± 0.04) was significantly downregulated while ALDH3A1 (1.95 ± 0.18) was upregulated (p < 0.05) after MCF10A treatment with obese compared to lean RPAT secretome. No statistical differences were found between lean or obese SAT secretome treatment.

Conclusions: These results point out to a possible involvement of factors produced by obese visceral adipose tissue in changes related to early steps of tumor promotion. Further studies are needed to identify those obesity-related carcinogenic factors.

Acknowledgement: The present research was funded by CIBERObn, Xunta de Galicia, and Instituto de Salud Carlos III.

T2.PO.074
Characterization of the role of alm1 in the adipose tissue in mice and humans
Faggian A1, Favretto F.1, Milan G,1, Collin G.B.2, Marshall J.D.,2 Maffei P1, Naggert J.K.2, Vettor R.1
1Endocrine-Metabolic Laboratory, Internal Medicine 3, Department of Medicine, University of Padua, via Ospedale 105, 35128 Padua, Italy,
2The Jackson Laboratory, Bar Harbor, Maine, United States of America

Introduction: Alström Syndrome (AS) belongs to the class of ciliopathies and is a rare recessive disease characterized by obesity and Type 2 diabetes (T2DM), and fibrosis with multiple organ involvement. The disease causing gene is ALMS1, which is ubiquitously expressed with multiple splice variants. The protein ALMS1 localizes to the centrosomes, basal bodies and endosomes suggesting a role in ciliary function and intracel-
lular transport, but its link with the metabolic complications is still poorly understood.

Methods: We characterized the adipose tissue (AT) of a mouse model of AS (Alms1GT/GT) at 6 weeks of age, using gene and protein expression analysis. We also examined the expression of ALMS1 in the AT of obese mouse models of obesity as well as in obese patients with or without T2DM and comparing their levels with those obtained in normal weight subjects.

Results and Conclusions: Young Alms1GT/GT displayed a systemic glucose intolerance and altered localization of GLUT4 both in the basal state and after insulin stimulation, which causes an aberrant insulin signaling, downstream or independently of AKT. These events appear before the increase of body weight and insulin circulating levels. AT action appears to be secondary to the increase in de novo lipogenesis stimulated by the high insulin levels. These findings propose a direct role of ALMS1 in the glucose homeostasis through the GLUT4 trafficking pathway. ALMS1 expression in human and mouse models of obesity showed quantitative differences between obese and control subjects. Furthermore, the reduction of ALMS1 in obese patients suggests its implication in the pathophysiology of the AT, independent from AS.

Reference:

T2.P.O.075
Betulinic acid, a TGR5 agonist, prevents adipogenesis in 3T3-L1 adipocytes through suppression of STAT3 phosphorylation

Kim G.W.*, Jo H.K.*, Chung S.H.†
†Department of Life and Nanopharmaceutical Science, College of Pharmacy, Kyung Hee University, Seoul, Republic of Korea

Aim of this study was to evaluate the anti-adipogenic effect of betulinic acid (BA), a plant-derived triterpenoid, and its action mechanism in relation to STAT3. BA treatment during 3T3-L1 differentiation significantly suppressed adipogenesis as demonstrated by Oil Red O staining. STAT3 is a key transcription factor, recently known to be involved in the adipogenic process. At the initial stage of 3T3-L1 differentiation, phosphorylation of STAT3 was significantly increased. Pre-incubation with BA inhibited differentiation-induced activation of STAT3 and reduced adipogenic (PPARγ, C/EBPα and GLUT4), and lipogenic (SREBP1, FAS, SCD1 and adiponectin) mRNA levels, showing that anti-adipogenic effect of BA is mediated by inhibition of STAT3 activation. BA is known agonist for a Gs-protein coupled bile acid receptor, commonly known as TGR5. Involvement of TGR5 in energy homeostasis and metabolic diseases is becoming evident, and TGR5 activation is known to negatively regulate STAT3 signaling in the liver of TGR5-deficient mice [1]. Interestingly, the intracellular level of cyclic-AMP was elevated after 1 h treatment of BA and the inhibitory effect of BA on adipocyte differentiation was reversed by pre-treatment of SQ22536, an adenylyl cyclase inhibitor, inferring that BA might exert anti-adipogenic effect most likely through TGR5 activation. This study suggests that BA suppresses adipocyte differentiation via inhibition of STAT3 phosphorylation and induction of cyclic-AMP level. These results direct future studies into identification of specific signaling role of TGR5 in adipogenesis.

Reference:

T2.P.O.076
Obesity-induced chronic inflammation in C57Bl/6J mice, a novel risk factor in the progression of renal AA amyloidosis?

van der Heijden R.A.1, Sheedfar F.2, Bijzet J.3, Hazenberg B.P.4, Koonen D.P.2, Heeringa P.5

1Department of Pathology and Medical Biology, University Medical Centre Groningen, Groningen, The Netherlands,
2Department of Pediatrics, Section Molecular Genetics, University Medical Centre Groningen, Groningen, The Netherlands,
3Department of Clinical Immunology and Rheumatology, University Medical Centre Groningen, Groningen, The Netherlands

Background: Compelling evidence links obesity induced systemic inflammation to the development of chronic kidney disease (CKD). This systemic inflammation may result from exacerbated adipose inflammation. Besides the known detrimental effects of typical pro-inflammatory factors secreted by the adipose tissue (TNF-α, MCP-1 and IL-6) on the kidney, we hypothesize the enhanced obesity-induced secretion of serum amyloid A (SAA), an acute inflammatory protein, to play a key role in aggravating obesity-induced CKD. Methods: Groups of male C57Bl/6J mice (n = 99 in total) were fed a low (10% lard) or high (45% lard) fat diet for a maximum of 52 weeks. Mice were sacrificed after 24, 40 and 52 weeks. Whole blood samples, kidneys and adipose tissues were collected. The development of adipose and renal tissue inflammation was assessed on gene expression and protein level. Adipocytokine levels were measured in plasma samples. Results: A distinct inflammatory phenotype was observed in the adipose tissue of HFD mice prior to renal inflammation, which was associated with an early systemic elevation of TNF-α, leptin and SAA (1A–C). With aging, sclerotic lesions appeared in the kidney, the extent of which was severely aggravated by HFD feeding. Lesions exhibited typical amyloid characteristics (2A) and pathological severity positively correlated with bodyweight (2B). Interestingly, more SAA protein was detected in lesions of HFD mice. Conclusion: Our data suggest a causal link between obesity induced chronic inflammation and AA amyloidosis in C57Bl/6J mice. Though future studies are necessary to prove this causal link and to determine its relevance for the human situation, obesity may hence be considered a risk factor for the development and progression of renal AA amyloidosis in the course of CKD.

Reference:
1. Y oung Alms1GT/GT displayed a systemic elevation of TNF-α, leptin and SAA (1A–C). With aging, sclerotic lesions appeared in the kidney, the extent of which was severely aggravated by HFD feeding. Lesions exhibited typical amyloid characteristics (2A) and pathological severity positively correlated with bodyweight (2B). Interestingly, more SAA protein was detected in lesions of HFD mice. Conclusion: Our data suggest a causal link between obesity induced chronic inflammation and AA amyloidosis in C57Bl/6J mice. Though future studies are necessary to prove this causal link and to determine its relevance for the human situation, obesity may hence be considered a risk factor for the development and progression of renal AA amyloidosis in the course of CKD.
T2.PO.077

Insulin resistance is exaggerated in early-onset obesity and accompanied by down-regulation of miRNAs that mediate inflammation and fibrosis.


1Life Sciences Research Division, Anti-Doping Lab Qatar, 2Adipokines and Metabolism Research Group, Division of Medicine, University College London, UK, 3Al Emadi Hospital, Doha, Qatar, 4Hamad Medical Corporation, Doha, Qatar, 5North London Obesity Surgery Service, Whittington Hospital, London, UK

Background: Early and rapid onset of obesity, consequent to abdominal adipose tissue expansion is associated with inflammation and insulin resistance (IR). microRNA (miRNA) may be biomarkers and mediators of both.

Aims: Cardiometabolic risk factors, before and after weight loss, was investigated in early- and adult-onset obesity. Expression of miRNA mediators was also determined.

Method: Non-diabetic subjects before and after surgical weight loss were recruited. Anthropometric measures recorded and fasting blood samples used for determination of lipids, glucose, insulin and adipokines. Expression of miRNA was assessed using an inflammatory array.

Results: Despite both cohorts being morbidly obese, the early-onset group was younger, more IR, hyperleptinaemic, had higher levels of IL-6 and MCP-1 and lower adiponectin. On dichotomization into metabolically healthy (MHO) and pathological (PO), the prevalence of MHO in the early-onset was 20% as opposed 27% in adult-onset. However, in the adult-onset the PO had high leptin, while analogous group of the early-onset had low leptin levels, compared to the MHO. Surgical weight loss improved metabolic profiles of PO of both cohorts, while MHO remained unchanged. miRNA expression in the PO compared to the MHO before weight loss showed significant down regulation of those associated with inflammation (mir-19b, mir-9), IR (mir-142, mir-144, mir-122), fibrosis (mir-29) and adipogenesis (mir-15, mir-130a, mir-374a). Weight loss lead to upregulation of miRNA expression (mir-302a, b, c, mir-9).

Conclusion: In early-onset obesity IR and inflammation are exaggerated. Also lower levels of leptin in this group may suggest greater SNS activation directly inhibiting adipose leptin. Some, but not all, of the metabolic and inflammatory lesions that accompany obesity and IR are ameliorated by weight loss, along with up-regulation of miRNAs mediating IR and inflammation, but not fibrosis.

T2.PO.078

A-mangostin regulates the hepatic steatosis and body fat mass in obese mice with high-fat diets

You B.H., Choi Y.H.

1Pharmacokinetics lab, College of Pharmacy, Dongguk university, Korea Republic,

Obesity is a major risk factor to develop the metabolic disorders related to hyperglycemia, insulin resistance, hyperlipidemia, hepatic steatosis and cardiovascular diseases, while weight loss has been reported to ameliorate these associated conditions. Due to the previous reports regarding anti-adipogenic activity of a-mangostin, a major active xanthone from mangosteen, Garcinia manostana L., in vitro experiments, we investigated the effects of long-term supplementation with a-mangostin (10 and 50mg/kg/day p.o. for 7 weeks) in mice with established obesity (3month high-fat diet). Therefore, the objective of this study was to investigate the effects of a-mangostin on the metabolic disorder states in high-fat-diet (HF)-fed mice and the underlying mechanisms related to adipogenesis. a-Mangostin supplementation produced a marked decrease in body weight and the levels of serum GOT, GPT, glucose, triglyceride, total cholesterol, low-density lipoprotein cholesterol, and free fatty acid were significantly reduced compared to those in mice with HF diets. Also a-mangostin decrease the fat volume and size and ameliorated the hepatic steatosis in mice with a-mangostin supplementation plus HF. Moreover, a-mangostin activated the AMPK, sirT 1 and suppressed PPARγ levels in liver. Thus, our results suggest that a-mangostin exerts anti-obesity effects in HF-induced obese mice.

Acknowledgement: This work was supported by 2014 Brain Korea 21-plus project, the grant of National Research Foundation of Korea (NRF) funded by the government of Korea (S-2014-010400, Y. H. Choi) and GRRC program of Gyeonggi province ([GRRC ~ DONGGUK 2014-B01) and Biological Applications of New Therapeutic Target Modulators
Association of serum 25-hydroxy vitamin-D levels with cardiometabolic variables in pre-pubertal children with obesity

Galcheva S.1, Galunskas B.1, Gerova D.1, Lateva M.1, Iotova V.1
1Department of Pediatrics and Medical Genetics, Varna Medical University, Varna, Bulgaria
2Department of Pharmaceutical Technology, Varna Medical University, Varna, Bulgaria
3Department of Clinical Laboratory, Varna Medical University, Varna, Bulgaria

Introduction: The relationship between obesity and vitamin-D status has already been proven and it seems that obese population is at risk of vitamin-D deficiency. The aim of this preliminary study was to estimate the vitamin-D concentration and its association with cardiometabolic indices in pre-pubertal children with different degree of total/abdominal obesity.

Methods: Thirty three children (mean age 8.0 ± 1.3 years, 57.6% males) were recruited. Anthropometric and blood pressure (BP) measures, fasting serum 25-hydroxyvitamin-D (25OHD), glucose, insulin, homeostatic model of assessment (HOMA-IR) and lipids were investigated. Vitamin-D levels < 50 nmol/L were considered as a severe insufficiency and those between 50–75 nmol/L as a mild insufficiency. 25OHD levels were measured by a validated HPLC/UV method. Obesity status was estimated using the IOTF reference for BMI and the Bulgarian childhood reference for waist circumference.

Results: Severe 25OHD insufficiency was observed in 48.5% of all participants, while 30.3% of them had suboptimal Vitamin-D concentrations. The median 25OHD level was 48.3 (41.6–60.9) nmol/L, without gender differences. Obese children had lower 25OHD concentrations compared to their non-obese counterparts [48.2 (32.9–59.9) vs. 62.6 (50.2–76.0)], p < 0.05. Serum 25OHD levels correlated negatively with insulin levels (r=-0.592, p = 0.012), HOMA-IR (r=-0.521, p = 0.032) and body weight (r=-0.526, p = 0.03). No significant association was found with lipids and BP measurements. Applying the backward regression model, the age of our participants was found as the main predictor of their Vitamin-D status.

Conclusion: Abnormal Vitamin-D status is highly prevalent among obese pre-pubertal children, associated with increased insulin resistance.

Sarcopenic obesity, metabolic syndrome and inflammation in adult Caucasian Italian subjects

Poggiogalle E.1,2
1Department Experimental Medicine-Medical Physiopathology, Food Science and Endocrinology Section, Sapienza University of Rome, Italy
2Department of Medicine, Geriatrics Division, University of Padova, Italy

Introduction: Recently metabolic aspects linked to sarcopenic obesity (SO) were investigated. Extant studies involved especially older people from Asian or White-mixed American cohorts. The aims of our study were to explore the prevalence of SO in Italian pregeriatric subjects and to investigate the relationship among SO, metabolic syndrome (MS) and inflammation.

Methods: Subjects were recruited from 2011 to 2014. Inclusion criteria were age >18 and <65 years, BMI=30 kg/m². Body weight, height, waist circumference (WC) were measured. Fat mass (FM) and fat-free mass (FFM) were assessed by DXA. Appendicular skeletal muscle mass (ASM) was calculated. Sarcopenia was defined as ASMM/h2 or ASMM/weight <2SD than the sex-specific mean of a young population. The cutoffs were ASMM/h2=6.54 kg/m² for men and 4.82 kg/m² for women, and ASMM/weight<0.827 for men and 0.2347 for women. ISI-Matsuda was calculated.

Results: 133 subjects (age 44.9 ± 13.54, BMI:37.22 ± 5.08 kg/m²)were enrolled. The prevalence of SO was 1.0% or 34.8% in men and 0.6% or 50.1% in women, basing on ASMM/h2 ratio or ASMM/weight. SO subjects based on ASMM/h2 were scarce, only data relying on ASMM/weight were considered. SO subjects were older, with higher BMI, WC, FM, and lower FFM and ASMM than non-SO individuals. hs-CRP levels were higher and ISI-Matsuda was lower in SO subjects. The presence of MS was higher in SO subjects than non-SO subjects (47.6% vs 34.3%). ASM/weight decreased when increasing the components of MS (p < 0.05 for all values).

Conclusion: SO is associated with MS and inflammation in adult Caucasian subjects. Metabolic profile evaluation should be recommended in SO.
reveal whether plasma concentrations of 7α-OH-DHEA, 7β-OH-DHEA and 7-oxo-DHEA are associated with adiposity measures and their changes in response to a short-term weight management in adolescents.

Methods: 248 adolescents: 108 boys - age (x ± SD): 15.0 ± 1.5 years, body mass index (BMI): boys 32.9 ± 4.6 kg/m²; 140 girls - age: 15.4 ± 1.5 years, BMI: 31.5 ± 4.1 kg/m². Body composition: bioimpedance Tanita BC-418 MA. Steroids: liquid chromatography-tandem mass spectrometry. Weight management (WM): 4-week supervised in-patient WM programme (energy restricted diet, daily aerobic exercise and cognitive behavioural therapy).

Results: Both 7α-OH-DHEA and 7β-OH-DHEA were positively associated with BMI, BMI SDS, WC and WC SDS (p < 0.01). In addition 7α-OH-DHEA was also significantly positively related to % fat and % trunk fat (p < 0.001). Only in girls baseline 7β-OH-DHEA levels were positively related to all anthropometric indexes (p < 0.038). Baseline concentration of 7α-OH-DHEA was inversely related to decreases of BMI, % fat and % trunk fat (p < 0.003) in response to WM. On the other hand, baseline concentrations 7β-OH-DHEA and 7-oxo-DHEA were not associated with decline in adiposity measures.

Conclusions: Plasma concentrations of 7α-OH-DHEA were positively related to baseline adiposity measures and inversely to their changes in response to WM in adolescents. In contrast, baseline concentrations of 7β-OH-DHEA and 7-oxo-DHEA were not associated with decline in adiposity measures. Our results do not support favourable effects of the pre-treatment levels of 7-oxygenated derivatives of DHEA on adiposity reduction in response to a short-term WM.

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T4 – Addiction/Addiction after Bariatric Surgery

T4:PO.001
Continuous Glucose Monitoring for Evaluation of Glycemic Excursions and Hypoglycemia after Roux-en-Y Gastric Bypass

Nielsen J.B.,1 Abild C.B.,1 Richelsen B.1
1Department of Endocrinology and Internal Medicine, Aarhus University Hospital, Aarhus, Denmark

Introduction: Hypoglycemia is well-known after Roux-en-Y gastric bypass (RYGB) and may be difficult to diagnose since symptoms are non-specific and difficult to distinguish from dumping syndrome. Continuous glucose monitoring (CGM) has been proposed as a diagnostic tool in this evaluation. Thus, we aim to assess the CGM technology in evaluating the glycemic excursions among RYGB-patients.

Methods: Twelve subjects with symptomatic hypoglycemia and 12 subjects asymptomatic after RYGB were recruited. Subjects were subjected to CGM (measuring interstitial fluid glucose (IFG) every 5 min) for 6 days. Moreover a 5-hours mixed meal tolerance test (MMTT) was performed measuring plasma glucose (PG). Another day the patients followed a low-carbohydrate diet (LCD). The other days the patients followed their ordinary diet (OD).

Results: Fig 1 shows the relationship between mean IFG and mean PG during the MMTT. Bland-Altman plot (fig 2) of the relationship between minimum IFG and minimum PG indicates that CGM overestimates minimum IFG by a fixed bias of 1.0 mM; CI (0.7; 1.4). Mean IFG (from 06 AM to midnight) was comparable during the day of LCD and an OD-day ((5.4 ± 0.1 vs. 5.6 ± 0.1) mM; p = 0.06) whereas the standard deviation (SD) of mean IFG was significantly lower during LCD compared to OD ((0.6 ± 0.1 vs 1.1 ± 0.1) mM; p < 0.001). The mean amplitude of glycemic excursions (MAGE) was significantly reduced during LCD compared to OD (p < 0.001).

Conclusion: Although CGM overestimates minimum IFG this study indicates that CGM may be a useful tool especially in the evaluation of treatment effect on glycemic variation in RYGB-operated subjects, as illustrated for LCD. LCD reduces the glucose variability compared to OD expressed both as a reduction in SD and MAGE, even at the same mean IFG.
Pre-diabetes and its influence on bariatric surgery outcomes: A prospective study in a hospital population

Lau E.1,2, Oliveira J.1,2,3, Cunha F.1,2,3, Saavedra A.1,2,3, Costa M.M.1,2,3, Bettencourt-Silva R.1,2,3, Maglhães D.1,2,3, Freitas P.1,2,3,4, Varela A.1,2,3,4, Queirós J.1,2,3,4, Carreira F.1,2,4, AMTCO A.1,2, Carvalho D.2,3,5

1Department of Endocrinology, Diabetes and Metabolism, Hospital de Sã o João EPE, Porto, Portugal
2Multidisciplinary Assessment of Surgical Treatment of Morbid Obesity, High Differentiation Centre for Surgical Treatment of Obesity, Hospital de Sã o João EPE, Porto, Portugal
3Faculty of Medicine, University of Porto, Porto, Portugal
4Faculty of Nutrition and Food Sciences, University of Porto, Porto Portugal
5Institute for Research and Innovation in Health Sciences, Porto, Portugal

Introduction: Several studies have established the influence of type 2 diabetes on bariatric surgery outcomes. As pre-diabetes is the early stage of glucose abnormalities, it seems relevant to understand if pre-diabetes has already impact on bariatric surgery outcomes.

Objectives: To evaluate the implications of pre-diabetes on bariatric surgery outcomes.

Methods: Observational, prospective study of obese patients evaluated between January/2010-December/2013. Anthropometric and metabolic parameters were analyzed. Glucose metabolism abnormalities defined according to ADA.

Results: Of 983 patients, 252 were excluded for prior diagnosis of diabetes, 13 for insufficient data and 1 for age <18 years. Of the 717 patients included, 629 (87.7%) were female, had a median age of 41 years (IQR, 34–51) and body mass index of 43.5 kg/m²; 55% were diabetic and 328 pre-diabetic, with no differences in basal BMI. Pre-diabetics had higher levels of total cholesterol, LDL cholesterol, triglycerides, systolic blood pressure and HOMA-IR, compared to euglycemic (p < 0.05). Comparing to euglycemic at 12 months post-surgery, pre-diabetics had a more significant reduction in fasting glucose, HbA1c and HOMA-IR; had less significant reduction in total cholesterol, LDL and diastolic blood pressure (p < 0.05); and had lower % of excess BMI lost (%EBMIL) (66.0% vs 75.2, p < 0.001). No differences were found regarding %EBMIL, comparing diabetics and pre-diabetics.

Conclusion: In our population pre-diabetes is a determinant of bariatric surgery outcomes. Regarding %EBMIL, these results demonstrate that the statistically significant difference was related to the transition of the euglycemic state to pre-diabetes and not from pre-diabetes to diabetes. These data support the need of an early intervention in obese patients, before settling down glucose metabolism abnormalities.

Increased bioavailability of alcohol following sleeve gastrectomy – preliminary results 3 months after surgery

Strømmen M.1,2, Kulseng B.3, Dale O.3

1Centre of Obesity, Dept. of Surgery, St. Olavs University Hospital, Trondheim, Norway
2Dept. of Neuroscience, Norwegian University of Science and Technology, Trondheim, Norway
3Dept. of Circulation and Medical Imaging, Norwegian University of Science and Technology, Trondheim, Norway

Introduction: There is growing concern that bariatric surgery increases risk of alcoholism postoperatively. As several surgical procedures exist, insight into how different operative techniques influence bioavailability relatively can be valuable information when deciding for appropriate treatment. We set up a trial to compare the effect of sleeve gastrectomy versus gastric bypass on 1 year bioavailability of ethanol. This is 3 months preliminary data from the 5 first sleeve gastrectomy patients.

Methods: Participants, all with BMI >40 kg/m², met fasting and had a standardized breakfast one hour prior to alcohol administration. Ethanol dosage was calculated on basis of preoperative total body water (TBW) estimated by bioelectrical impedance (InBody 720). Dosage was 0.4 g/kg TBW for women and 0.5 g/kg TBW for men. Test sequence (intravenous or peroral) was randomized with a washout period of minimum 48 hours. For peroral testing, participants consumed in 5 minutes vodka 40% diluted with orange juice to a concentration of 20%. For the intravenous test, ethanol 40% was diluted with glucose 5% to a concentration of 5 g/100 mL, and administered as infusion over 30 minutes in vena brachialis. Blood alcohol content (BAC) was analysed with Roche Modular P with lower detection limit of 2.2 mmol/L, and area under curve (AUC) was calculated with WinNonlin software.

Results: 3 months postoperatively uptake of alcohol was more rapid, reached higher concentrations and were detectable longer. Relative bioavailability (AUClast) was considerably higher than prior to surgery.

Conclusion: Sleeve gastrectomy seems to increase bioavailability of ethanol which in turn may enhance its toxicological effects.

Acknowledgement: We are grateful to the Clinical Research Facility at St. Olavs University Hospital for their assistance in the trial.
Introduction: Few studies have investigated the nature of the relationship between body mass index (BMI) and food addiction (FA), measured by the Yale Food Addiction Scale (YFAS; Gearhardt et al., 2009). While most of them reported a positive linear relationship between these variables, one study using aggregated data suggested a non-linear relationship (Meule, 2012). The aim of the present study was to pursue the exploration of the relationship between BMI and FA in an attempt to shed more light on the nature of this relationship among a clinical sample.

Methods: Individuals seeking help for eating or weight difficulties in clinics affiliated with Laval University were recruited. They were weighted and measured, and completed the YFAS (N=70, mean BMI=41.84kg/m²). Linear and logistic regression analyses were conducted to determine whether being in a certain weight category significantly predicted the number of FA criteria endorsed and the probability to obtain a FA diagnosis.

Results: As shown in figure 1, analyses revealed that when compared to the obesity class III category (reference group; BMI > 40 kg/m²), the overweight (p = 0.044) and the obesity class I (p = 0.019) categories could significaantly better predict the number of FA criteria endorsed. This model explained 13% of the variance. The same pattern was found for the relationship between BMI and FA diagnosis (odds ratio 11.67 (overweight) and 15.56 (obesity class I)) and this model explained 28% of the variance.

Conclusion: Findings from this study help clarify the way BMI and FA relate and highlight the complexity of this relationship, as FA symptomatology appears to behave differently across weight categories. Further studies are needed to better understand this relationship and its clinical implications.

Fig. 1. Prevalence of food addiction diagnoses, in percentage (%), as well as mean number of food addiction criteria endorsed in relation to established weight categories. *p < 0.05
Results: A progressive decline in exploratory and cognitive performance was detected at 8 months of age from ND to HFD, to AD and to HFD-fed AD mice (r=−0.4, p < 0.05), with a pronounced worsening in explorative behaviour in the latter group (p < 0.05 vs baseline). The encephalization quotient was reduced in proportion to the diet-induced weight gain (r=−
0.8r, p < 0.001). In fasting conditions, 18FDG PET revealed a considerably higher brain glucose uptake in cognitive and homeostatic regions in HFD-fed mice regardless of AD (p≤0.05 vs respective controls). A positive effect of intranasal insulin administration on brain glucose metabolism was observed, especially in the AD group.

Conclusion: A 6-month HFD exposure significantly alters cognitive performance and brain glucose metabolism in adult mice. The acute intranasal administration of insulin has a positive effect on brain glucose metabolism in AD.

T4 – Eating Disorders

T4-PO.008
Association between adult attention deficit/hyper activity disorder, binge eating and obesity in the population of Belarus.

Ramanouskaya T.
Department of Psychiatry and Medical Psychology, Belarusian State Medical University

Introduction: Attention deficit/hyperactivity disorder (ADHD) is a neurobehavioral disorder that affects near 3.2–4.0% of the adult population of Belarus. Studies have revealed high rates of ADHD (26–61%) in patients seeking weight loss treatment suggesting an association between ADHD and obesity. The objective of the present study was to test the association between ADHD and overweight and obesity in the population of Belarus.

Methods: Participants were 2560 residents (58.6% female) aged 18–45 years. A retrospective assessment of childhood ADHD and a self-report assessment of adult ADHD were administered. Diagnosis was defined by three categories: never met diagnostic criteria, met full childhood criteria with no current symptoms, and met full childhood criteria with current symptoms.

Results: The prevalence of overweight and obesity was 34.8 and 28.4%, respectively, among adults with ADHD, and 29.6 and 20.6%, respectively, among persons with no history of ADHD. Adult ADHD was associated with greater likelihood of overweight, (odds ratio (OR) = 1.64; 95% confidence interval (CI) = 1.05, 2.37) and obesity (OR = 1.82; 95% CI = 1.14, 2.65).

Conclusion: Results were similar when adjusting for demographic characteristics and depression. Mediation analyses suggest that binge eating disorder (BED), but not depression, partially mediates the associations between ADHD and both overweight and obesity.

Results: suggest that adult ADHD is associated with overweight and obesity and BED.

T4-PO.009
Increasing risk of eating disorders in patients with childhood obesity


1Unit of Human Nutrition and Dietetics, Department of Public Health, Experimental and Forensic Medicine, University of Pavia, Italy.

2Institute of Molecular Genetics, National Research Council of Italy, Pavia, Italy

Introduction: Obesity from early age is considered a strong predictor of the premature development of cardiovascular diseases and other comorbid conditions [1–3]. This retrospective case-control study aims at exploring if childhood obesity may be involved in the development of eating disorders (EDs).

Methods: A group of patients with diagnosis of EDs (n=99) were compared with a control group (n=423). Personal data, socioeconomic status, lifestyle, weight history, dieting, body mass index at pubertal development, family history of obesity as well as for eating disorder have been considered. Logistic regression has been used to assess the influence of childhood obesity in the development of EDs.

Results: Obese children had almost two times (p = 0.018) the risk to develop EDs, compared with normal and underweight ones. In particular, obese children had a three times (p = 0.018) and 2.6 times (p = 0.031) higher risk to develop respectively binge eating disorder (BED) and bulimia nervosa (BN). Moreover, the female component of our sample as well as the subjects with motherly positive anamnesis for EDs (MPAEDs), had respectively a five times (p < 0.001) and four times (p = 0.037) higher risk to develop EDs than males and subjects with motherly negative anamnesis for EDs (MNAEDs).

Conclusion: Our results indicate a high and increasing prevalence of EDs patients with early history of childhood obesity and suggest the necessity to develop more sensibility and awareness by clinicians who treat overweight and obese children.

References:

T4-PO.010
Psychopathology ofnes obese patients

Micanti F., Cucinelli C., Loiardo G., De Blasio A., Formisani N., Pecoraro G., Galletta D.

1Department of Neuroscience.University “Federico II”. Naples.

Introduction: Night Eating Syndrome (NES) is an Eating Disorder characterized by evening hyperphagia (consuming ≥25% of total daily food intake after dinner), morning anorexia, and depressed mood that worsens in the evening. It is still unclear which are the psychopathological features of NES and the importance of the sleep disorder in its etiopathogenesis. This study evaluates mental dimension features in NES obese patients and psychiatric comorbidities.

Methods: 980 obese patients (M age: 35; M BMI: 44.4; f/m:653/327) were enrolled in this study. 96/980 had NES diagnosis (M age: 38; M BMI: 43; f/m:55/41). The diagnostic evaluation includes: psychiatric interview, semi-structured interview for eating behavior and psychodiagnosis to evaluate the mental dimensions: impulsiveness: Binge Eating Scale(BES), Barratt Impulsiveness Scale(BIS-11), depression: Beck Depression Inventory(BDI-II), body image: Body Uneasiness Test(BUT), anxiety: State Trait Anxiety Inventory(STAI-Y 2).

Results: In this sample, morning anorexia is not present. It turns out to have associated a daytime eating behavior: binge24%; nibbling 40%; gorging and snacker 36%. BIS = 67.8 and BES = 19.5; STAI-Y = 47.7; BUT: GSI = 2.55; PST = 16.1; PSDI = 0.6; Tot = 84. Prevalent psychiatric comorbidities are: depression (21%), an anxiety disorder (12.5%), psychosis (2%).

Conclusion: The psychopathological analysis of obese patients with NES requires a psychiatric treatment: psychopharmacological and/or psychotherapeutic before any care in fulfilling obesity healing.

Acknowledgement: Rossetti GL.MD Digestive Surgery Unit. II School of Medicine SUN Naples Italy. Belfiore AM MD Department of Nutrition; Colao AM MD and Savastano S MD Department of Medicine and Surgery. Division of Endocrinology. School of Medicine Federico II Naples Italy

References:

Acknowledgement: Rossetti GL.MD Digestive Surgery Unit. II School of Medicine SUN Naples Italy. Belfiore AM MD Department of Nutrition; Colao AM MD and Savastano S MD Department of Medicine and Surgery. Division of Endocrinology. School of Medicine Federico II Naples Italy

References:
Attitudes and Behaviors Related to Eating and Body Shape in Young Adults Born Preterm

Matroni H.M.,2,3, Sipola-Leppänen M.,1,2, Tikkanmäki M.1,2, Heinonen K.,1,2, Lahti J.3,2, Lahti M.,2, Wehkalampi K.,2, Männisto S.,2, Järvelin M.R.2,4, Andersson S.,2, Lano A.,2, Vartia T.,2, Wolke D.3, Eriksson J.G.2,3,4,5, Vääräsmäki M.1,2, Rääkkönen K.,2, Kajantie E.2,3,4,5

1National Institute for Health and Welfare, Department of Health, Chronic Disease Prevention Unit, Helsinki and Oulu, Finland.
2Institute of Health Sciences, University of Oulu, Finland.
3Department of Pediatrics and Adolescence, Oulu University Hospital, Oulu, Finland.
4Institute of Behavioural Sciences, University of Helsinki, Helsinki, Finland.
5Folkhälsan Research Centre, Helsinki, Finland.
6Children’s Hospital, Helsinki University Central Hospital and University of Helsinki, Helsinki, Finland.
7Imperial College, London, UK.
8Department of Psychology, University of Warwick, UK.
9Department of General Practice and Primary Health Care, Institute of Clinical Medicine, University of Helsinki, Helsinki, Finland.
10Unit of General Practice, Helsinki University Central Hospital, Helsinki, Finland.
11Department of Obstetrics and Gynaecology, MRC Oulu, Oulu University Hospital and University of Oulu, Oulu, Finland.

Background: Preterm birth has been listed as a potential risk factor for later attitudinal and behavioral problems related to eating disorders (ED). We examined the association between preterm birth and symptoms related to EDs in young adult women and men.

Methods: We studied young adults from two birth cohorts: ESTER (Northern Finland 1985–1989) and Arvo Ylppö Longitudinal Study (Uusimaa, Finland, 1985–1986). Of them, 175 were born early preterm (EPT, <34 wk GA), 349 late preterm (LPT, between 34–37 wk GA) and 635 were term-born controls (N=1159). Mean age was 24.1 (SD 1.4) years. The subjects completed 3 subscales of the Eating Disorder Inventory (EDI)-2 (total of 22 items), including Drive for Thinness (DT), Body Dissatisfaction (BD) and Bulimia (B). Group differences were examined by linear regression.

Results: Mean total EDI score was higher in women than in men (74.2, SD 18.9 vs 55.0, SD 14.5, p < 0.001). Women born EPT scored 5.9 points (95% CI –10.6 to –1.3, p < .05) lower in EDI total scores than controls. This difference was observed in all three EDI subscales, DT, BD and B. The differences persisted after adjustments for cohort, age, parental education, maternal smoking and pre-pregnancy BMI and height, body fat percentage, smoking, depression and timing of puberty of the subject. We did not observe differences between women born LPT and controls or any differences among men.

Conclusions: Women born EPT have significantly healthier attitudes and behaviors related to eating and body shape than controls born at term.

The impact of shame, self-criticism and social rank on eating psychopathology in overweight and obese members of a commercial weight management programme.

Duarte C.,1 Matos M.1, Gail C.,1 Morris L.1, Stubbs R.J.2,4, Gilbert P.1

1Cognitive and Behavioural Centre for Research and Intervention, University of Coimbra, Rua do Colégio Novo, Apartado 6153, 3001-802 Coimbra, Portugal.
2Mental Health Research Unit, Kingsway Hospital, Derby, DE22 1LZ, UK.
3College of Life and Natural Sciences, University of Derby, Kedleston Road, Derby, DE22 1GB, UK.
4Nutrition and Research Department, Slimming World, Clover Nook Road, Somercotes, Alfreton, Derbyshire, DE5 4RF, UK

Background: Research has highlighted the important role social rank, shame and self-criticism play in vulnerability to and maintenance of eating disorders. However, it is not clear if these factors are also important for weight control capability in populations who are overweight or obese. This study examined associations between self-criticism, social comparison, external shame, negative affect (emotions) and eating psychopathology in overweight/obese participants attending a weight management programme focused on behaviour change.

Methods: 2236 participants completed an online survey with measures of self-criticism, social comparison, external shame and negative affect, adapted to address these aspects in relation to eating behaviour, body weight and shape.

Results: Correlational analyses showed that external shame, self-criticism and social comparison were associated with negative affect and eating psychopathology. Path analysis showed that when the effect of depressive symptoms was controlled for the impact of external shame, hated self and reassured self on disinhibition and susceptibility to hunger was fully mediated by their effect on weight-related negative affect. In turn, inadequate self and negative social comparison predicted higher disinhibition and susceptibility to hunger directly and partially through weight-related negative affect.

Conclusions: Shame, self-criticism, and perceptions of low social rank significantly predict eating-related difficulties in members of the general population participating in popular weight-loss programmes. Targeting shame, self-criticism, and perceptions of low social rank are important areas of focus for interventions in members of the general population experiencing eating and weight-related difficulties.
The impact of self-criticism and self-reassurance on weight related positive and negative affect and well-being in participants of a commercial weight management programme.

Duarte C1, Matos M1, Gale C1, Morris L1, Stubbs R J1,2, Gilbert P1
1Cognitive and Behavioural Centre for Research and Intervention, University of Coimbra, Rua do Colégio Novo, Apartado 6153, 3001-802 Coimbra, Portugal, 2Mental Health Research Unit, Kingsway Hospital, Derby, DE22 3LZ.

Introduction: Weight stigma can potentially undermine weight management by increasing self-criticism. We recently examined the links between external shame, self-criticism, social comparison, negative affect and eating behaviours in 2,236 participants attending a community based weight management program focused on behaviour change. Shame and self-criticism influenced measures of eating behaviour (dissimulation and perceived hunger)- an effect fully mediated through weight-related negative affect. In the present study we examined the impact of self-criticism on wellbeing.

Method: 2,175 participants completed an online survey using measures of self-criticism, self-reassurance negative and positive affect and well-being (which were adapted to specifically address eating behaviour, weight and body shape perceptions).

Results: Correlation analyses showed that self-criticism was associated with negative affect and wellbeing. Path analysis suggested that self-criticism significantly decreased well-being, both directly and indirectly, mediated by increased levels of negative affect about one's weight, and by decreased levels of positive affect about one's weight. The ability to self-reassure had a higher predictive effect on increased well-being by predicting less negative affect and by predicting increased levels of positive affect regarding one's weight. All effects were significant at p <0.001.

Conclusions: Factors that increase self-criticism impact on well-being in participants engaged in attempts to manage their weight, both directly and through their impact on weight related affect. Developing self-reassuring competencies in weight management programmes enhances weight related affect and well-being.

T4:PO.016 Prevalence of depression and associated factors in greek obese patients

Kouniakis F1, Gouni-Billioti F1, Fotiadou E1, Dimitrakou C1, Axiotidou E1, Kourtoglou N1, Bellivani M1, Savopoulou C1, Hatziotis A1.
1Obesity & Metabolism Outpatient Clinic, EASO accredited Collaborating COM.

Introduction: Prevalence of depression in obese population is significantly high, resulting in deterioration of overall quality of life. Most of the time depression and obesity co-exist, affecting many aspects of life, such as sexual life and quality of sleep.

Methods: In the first COM in Greece a total sample of 48 obese outpatients (mean age 47.8 ± 14.1 years and mean BMI 41.6± 8.1 kg/m²) undergone a psychiatric evaluation of depression status (HDRS), sexual dysfunction (ASEX) and quality of sleep and daytime sleepiness as part of the standard baseline assessment.

Results: All the outpatients have suffered from some degree of depression (mild 16.7%, moderate 43.8%, severe 14.6%, very severe 25%). Majority of study population were women (79.2%) and morbidly obese (43.8%). According to Epworth Sleepiness Scale 87.5% of the outpatients had developed either moderate or serious sleep disorder, while 33.3% had sexual dysfunction. The severity of depression demonstrates a significant positive correlation to sexual dysfunction (p < 0.05) as well as to quality of sleep (p < 0.01). There was a significant relation between depression and financial status of individuals (p < 0.05). BMI and weight, on the other hand, was not statistically associated to depression degree.

Conclusion: Although overweight and obesity are positively associated with depression and depressive symptoms there is data that report either no relationship or an inverse relationship between the two. Nevertheless, this study indicates that prevalence of depression and related disorders are very common among obese people who seek treatment, a fact that highlights the essential role of a psychiatrist as a member of the specialized team for the treatment of obesity.

T4:PO.017 Self-esteem and its relation to self-recognition of one’s own body in relation to nutritional status of women diagnosed with polycystic ovary syndrome

Wyskida K1, Dybczak D1, IzydorKiewicz E1, Gorki K1, Gawelek E1, Dworzynska B1, Miras K1, Bąk-Sosnowska M1, Chudek J1, Madej P1, Olszanecka-Glinianowicz M1.
1Health Promotion and Obesity Management Unit, Department of Pathophysiology, Medical Faculty in Katowice, Medical University of Silesia, 2Department of Psychology, School of Health Care, Medical University of Silesia, 3Pathophysiology Unit, Department of Pathophysiology, Medical Faculty in Katowice, Medical University of Silesia, 4Department of Gynecological Endocrinology, Medical Faculty in Katowice, Medical University of Silesia.

Introduction: Symptoms of depression and the lack of self-acceptance is more common among women with polycystic ovary syndrome (PCOS) than in the general population of women. One of factors influencing these...
disturbances is nutritional status. Therefore, the aim of the study was to assess self-esteem and its relation to self-recognition of one’s own body of women with PCOS in relation to nutritional status.

**Methods:** Two-hundred-thirty-four women diagnosed with PCOS were enrolled. Body mass and height were measured and BMI was calculated. Nutritional status was assessed on the basis of WHO criteria. Self-esteem was assessed on the basis of polish adaptation M. Rosenberg scale and self-recognition of own’s body by Franzoi and Shields scale.

**Results:** Normal body mass was diagnosed in 66.2% study women, overweight in 19.7% and obesity in 14.1%. There were no differences in age of the study group (24.7 ± 5.5, 24.9 ± 4.6 and 25.5 ± 4.6 yrs) and satisfaction with their sexual attractiveness (47.3 ± 7.7; 47.1 ± 7.6 i 46.1 ± 10.6 points). While, the degree of satisfaction with weight control and with physical condition (29.3 ± 9.1 vs. 25.4 ± 7.2 vs. 23.8 ± 9.8 points and 32.1 ± 5.9 vs. 28.9 ± 6.5 vs. 28.0 ± 8.0 points, respectively). Low level of self-esteem was more frequent in obese women 18.1%. In addition, any obese women had high level of self-esteem.

**Conclusions:** Overweight and obesity are the factors decreased satisfaction with weight control and physical condition but not with sexual attractiveness. While, low self-esteem in women diagnosed with PCOS is increased by obesity, only.

**T4.P0.018**

The role of emotional regulation in childhood obesity: Implications for prevention and treatment

Aparicio-Llopis E., Michels N.

1Faculty of Medicine and Health Sciences, Nutrition and Mental Health Research Group (NUTRISAM), Institut de Investigació Sanitaria Pere Virgili (IISPV), Universitat Rovira i Virgili (URV), Reus, Spain,
2Department of Public Health, Ghent University, Belgium

**Background:** Stress and negative emotions represent an important public health threat e.g. by increasing the risk to develop obesity. Since the process to cope with negative emotions (= emotion regulation (ER)) already develops during childhood, we present a novel conceptual framework model on the role of ER in prevention and treatment of childhood obesity.

**Methods:** An electronic database search (MEDLINE, Web of Knowledge and Scopus) was conducted on observational and interventional/experimental literature concerning the ER-obesity link and its underlying concepts. We also present an overview of ER intervention techniques.

**Results:** Our model states that childhood ER is a fundamental link between stress and obesity. Stress along with ineffective ER causes abnormal cortisol patterns, emotional eating, a sedentary lifestyle and sleep problems. In the development of obesity and ER, also parents play a role. In contrast, effective ER skills decrease obesity-related unhealthy behaviour and enhance protective factors, which boost mental and physical health. In children, some observational studies were found but very few intervention studies, mainly pilot or still on-going studies.

**Conclusions:** Encouraging effective ER could be a new approach in the fight against and the treatment of childhood obesity. Future ER interventions are needed to confirm this model in children.

**T4.P0.019**

Retrospective analysis of subjective wellbeing and weight loss in patients receiving talking therapies at the Rotherham Institute for Obesity (RIO)

Boyden C.I., Wilson C.I., Capehorn M.I.

Rotherham Institute for Obesity (RIO)

**Introduction:** RIO is a specialist weight management service with a comprehensive multidisciplinary team approach that includes talking therapies. The therapies involved are solution focussed and include Motivational Interviewing (MI), Cognitive Behavioural Therapy (CBT), Neurolinguistic Programming (NLP), Emotional Freedom Techniques, life coaching and hypnotherapy. Patients are referred by other members of the RIO MDT if patients are suspected of emotional eating, are identified as having binge eating or comfort eating, or are suspected of having underlying psychological barriers to weight loss.

**Methods:** Retrospective analysis of qualitative and quantitative data for all participants aged 19–80 years, between April 2010 to March 2013, who attended the RIO weight management programme (n=4587). Subjective wellbeing (SWB) scores were measured by means of the WHO-5 wellbeing index at the initial assessment and at 6 months.

**Results:** From the 2091 patients that completed the 6 month RIO programme, 627 patients (30%) were seen by a talking therapist (TT). patients who saw a TT demonstrated improved SWB scores by 25% (p < 0.001, r=0.3) compared to 21% (p < 0.001, r=0.2) who had not seen a TT. Patients who were referred had a higher BMI (average 44.4 kg/m²) compared to those who had not (41.02 kg/m²). Weight loss was similar for both groups; 5.8kg in those who received TT compared to 5.7kg in those who did not.

**Conclusion:** SWB improvements were enhanced for patients who saw a talking therapist, however overall weight loss results were similar for both groups. Patients referred for talking therapy were usually those having significant difficulty in losing weight, yet relatively a considerable amount of weight was seen in this cohort.

**T4.P0.020**

Does A Health Information Technology developed by Children and their Parents improve Obesity Therapy?


1Department of Adolescent medicine, Children`s Hospital of Eastern Switzerland, St. Gallen, Switzerland

Existing interventions prove limited effectiveness and sustainability. IT-enhanced interventions have the potential for higher accessibility and cost-effectiveness. They aim not only modifying the patient’s behavior but also to positively influence their family system.
T4 – Quality of life

T4:PO.021

Not weight status but parental education and perception of weight and health are related to health related quality of life in children and adolescents.

Ligthart K A 1, Paulis W D 2, Koes B W 1, Middelkoop M 1
1Department of General Practice, Erasmus MC, University Medical Center, Rotterdam, The Netherlands

Introduction: Previous research suggests that weight status is negatively associated with health related quality of life (HRQoL) in children and adolescents. However, little is known on other factors influencing HRQoL. Therefore, the aim of this study is to describe the association between weight status, children’s characteristics and HRQoL.

Methods: Baseline data from a prospective cohort studying 715 children (2–18 years) in 73 general practices in the Netherlands were used. Height and weight were measured during regular consultation and children and parents filled-out questionnaires about HRQoL. (Pediatric Quality of Life Inventory), demographics, parents’ perception of the child’s weight, parents’ perception of the child’s health status and number of GP consultations over the last twelve months. Data were analysed using a multiple linear regression model with HRQoL as dependent variable.

Results: Global HRQoL scores were significantly lower in overweight and obese children (78.2 (14.1), n=116) compared to underweight (84.9 (10.1), n=109) or normal weight (83.6 (10.7), n=372) children (p < 0.001). Multiple linear regression analysis showed that not weight status but lower parental education, perceived overweight and perception of lower health were significantly associated with decreased global and physical HRQoL (p < 0.001). Higher weight status, child considered as overweight and poor perceived health were associated with impaired psychosocial HRQoL (p < 0.05).

Conclusion: Physical HRQoL is associated with parental education and perception of weight and health while psychosocial HRQoL is associated with weight status but also with health and weight perception.

T4:PO.022

Liraglutide 3.0 mg reduces body weight and improves hrqol in overweight or obese adults without diabetes: Scale obesity and prediabetes randomized, double-blind, placebo-controlled, 56-week trial

Leu D C 1, Fujioka K 1, Astrup A 1, Greenway F 2, Halpern M 1, Le Roux C 1, Violante Ortiz R 1, Wilding J P 2, Wolden M 1, Jensen C B 1, Pi-Sunyer X 1
1University of Calgary, Calgary, AB, Canada
2Scirpg Clinic, La Jolla, CA, USA
3University of Copenhagen, Frederiksberg, Denmark
4Pennington Biomedical Research Center, Louisiana State University System, Baton Rouge, LA, USA
5Hospital das Clínicas, University of São Paulo Medical School, São Paulo, Brazil, 6Université de Nantes, Nantes, France
7University College Dublin, Dublin, Ireland
8Instituto Mexicano del Seguro Social, Cd.Madero, Tama, México
9University of Liverpool, Liverpool, UK
10Novo Nordisk A/S, Søborg, Denmark
11Columbia University, New York, NY, USA

Obesity is a chronic disease associated with physical and mental health problems and reduced health-related quality of life (HRQoL), which can be improved by weight loss (WL). The effects of liraglutide 3.0 mg, as adjunct to diet & exercise, on body weight (primary endpoint) and HRQoL in overweight/obese adults were investigated. Individuals (BMI ≥27 kg/m², with ≥1 comorbidity or ≥30 kg/m²) were advised on a 500 kcal/day deficit diet & exercise program, and randomized 2:1 to once-daily sc liraglutide 3.0 mg (n=2487) or placebo (n=1244). Baseline characteristics: age 45.1 years, 78.5% female, weight 106.2 kg, BMI 38.3 kg/m², 61.2% with prediabetes. The Impact of Weight on Quality of Life–Lite (IWQoL), Short-Form (36) Health Survey (SF-36) and Treatment Related Impact of Weight (TRIM-W) questionnaires were used to assess health-related outcomes (score ranges 0–100). Data were observed means±SD and estimated treatment differences (ED), with LOCF Clinicaltrials.gov ID: NCT01272219. At week 56, individuals on liraglutide 3.0 mg had more WL (8.0 ± 6.7 %) vs placebo (2.6 ± 5.7 %); ED –5.4 % [95%CI –5.8;–5.0]; p < 0.0001). WL was accompanied by improvements in the total IWQol score with liraglutide (10.6 ± 13.3) vs placebo (7.6 ± 12.8; ED 3.2 [2.4;4.0], p < 0.0001), mostly driven by improved physical function. The TRIM-W total score (ED 2.1 [1.3;3.0], p < 0.0001), SF-36 summary physical/mental health scores (ED 1.7 [1.2;2.2], p < 0.0001; 0.9 [0.3;1.5], p = 0.003), and all domain scores of IWQoL and SF-36 improved with liraglutide vs placebo. In conclusion, weight loss with liraglutide 3.0 mg, as adjunct to diet & exercise, was accompanied by weight-related improvements in HRQoL, including physical function and mental health. Greater weight loss led to greater improvements in HRQoL scores.

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T4:PO.023

Quality of life and negative emotionality in overweight and obese non-clinical sample

Pakrjuk-Buljan A 1, Kucik M 2, Basic-Markovic N 2
1Department of Psychology, Faculty of Humanities and Social Sciences, University of Rijeka, Rijeka, Croatia
2Family medicine practice, Srdčići 65d, Rijeka, Croatia

Introduction: The present study investigates the correlates of health-related quality of life (HRQoL) in the adult overweight and obese population and the association between body mass index, depression, anxiety, and potential mediating effects of physical health functioning.

Methods: The research was conducted on a sample of overweight and obese adults who visited their primary care physician. A total of 143 women and 130 men were enrolled in the study; 43% of the subjects were overweight, and 57% of the subjects were obese. The subjects ranged in age between 21 and 60 years. Depression and anxiety were assessed using the...
Hospital Anxiety and Depression Scale (HADS), physical health functioning was evaluated using the Medical Outcome Study Short-Form 36 (SF-36), and BMI was calculated as weight divided by height squared.

Results: The regression analysis results indicated that the components of physical HRQoL (physical functioning and role limitation due to physical problems) mediate the relationship between body mass index and depression only in women. The higher level of body mass decreased the quality of life, and different aspect of impaired physical health became a potential risk factor for the development of depressive symptoms. Men do not relate their weight to poorer quality of life (e.g., general health or life roles).

Conclusion: The results from the present study show that a different pattern of functioning exists between men and women. It is important to identify the factors that can effectively motivate and stimulate obese people to change their lifestyle and to consider the differences in psychological functioning between women and men.

T4.P0.025

'Blodomloppet' - a way to increase self-confidence connected to physical activity

Törner S, Simmons C.

1Department of physiotherapy, Queen Silvia Childrens Hospital, Sahlgrenska University Hospital, Gothenburg, Sweden

Introduction: Physical activity has an important role to play regards to affecting different risk factors, among others insulin sensitivity and improved physical wellbeing (1–2). It is also well known that children and young people who are physically active as children tend to retain these good habits into adulthood (2). Many young people who suffer from obesity have negative experiences of physical activity and are often excluded early from physical activities. This in turn leads to exclusion and increases the stigma both physically and socially (3). We decided to start training for a non-competitive race and chose 'Blodomloppet', a 5km circuit non-professional running competition.

Method: Reduced starting fees enabled the group to take part free of charge. Four young people entered in 2012 and five in 2013. One physiotherapist ran the race with the group and one was placed alongside the track to offer support and as a rallying point. This also gave us an opportunity to discuss nutrition and training in connection with the experiences from 'Blodomloppet'.

Result: All participants completed the race. They expressed the importance and strength of the group (community) which gave all the participants the confidence to run the race. After the race the participants felt an increased confidence in their own bodies through physical activity. The memory of their achievement was later seen in the group training and as a consequence we could raise our expectations of them. Estimations of the group BMI before and after the race resulted in a reduction of 0.9 units of BMI. Research suggests that a reduction of 0.5 units of BMI means a significant health gains with respect to risk factors (1).

Conclusion: To put the foundation for a healthier lifestyle where physical activity remains a certainty, can perhaps become the result when a homogeneous group is put together to give the conditions they did not have with them from the outset.

Fig. 1. Adolescents that participated in „Blodomloppet“

T4.P0.026

Deterioration of quality of life perception depending on different obesity levels

Gouni-Stathaki I1, Fotiadou E1, Kouniaki F1, Dimitroula C1, Axiotidou E1, Kourtoglou N1, Bellivani M1, Grammatikopoulou M.G2, Savopoulou C1, Hassapidou M.N1, Hatziolios A.J1.

1Obesity & Metabolism Outpatient Clinic, EASO accredited Collaborating COM, 1st Propedeutic Department of Internal Medicine, AHEPA University Hospital of Thessaloniki, Greece
2Department of Human Nutrition & Dietetics, Alexander Technological Educational Institute of Thessaloniki, Greece

Introduction: In recent years, the assessment of quality of life of obese people has been extensively studied. Although anthropometric characteristics are strong indicators of health status, obese population demonstrates also impairment of quality of life. The aim of our study was to assess the
relationship between the quality of life self-perception and the obesity degree, using the Moorehead – Ardelt QOL-2 (MAI) questionnaire, among subcategories of obesity in the first COM in Greece.

**Methods:** A total of 23 outpatients (mean age 44.6 ± 12.2 years and mean BMI 39 ± 5.2 kg/m²) were recruited in order to assess the MA II. Basic anthropometric and sociodemographic characteristics were recorded.

**Results:** The majority of the outpatients were women (82.6%) and declared a moderate financial status (73.9%). Half of the outpatients (47.8%) were university educated. The 34.8% had a regular weekly physical activity, while 39% were smokers and had metabolic syndrome, according to IDF classification criteria. Obesity was sub-grouped into three categories according to WH0 criteria, class I (17.4%), class II (47.8%) and class III (34.8%). MA II total score had a negative correlation with body weight (-0.456, p < 0.05) and BMI (-0.548, p < 0.01) and it was significantly different among obesity subgroups (p < 0.05), demonstrating a gradual decrease by each higher obesity category.

**Conclusion:** This study demonstrates that perceived quality of life deteriorates as the obesity degree rises, instigating that even a small weight reduction may play a crucial role not only in health status improvement but also into quality of life, underlying the need of holistic treatment of obesity.

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**T4.PO.027**

**Family-based behavioural treatment for childhood obesity decreases BMI and improves health related quality of life**

Byrnjeildsdottir B.1, Kristjansdottir B.1, Bjornsddottir O.E.1,2, Zoega H.1,2, Helgason T.1, Olafsdottir A.S.1,2, Bjornason R.1,2

1Children's Medical Centre, Landspitali University Hospital, Reykjavik, Iceland.
2University of Iceland, Centre of Public Health Sciences Reykjavik, Iceland.
3University of Iceland, School of Education, Reykjavik, Iceland.
4University of Iceland, Faculty of Medicine, Reykjavik, Iceland

**Introduction:** Over the past decades childhood obesity rates have tripled. Effective treatment for obese children is extremely important because of the negative impact it can have on both the physical and psychological well-being of the child, as well as health-related quality of life (HRQL). The objective of this study was to examine potential benefits of family-based behavioral treatment for obese children on BMI standard deviation scores (BMI-SDS), psychological well-being and health related quality of life HRQL.

**Method:** Treatment was provided to 43 obese children, aged 7–12 years and a participating parent. The treatment consisted of 18 group and individual sessions delivered three times a week over six weeks. Measurements included height and weight, BMI-SDS was calculated, and psychological well-being and quality of life were assessed with questionnaires (The Strength and Difficulties Questionnaire and Pediatric Quality of Life). Assessments were conducted at baseline, after the 6 weeks of treatment and during booster sessions at 3, 6 and 12 months post-treatment.

**Results:** Among the 31 children that finished the 6 weeks program, the BMI-SDS decreased significantly during treatment (mean BMI-SDS = 3.49 (SD = 0.7) at baseline and 3.08 (SD = 0.6) after the 6 weeks of treatment (p < .0001). Among the 16 children that met up at the 1-year booster session the BMI-SDS decreased significantly (mean BMI-SDS = 3.36 (SD = 0.6) at baseline and 2.80 (SD = 0.4) after 1-year (p < .0001). There were no significant differences in psychological well-being during treatment (p > .05), nor at 1-year follow-up (p > .05). HRQL improved during treatment (p < .01) but was not maintained at 1-year follow-up (p > .05).

**Conclusion:** The family-based behavioural treatment provided to obese children in Iceland produced promising results regarding long term decrease in BMI-SDS and in short term health-related quality of life.

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**T4.PO.028**

**Skeletal Muscle Quality: Concordant Findings from Two Practical Non-Invasive Approaches**

Pietrobelli A.2, Johnson C.1,3, Heymsfield S.B.1, Zeng J.2

1Pediatric Unit Verona University Medical School, Verona (ITALY);
2Institute for Social and Preventive Medicine, University of Zürich, Switzerland;
3Department of Internal Medicine, Internal Medicine, Lausanne University Hospital (CHUV), Switzerland;
4Pediatric Gastroenterology Unit, Department of Pediatrics, Centre Hospitalier Universitaire Vaudois, University of Lausanne, Switzerland

**Background:** Phase angle (θ), derived from bioelectrical impedance analysis (BIA) resistance and reactance, decreases with adult age and is associated with changes in nutritional status, skeletal muscle (SM) function, and insulin resistance. Another measure of SM quality is the light fraction (LF) measured with ultrasound (US) followed by image processing; echographic light SM is produced with fat and fibrous tissue infiltration of normally dark SM. While BIA systems automatically measure θ, technical training is needed for operation of the US system and subsequent image analysis.

**Methods:** The aim of this study was to examine the associations between these two age-related measures of SM quality: θ at 50 KHz using an 8-electrode multi-frequency BIA system (MC980, Tanita Corp., Tokyo, Japan); US (GE LOGIC) Subjects were 165 males and females, ages 5–80 yrs, with US measures of biceps, triceps, calf, and thigh muscles; and θ measures of each arm and leg.

**Results:** Significant correlations (p < 0.05) were present for key associations, including: biceps θLF and arm θ; triceps θLF and arm θ; thigh θLF and leg θ; and biceps and thigh θ, and leg θ. Our findings thus show concordant results between the two different measures of SM quality, θ and LF.

**Conclusions:** Measurement of θ may be a simple, practical, and clinically-useful measure of age-related changes in SM quality that can be studied in the context of sarcopenia and related metabolic disorders.

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**T4.PO.029**

**Psychosocial quality-of-life, lifestyle and adiposity: A longitudinal study in preschoolers**

Michels N.1, Kriemler S.1,2, Marques-Vidal P.M.1, Nydegger A.1,2, Puder J.J.3

1Department of Public Health, Ghent University, Belgium;
2Institute for Social and Preventive Medicine, University of Zurich, Switzerland;
3Department of Endocrinology, Diabetes and Metabolism & Division of Pediatric Endocrinology, Diabetes and Obesity, Centre Hospitalier Universitaire Vaudois, University of Lausanne, Switzerland

**Objective:** In obesity prevention, insight about the role of psychosocial aspects early in life is pivotal. Several reviews reported contradictory results regarding the associations between children's psychosocial and adiposity and they noted the lack of longitudinal studies focusing on explaining or moderating lifestyle factors. Therefore, our aim was to test whether low psychosocial Quality-Of-Life (QOL) in preschoolers is associated with lifestyle and adiposity changes over one schoolyear and whether lifestyle moderates the latter.

**Methods:** Longitudinal data from 291 preschoolers (initially 3.9–6.3yrs) was collected in the Swiss Ballabeina study: psychosocial QOL (emotional, social and school QOL by PEDsQOL), adiposity (BMI, waist, fat%), diet (food frequency), screen time and activity-level (accelerometers).

**Results:** Low psychosocial QOL was related to unfavorable changes in diet (less fruit β=0.21 and more fat intake β=-0.28) and lower physical activity (β=0.21). Some longitudinal QOL-adiposity relations appeared only after moderation by lifestyle (beta-range: 0.13–0.67). Low psychosocial QOL was associated with adiposity increases in children with an unhealthy diet intake (i.e. low fruit, high fat intake or high soft drink intake frequency) or a high sedentary time. By contrast, low psychosocial QOL was associated with longitudinal decreases in adiposity in preschoolers with a high fruit intake frequency or with a healthier activity level.
Conclusions: The current study results emphasize the need for testing moderation in the QOL-adiposity relation. An unhealthy diet can be a vulnerability factor and high physical activity a protective factor in QOL-induced adiposity. Consequently, QOL and lifestyle should be targeted concurrently in multi-factorial obesity prevention.

References:
1. Reference: changes on completion

Fig. 1. Fatty food intake as moderator in the longitudinal effect of QOL on adiposity

T4:PO.030
Retrospective analysis of subjective wellbeing index scores, with effect of weight change and demographics in patients attending the Rotherham Institute for Obesity

Boydén C., Fellows S.J., Capehorn M.1
1Rotherham Institute for Obesity, University of Chester

Introduction: There is a bi-directional association between obesity and mental wellbeing (Gatineau and Dent, 2011). Demographics such as age, Body mass Index (BMI), gender, deprivation and employment are also involved in the relationship. This study aimed to identify if the subjective wellbeing (SWB) of patients is affected by attending the Rotherham Institute for Obesity (RIO), and to investigate whether weight loss or gain affects the result, and identify other variables or demographics that may affect the initial SWB.

Methods: Retrospective analysis of qualitative and quantitative data for all participants aged 19–80 years who completed the full 6 month RIO weight loss programme between Jan 2010 to Dec 2012 was made (n=1895). The data included age, gender, weight, BMI, postcode, employment status and WHO-5 index scores.

Results: All participants achieved the WHO-5 criteria of 10% increase in scores at 6 months (p < 0.017 Bonferroni adjusted score). Demographics did affect initial SWB scores, but overall SWB improved in most categories apart from participants who were classed as carers (p = 0.01) or permanently sick (p = 0.04) or students (p = 0.93). The participants that lost or maintained weight achieved the WHO-5 criteria of 10% increase in scores achieving significant change (p = 0.001) whereas the patients who gained > 4.9 kg of weight achieved less than 10% (p = 0.19).

Conclusion: SWB does improve after completing a 6 month weight management programme and is affected by demographics initially, and weight changes on completion

Reference:

T4:PO.031
Depressive symptoms and associations with low vitamin D levels and adherence to Mediterranean diet in morbidly obese patients

Luger M.1,2, Kruschitz R., Marculescu R., Klammer C., Adelfang M., Kral M., Hoppcichler F., Langer F., Prager G., Schindler K., Ludvik B.1
1Department of Internal Medicine III, Medical University of Vienna, Vienna, Austria, 2Special Institute for Preventive Cardiology And Nutrition, Salzburg, Austria, 3Department of Laboratory Medicine, Medical University of Vienna, Vienna, Austria, 4Department of Surgery, Medical University of Vienna, Vienna, Austria

Introduction: In obese persons vitamin D deficiency (VDD) is present and obesity is associated with depression.1 We evaluated parameters of vitamin D, severity of depression and adherence to Mediterranean diet in morbidly obese patients.

Methods: In this randomized controlled trial (NCT02092376) patients with VDD were included. The Beck Depression Inventory (BDI-V) was used to estimate depression in morbidly obese patients with 35 points as threshold. Additionally, 25-hydroxy-vitamin D (25-OHD), 1,25-dihydroxy-vitamin D (1,25-DiOHD) and Mediterranean Adherence Score (MEDAS)3 were assessed. The threshold of 25-OHD and 1,25-DiOHD is 75 nmol/l and 86.5 pg/ml.

Results: In patients (n=39; age 43 (14) years, mean (SD); 72% women; BMI of 43.7 (4.6) kg/m²) with following means of 25-OHD: 41.3 (12.2) nmol/l, 1,25-DiOHD: 47.5 (16.7) pg/ml, BDI-V: 31 (16) points, and MEDAS: 5 (2) points. 35% suffered from clinically relevant depression by BDI-V. Patients with lower 1,25-DiOHD levels showed higher BDI-V points (r=-0.43; p = 0.02). Depressive patients had lower adherence to Mediterranean diet (4 (1) vs. 6 (2) points; p = 0.001) compared to non-depressive ones.

Conclusion: About one third suffered from depression with association to low levels of active form of vitamin D. Furthermore, non-depressive patients showed a higher adherence to Mediterranean diet compared those with depression. However, further research regarding causality of the association between VDD and depression is required.

References:

T4:PO.032
Depression and suicidal ideation among adults with metabolic syndrome: Data from the 2008–2010 Korea National Health and Nutrition Examination Survey

Kang J.1, Kyu S., Kim C., Ryu O., Lee S., Hong E., Kim D., Yoo J., Ihm S., Choi M., Yoo H.1
1Endocrinology and Metabolism, Hallym University College of Medicine, Anyang, Republic of Korea

Aim: Suicide and depression are one of the highest public health problems worldwide. Suicidal ideation represents an important phase in the suicidal process and often precedes suicidal attempts or completed suicide. Patients with chronic medical disease are more likely to report suicidal thoughts and depression. However the studies on relationship between these conditions and metabolic syndrome are rare. We aimed at investigating the prevalence of depression and suicidal ideation among adults with metabolic syndrome in Korea.

Methods: We analyzed data for 17924 persons (Men: 7516 persons & Women: 10408 persons) from 2008–2010 KNHANES who did not have cancer or hepatitis or liver cirrhosis. Each individual was assessed for the presence of metabolic syndrome according to the NECP-ATP III criteria except for waist circumference, for which new criteria recently suggested
by Korean Society for Study of the Obesity was used. The presence of depression or suicidal ideation and were defined by a self-reported questionnaire asking if the participants had ever been diagnosed with depression by medical doctor or had any suicidal thoughts.

**Results:** The prevalence of depression (17% vs. 14%, p < 0.001) and suicidal ideation (20% vs. 17%, p < 0.001) was significantly higher in participants with metabolic syndrome. Mean scores for the EQ-5D decreased significantly with participants with depression (0.80 ± 0.22 vs. 0.91 ± 0.13, p < 0.001) and suicidal ideation (0.79 ± 0.22 vs. 0.92 ± 0.13, p < 0.001) in the group with metabolic syndrome.

**Conclusions:** This study shows that metabolic syndrome is associated with depression and suicidal ideation and this relationship was negatively associated with health related quality of life.

**T4-PO.034**

**Piloting a manualised weight management programme for overweight and obese persons with mild-moderate learning disabilities: Results of the shape up-LD study**


1Department of Epidemiology & Public Health, University College London, 2Department of Statistical Science, University College London, 3Department of Primary Care & Population Health, University College London, 4Anglian Community Enterprise, Essex, 5Division of Psychiatry, University College London

**Introduction:** Obesity prevalence is higher among adults with mild-moderate learning disabilities (LD) than in the general population. There is a need for services designed to meet the needs of this group. We piloted a manualised weight management programme for overweight and obese adults with LD (Shape Up-LD).

**Method:** A two-arm, individually randomised, controlled pilot trial in adults with LD (n=50) comparing Shape Up LD to Usual Care. Shape Up LD involves 12 weekly group sessions led by trained facilitators, including advice on healthy eating, physical activity and behaviour change techniques. Communication is aided through the use of pictorial handouts. Where applicable, carers of the participants attended sessions and received training on how to support participants. Anthropometric measures were taken at baseline, 3 and 6 months. Participants in the groups and group facilitators were also interviewed.

**Results:** At 3 months, Shape Up-LD participants were 0.34kg lighter than those who had received Usual Care (95% CI –2.38kg, 1.69kg). At 6 months this difference had increased to –0.53kg (95% CI –4.34kg, 3.24kg). Participants and carers were positive about the programme and gave examples of behaviour change, though some wanted more practical elements to be included. Facilitators liked the programme but were frustrated with carers who did not support participation in the group or behaviour change despite the training given.

**Conclusion:** Shape Up LD may be beneficial for weight loss. Although the observed difference in this pilot was small, weight loss appeared to continue even after the groups had finished. There was enthusiasm for the groups among those involved, but more work may be needed to develop stronger interventions that better manage the role of carers.

**Acknowledgement:** This study was funded by the National Institute for Health Research (NIHR) under its Research for Patient Benefit (RfPB) Programme.

**T4-PO.035**

**The effect of weight on cognitive function**

Mullen M.1, Abbott J.2, Skelton F., Cleator J.3

1School of Psychology, University of Central Lancashire, Preston, United Kingdom,
2School of Life, Sport and Social Sciences, Edinburgh Napier University, Edinburgh, United Kingdom,
3School of Nursing, Midwifery and Social Work, University of Manchester, Manchester, United Kingdom

**Introduction:** There is some evidence that poor neurocognitive ability and conditions such as Alzheimer’s disease may be associated with obesity. A few studies, predominantly in clinical settings, demonstrate poorer executive function in obese adults. Executive functions are high level cognitive mechanisms that manage everyday thinking and behaviour; however, measurement has been problematic and has lacked a theoretical foundation. Using Miyake et al’s (2000) model of executive function this work (a) assessed the feasibility of employing a range of cognitive tests in a community setting and (b) the association between weight and cognitive function.
Methods: A mixed method sampling strategy was employed to collect cross-sectional data from a community sample (e.g. workplaces, community centres). Cognitive tests that reflected the main executive functions were designed and piloted. Four cognitive tests were used in the study. Height and weight were measured and self-reported depression (CES-D), demographic and clinical variables were obtained. Individuals were classified using the 5 traditional BMI groups.

Results: Three-hundred and fifteen individuals, aged 18 – 65 years, were recruited to the study (mean age 38 years; 55% female; 61% employed). Underweight and obese/morbidly obese individuals demonstrated deficits on tests of memory and cognitive processing when compared with normal weight individuals, when controlling for age and depression.

Conclusion: Having a healthy BMI appears to provide a cognitive advantage. Further data collection and statistical modelling is required to control for other potentially key demographic and clinical confounding variables. Whether deficits on these cognitive tests translate into deficits in everyday tasks also warrants attention.

T4-PO.036
Do patients with mental health conditions or learning difficulties that attend the Rotherham Institute for Obesity lose weight?

Steele C., Capehorn M.1

1Rotherham Institute for Obesity

Introduction: The Rotherham Institute for Obesity (RIO) is a specialist centre for weight management with a multidisciplinary team approach, based in a primary care setting. The commissioned contract did not require that RIO saw any patient with severe mental health conditions, learning difficulties, or anyone else that might be deemed to struggle with engagement with the service or understanding of the information/support provided. However, the MDT agreed to see these patients and this study is the first analysis of whether these cohorts of patients respond to the specialist weight management services offered at RIO.

Methods: A retrospective analysis of adult data during the 12 months during 2013 was performed and patients identified with the specified conditions that might be classified as severe mental illness or learning difficulties. A further breakdown of these patients was also performed in order to see if there was any variation in success with specific conditions. Further analysis of weight loss was performed and other markers of success including bio-impedence and blood tests.

Results: 54 patients with severe mental health illnesses or learning difficulties attended RIO during the period analysed. Of these, 36 (66.7%) did not complete the full 6 month RIO weight management programme, which was higher than the normal average drop out rate for completion at RIO (approximately 50%). 18 patients did complete the full 6 month RIO programme and of these 15 (83%) were successful at losing weight.

Conclusion: Patients attending RIO who are classified as having severe mental health problems, and/or learning difficulties, can lose weight with the support of a specialised weight management service.

T5 – Pregnancy

T5-PO.001
Stability and change in BMI, self-esteem, eating and body satisfaction during and after pregnancy: A cross cultural comparison of Israeli and UK women.

Shlomn N.1, Rudolf M.2, Feitbauer R.3, Hetherington M.1

1Institute of Psychological Sciences, University of Leeds, Leeds LS2 9JT, UK,
2Faculty of Medicine in the Galil, Bar Ilan University, Safed, Israel,
3Centre for Epidemiology and Biostatistics, Leeds Institute for Genetics Health

Introduction: Maternal body mass index (BMI) is associated with negative body image and restrained eating which are experienced differently across cultures. The present study explored if levels of self-esteem, eating behaviours and body satisfaction change from early pregnancy to 24 months following birth. An additional aim was to identify if such measurements vary according to country and BMI.

Methods: 73 women from Israel and the UK participated in the study. Data were collected every six months and women completed questionnaires assessing self-esteem (RSEQ), body image (BIS/BIDQ) and eating behaviours (DEBQ). Women reported their weight and height and BMI were calculated. Regression modelling was used to account for changes and to assess the independent impact of BMI on outcomes.

Results: Self-esteem remained stable across follow-ups and did not differ according to country. As mothers' BMI increased they ate more according to emotional cues and were less satisfied with their body. Findings from this study note that BMI was the strongest predictor for self-esteem, eating behaviours and body satisfaction.

Conclusion: The period after pregnancy is a key time to investigate how well women adjust to motherhood. Future research should aim to continue and explore mothers' well-being, eating behaviours and body satisfaction in the immediate time postpartum, but also how well women adjust to such changes over time.

T5-PO.002
Patterns of prenatal growth and skinfold thickness at birth

Norris T.1, Johnson W.2, West J.3, Wright J.3, Cameron N.1

1School of Sport, Exercise & Health Sciences, Loughborough University, UK,
2MRC Human Nutrition Research Unit, Cambridge, UK,
3Bradford Institute for Health Research, Bradford, UK.

Introduction: Identify whether patterns of restricted or rapid fetal growth are related to skinfold thickness at birth.

Methods: Multilevel models were used for the modelling of fetal and postnatal growth from the Born in Bradford (BiB) cohort. Fitted values and Z-scores were produced at 20, 30, 40 prenatal weeks. Restricted and rapid growth were defined as a change in conditional Z-score in the fetal period of <-0.67 and >0.67, respectively. ANOVAs and linear regression (adjusted for weight at birth) were used to test for differences in subcapsular and triceps skinfold thickness and the centripetal fat ratio at birth, by type of prenatal growth.

Results: Neonates who had experienced restricted fetal growth had significantly smaller subcapsular and triceps skinfold thickness compared to those with normal or rapid fetal growth. Rapid fetal growth was also associated with significantly thicker skinfold thickness compared to normal fetal growth. After adjusting for weight at birth, these associations were attenuated and became non-significant. There were no significant differences in the centripetal fat ratio between any of the types of fetal growth, before or after adjustment for size at birth.

Conclusion: Periods of restricted or rapid fetal growth were associated with differences in skinfold thickness at birth. However, adjusting for size at birth resulted in differences being attenuated to the null, suggesting that independent effects of reduced or rapid fetal growth in a particular period of time were not apparent. Furthermore, a tendency to deposit fat centrally was not associated with any particular pattern of fetal growth.
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Abstracts

T5:PO.003

Extreme obesity in pregnancy and the association with preterm and postdate birth: A national study of births in england, uk

Slack E.1, Best K.1, Rankin J.1, Heslehurst N.1

1Institute of Health & Society, Newcastle University, Newcastle upon Tyne, UK

Introduction: Extreme obesity (BMI≥50kg/m²) represents the smallest subgroup of maternal obesity (BMI≥30kg/m²) with an incidence of 0.1%. However, it is increasing at a rapid rate and significantly associated with adverse perinatal outcomes(12). Preterm (<37 weeks) and postdate (≥42 weeks) births incur increased perinatal risk for mother and baby. There is an evidence-base for the association between maternal obesity and preterm or postdate birth, but a lack of research on the association with extreme obesity.

Methods: Secondary analysis of existing data on 531,219 singleton live births in 16 UK maternity units from 1990–2007 was undertaken. Logistic regression controlled for gestation at booking, ethnic group, parity, deprivation, maternal age and employment. Adjusted odds ratios (AORs) were produced for preterm and postdate births. Analysis of preterm subgroups included moderate (32–36 weeks) and very/extreme preterm birth (20–31 weeks; including births below the limit of viability <24 weeks).

Results: Following exclusions for missing data, 392,530 births remained. Compared to recommended BMI (18.5–24.9kg/m²), extreme obesity was significantly associated with preterm (AOR 1.9 95%CI 1.5–2.6) and postdate birth (AOR 1.8 95%CI 1.3–2.5). Subgroup analyses identified the greatest association with very/extreme preterm birth (AOR 2.1 95%CI 1.1–3.7).

Conclusion: Maternal extreme obesity was significantly associated with an increased risk of preterm and postdate birth. The association was greatest between extreme obesity and very/extreme preterm birth. This preterm birth subgroup has the greatest risk for the baby, including gestational age at delivery below the limit of viability.

Acknowledgement: Research relating to this abstract was funded by a UK Medical Research Council I+3 PhD studentship

References:
1. Heslehurst et al IJO 2010:34.

T5:PO.004

Relations between weight change before and during pregnancy: Data from the national elfe cohort

Jacotot M.1,2, Forhan A.1, Charles M.A.1, Heude B.1

1INSERM, UMR1153 Epidemiology and Biostatistics Sorbonne Paris Cité Center (CRESS), Team,
2University Paris-Sud, France.

Introduction: Several studies suggested a beneficial effect of weight loss before pregnancy in obese women in regard to pregnancy complications.

Methods: We studied the associations of weight change and dietary restriction in the year before conception with gestational weight gain, globally and by BMI category at conception, in 14077 mothers of the Elfe national French birth cohort. We excluded cases of pregestational diabetes or hypertension.

Results: Women who were obese at the beginning of pregnancy (9.1%) gained less weight during pregnancy than non-obese women (8.4 ± 7.3 vs 13.6 ± 4.9 kg, p < 0.0001). They also declared dieting in the year before pregnancy (29.4%) more often than non-obese women (12.2%, p < 0.0001). In multivariable analyses, women who lost more than 5 kg in the year before pregnancy were younger, had a higher BMI, were more often smokers and multiparous (p < 0.0001). Women who declared dieting in the year before pregnancy had higher BMI and economic and educational status, were more often born in France and employed (p < 0.0001). Regardless of maternal BMI right before pregnancy, women who lost more than 5 kg the year before pregnancy experienced higher gestational weight gain than the others (13.4 vs 11.9 kg for women with stable weight over the period, for example, global p < 0.0001), as did women who dieted before pregnancy (13.7 vs 11.8 kg, p < 0.0001). A similar pre-pregnancy weight loss had higher impact on gestational weight gain when associated with dietary restriction (interaction p: 0.003).

Conclusion: Almost 30% of obese women tried to lose weight in the year before pregnancy. Regardless of maternal nutritional status, pre-pregnancy weight loss, especially if voluntary, seems to induce a compensatory response resulting in higher gestational weight gain.

Acknowledgement: The Elfe cohort was funded by the French National Research Agency (ANR), program "Investments for the Future": reference ANR-11-EQPX-0038.

T5:PO.005

Implications of pregestational overweight and obesity on the lipid and glucometabolic profile during pregnancy

Bozkurt L.1, Göbl C.S.1, Hörmayer A.T.1, Luger A.1, Baumgartner-Parzer S.1, Kautzky-Willer A.1

1Department of Internal Medicine III, Division of Endocrinology and Metabolism, Unif of Gender Medicine, Medical University of Vienna, Vienna, Austria,
2Department of Obstetrics and Gynecology, Division of Feto-Maternal Medicine, Medical University of Vienna, Vienna, Austria

Lipid alterations during gestation are suggested to impact obesity and GDM associated adverse pregnancy outcomes. The objective is to assess longitudinal changes in serum lipids during pregnancy in women with different degrees of obesity under special consideration of the glucometabolic status. 208 pregnant women stratified by preconceptional BMI (normal weight with BMI<25: n=89 (42.8%), overweight with BMI 25–29.9: n=59 (28.4%), obese with BMI-30: n=60 (28.8%)) underwent an 75g-2h-OGTT ≤21st gestational week (visit 1). Final diagnosis was performed in GW 24–28 (IADPSG criteria: 129 NGT, 79 GDM). An additional blood drawn for the assessment of glucometabolic and lipid profile was performed in visit 1 and at further three visits until delivery. OGTT data were used to estimate insulin sensitivity. GDM prevalence was related to degree of obesity (normal weight: 25.8%, overweight: 40.7%, obese: 53.3%, p = 0.003). At baseline obese and overweight women showed already elevated levels of triglycerides (TG, p < 0.001) and hsCRP (p < 0.001) and decreased HDL-C values (p = 0.01), whereas total cholesterol (TC) and LDL-C were comparable between the groups. In relation to visit 1 all lipid parameters showed a significant increase in the whole group. However, the increase in serum lipid concentrations was less pronounced in overweight and obese compared to normal weight subjects (LDL-C: p = 0.006, TC: p = 0.002, TG: p = 0.002). These differences were independent of baseline insulin resistance and GDM status. Regarding fetal outcome maternal obesity was associated with higher birth weight (percentiles of gestational age). Although lipids were not correlated to birth weight there was a significant association with preconceptional BMI and insulin resistance during pregnancy. Decrease of pregnancy induced hyperlipidemia in obese and overweight women is independently prevalent of glucose disorders. Further studies on the effect of maternal metabolism on fetal outcome is needed.

Fig. 1. Trajectories of total cholesterol during pregnancy in women categorized by preconceptional BMI: normal weight (BMI<25), overweight (BMI 25–29.9), obese (BMI≥30)
**Determination of relationship between prepregnancy maternal body mass index and gestational diabetes mellitus**

Ede G.1, Samur G.1, Demirkol K.F.2, Keskin U.1
1Department of Nutrition and Dietetics, Hacettepe University, Ankara, Turkey.
2Gulhane Military Medical Academy Hospital, Ankara, Turkey

**Introduction:** Increasing of obesity among women of reproductive age may contribute to the occurrence of gestational diabetes mellitus (GDM). Aim of this study was to examine the relationship between maternal prepregnancy body mass index (BMI), weight gain during pregnancy and improving GDM in pregnant women.

**Methods:** Forty women with GDM and 40 healthy women as a control group were recruited from the Department of Obstetrics and Gynecology. Exclusion criteria were pre-GDM, polycystic ovary syndrome, kidney disease, thyroid disease, history of GDM, multiple pregnancy. GDM was diagnosed with two-step oral glucose tolerance test. BMI was calculated from weight and height and categorized according to the WHO classification.

**Results:** The average maternal age was 32.1 ± 4.9 years among cases and 28.7 ± 4.9 years among controls. Maternal weight gain was higher in the GDM group than in the control group (16.9 ± 4.33 kg versus 14.4 ± 4.61 kg, p < 0.05). Women with GDM had a high BMI (mean 26.4 ± 5.73 kg/m²) than healthy women (22.6 ± 3.56 kg/m²) and the difference between the two groups was statistically significant (p < 0.05). In the case group 22.5% of women were obese while in the control group 2.5% of women were obese (p < 0.05). Women’s prepregnancy BMI was significantly positive correlated with the risk of GDM (r=0.381, p = 0.000).

**Conclusion:** Higher prepregnancy BMI is correlated positively with improving GDM. Gestational weight gain is a significant risk factor for GDM in the overweight or obese patients but not in patients who were underweight or had a normal BMI before pregnancy.

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**Patterns of pre-pregnancy BMI and gestational weight gain in West Sumatra, Indonesia and their effects on pregnancy outcomes**

Solimani H1, Fair F1, Liputo I1, Klner K1
1Sheffield Hallam University, UK.
2Andalas University, Indonesia

**Introduction:** Indonesia is currently experiencing a nutrition transition, where obesity is increasing while malnutrition has not yet been defeated. Energy deficiency, obesity and gestational weight gain (GWG) all impact on pregnancy outcomes, which are known to influence the future development of obesity and metabolic disorders.

**Objective:** The objectives were to determine the pattern of body mass index (BMI) and GWG in a sample of Indonesian pregnant women and to identify the associated pregnancy outcomes.

**Methods:** Between August and December 2010, 1013 women in Indonesia were enrolled into the study. Birth weight data was available for 579 women.

**Results:** Under-nutrition (BMI<18.5kg/m²) in pregnancy in Indonesia was high at 19.6% and the proportion of women who were overweight (BMI≥25.0kg/m²) or obese (BMI≥30.0kg/m²) was 13.0% and 1.6% respectively. In pregnancy 50.6% of women gained too little weight according to the IOM guidelines. Weight gain in accordance with IOM guidance reduced the outcomes of small for gestational age (SGA) and large for gestational age (LGA). Macrosomia increased significantly with increasing pre-pregnancy BMI and weight gain above the IOM recommendations. Multivariate analysis showed GWG increased with increasing maternal education and in those living in urban rather than rural areas and GWG decreased with increasing pre-pregnancy weight. Birth weight was found in multivariate analysis to increase with increasing maternal age, height, prepregnancy weight and GWG and to be greater in women living in rural than urban areas.

**Conclusions:** To improve maternal and infant outcome there is a need to ensure adequate weight prior to pregnancy and for maternal education, especially in relation to appropriate weight gain in pregnancy.

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**Blood cell transcriptomic-based early biomarkers of adverse programming effects of gestational calorie restriction and their reversibility by leptin supplementation**

Konieczna J1, Sánchez J1, Palou M1, Picó C1, Palou A1
1Laboratory of Molecular Biology, Nutrition and Biotechnology (Nutrigenomics), University of the Balearic Islands and CIBER Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Palma de Mallorca, Spain

**Introduction:** Moderate maternal undernutrition during gestation in rats may program the offspring to develop later pathologies. Oral administration of physiological doses of leptin throughout lactation could revert
some of these alterations. Using these animal models, we aimed to identify early transcriptome-based biomarkers, indicators of both programmed susceptibility to later disorders and response to neonatal leptin treatment in peripheral blood mononuclear cells (PBMCs), an easily accessible surrogate tissue.

**Methods:** Male and female rats belonging to 3 groups were studied: the offspring of ad libitum fed dams (controls), the offspring of 20% calorie restricted dams during the first part of pregnancy (CR), and CR rats supplemented with physiological doses of leptin throughout lactation (CR-Leptin). Animals were sacrificed on postnatal day 25 and PBMCs were isolated. Whole genome microarray analysis was performed in PBMCs from male rats.

**Results:** 224 known genes were differentially expressed between control and CR animals (p≤0.01). Leptin treatment in CR males normalised the expression of 218 of these genes to control levels; 22 of them were fully reversed (p≤0.01). Of these 22 genes, q-PCR analyses in PBMCs from males and females revealed Crmp1, Gla, Gls, Lrp11, Paox, Tmbb4x and Ubash3b as particularly interesting, because increased expression levels found in CR pups were totally reversed by leptin treatment in both genders.

**Conclusion:** Leptin supplementation throughout lactation is able to revert most of the transcript-based potential early biomarkers identified in PBMCs associated to undernutrition during pregnancy. These markers may be useful for early identification and subsequent monitoring of individuals who are at risk of later diseases and would specifically benefit with the intake of appropriate amounts of leptin during lactation.

**Acknowledgement:** The research leading to these results was supported by the Spanish Government (grant AGL2012-33692), the European Union’s Seventh Framework Programme FP7/2007-2013 under grant agreement n. 244995 (BIOCCLAIMS Project), and the Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red Fisiopatología de la Obesidad y Nutrición, CIBEROBN.

**T5 – Fetal programming/epigenetics**

**T5.PO.010**

**Association of excessive gestational weight gain, using the iom criteria, with adiposity of their offspring: Systematic review**

Perez-Morales M.E.1, Bacardi-Gascon M.2, Jiménez-Cruz A.2

1Facultad de Ciencias Químicas e Ingeniería, Universidad Autónoma de Baja California, Tijuana B.C., México.
2Facultad de Medicina y Psicología, Universidad Autónoma de Baja California, Tijuana, B.C., México.

**Introduction:** Excessive gestational weight gain (GWG) during pregnancy is associated with an increase in adiposity indicators and metabolic disorders of the offspring. The objective of this review was to analyze the association of excessive GWG in prospective studies, using the Institute of Medicine (IOM) criteria, with the adiposity indicators and metabolic diseases of their offspring.

**Methods:** An electronic search was conducted in the MEDLINE/PubMed, EMBASE, and CINAHL databases from January 2004 to September 2014. Selection was restricted to prospective studies, using IOM criteria as definition of GWG. In total 1312 potential related studies were identified. After screening, 126 full papers were reviewed, and five papers met the inclusion criteria.

**Results:** The offspring age at assessing time ranged from 5 to 21 years. Only one study conducted in 21yo showed an association between excessive GWG with obesity and metabolic diseases of their offspring; one including 2 to 20yo, showed an association with child overweight; one at nine years of age show that greater GWG was associated with greater adiposity and adverse cardiovascular risk factors; one study of 5yo children showed an association of excessive GWG with an increase in child BMI Z-score among normal and overweight mothers, and one study of 5yo children showed an association between excessive GWG with overweight in non-overweight mothers.

**Conclusions:** All studies among normal weight mothers consistently showed an association of excessive GWG with adiposity indicators or other components of the metabolic syndrome early in life, during adolescence or adulthood. However, due to the age range of those studies it is warranted more long term studies that confirm this association among adult offspring.

**T5.PO.011**

**Maternal intake of a cafeteria diet during lactation in rats leads to a thin-outside-fat-inside (tofi) phenotype in the offspring**

Pomar CA.1, Van Nes R.1, Sánchez J.1, Picó C.1, Keijer J.1, Palou A.2

1Laboratory of Molecular Biology, Nutrition and Biotechnology (Nurigenomics), University of the Balearic Islands and CIBER Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Palma de Mallorca, Spain.
2Human and Animal Physiology, Wageningen University, Wageningen, The Netherlands.

**Introduction:** We aimed to assess, in rats, the influence of maternal intake of a cafeteria diet during lactation on the lasting metabolic effects in their offspring.

**Methods:** Dams were fed with a standard chow (control) diet or a cafeteria diet throughout lactation. After weaning, the offspring were fed with control diet until the age of 15 weeks and body weight was followed. Circulating triglycerides (TG) and free fatty acids (NEFA) were measured under ad libitum feeding and 14h fasting conditions at weaning and at 13 weeks of age. At this latter age, an oral glucose tolerance test (OGTT) was also performed.

**Results:** Maternal cafeteria diet feeding during lactation resulted in a lower body weight of their offspring (both in males and females), which was already significant at the age of 6 days and was persistent when animals were growing (until the age of 8 weeks in males and 15 weeks in females). Notably, despite the lower body weight, the offspring of cafeteria diet fed dams showed greater fat accumulation than controls at both ages studied. They also displayed, at weaning, higher circulating TG levels, both under feeding and fasting conditions, and higher circulating levels of NEFA under feeding conditions. At 13 weeks, the hypertriglyceridemia was still present in males, and circulating NEFA levels remained higher in females. Moreover, offspring of cafeteria diet fed dams presented an altered glycemic response to an OGTT.

**Conclusion:** The intake of a cafeteria diet during lactation in rats produces permanent consequences in the metabolic health of their offspring, which are associated with greater fat accumulation, without higher body weight: the so-called thin-outside-fat-inside (TOFI) phenotype.

**Acknowledgement:** This work was supported by the Spanish Government (AGL2012-33692), and the Instituto de Salud Carlos III, Centro de Investigación Biomédica en Red Fisiopatología de la Obesidad y Nutrición, CIBEROBN.

**T5.PO.012**

**Leptin intake in suckling rats restores altered t3 levels and markers of adipose tissue sympathetic drive and function caused by gestational calorie restriction**

Konieczna J.1, Palou M.1, Sánchez J.1, Picó C.1, Palou A.1

1Laboratory of Molecular Biology, Nutrition and Biotechnology (Nurigenomics), University of the Balearic Islands and CIBER Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Palma de Mallorca, Spain.

**Introduction:** Maternal calorie restriction during gestation in rats has been associated with altered white adipose tissue (WAT) sympathetic innervation and function in offspring. Here, we aimed to investigate whether supplementation with oral leptin (a breastmilk component) throughout lactation may revert the aforementioned adverse programming effects.

**Methods:** Three groups of male and female rats were studied: postnatal day 25: the offspring of control dams, the offspring of 20% calorie-restricted dams during pregnancy (CR), and CR rats supplemented with...
physiological doses of leptin throughout lactation (CR-Leptin). Tyrosine hydroxylase (TH) levels and its immuno-reactive area, and mRNA expression levels of lipid metabolism-related genes and of deiodinase iodothyronine type II (Dio2) were determined in WAT. Triiodothyronine (T3) levels were determined in blood.

Results: In CR males, leptin treatment restored the decreased TH levels and its immuno-reactive area in WAT, and partially normalized expression levels of genes related to lipolysis and fatty acid oxidation (adipose triglyceride lipase, hormone-sensitive lipase, carnitine palmitoyltransferase 1b, and peroxisome proliferator-activated receptor gamma coactivator 1-alpha). Leptin treatment also reverted the decreased T3 plasma levels and WAT lipoprotein lipase mRNA levels occurring in CR males and females, and the decreased Dio2 mRNA levels in CR females.

Conclusions: Leptin supplementation throughout lactation reverts the malprogrammed effects on WAT structure and function induced by undernutrition during pregnancy. These findings support the relevance of the intake of leptin during lactation, bearing clear characteristics of essential nutrient, and provide a strategy to treat and/or prevent the programmed trend to obesity acquired by inadequate fetal nutrition.

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T5.PO.014

Obesity predisposition in rats caused by maternal dietary obesity is avoidable by normalizing the diet before mating

Castro H.1, Sánchez J.1, Picó C.1, Palau A.1
1Laboratory of Molecular Biology, Nutrition and Biotechnology (Nutrigenomics), University of the Balearic Islands and CIBER Fisiopatología de la Obesidad y Nutrición (CIBERobn), Palma de Mallorca, Spain.

Introduction: Maternal obesity during pregnancy and lactation predisposes offspring to obesity and other metabolic disorders in adulthood. Here we studied in rats whether the expected detrimental effects in the offspring associated to maternal dietary obesity may be reverted by the removal of the obesogenic diet before mating.

Methods: Female rats were fed a cafeteria diet (CD) from days 10 to 100 of life and then a standard diet (SD) (post-cafeeteria dams). A parallel control group of female rats fed with SD were included. One month after removal of CD, female from control and post-cafeeteria groups were mated with males. At weaning, offspring of control and post-cafeeteria dams were fed with SD until 4-months of age, and then with SD or western diet (WD) until 6-months of age.

Results: Rats fed on a CD had higher body weight and body fat content than controls. The removal of the CD produced a reduction in body weight and body fat content, although both parameters remained 8% and 13% higher, respectively, in post-cafeeteria dams than in controls at mating. During lactation, no differences were observed between both groups concerning body weight; however, post-cafeeteria dams showed higher body fat content and higher leptin levels in serum and milk than controls. Notably, from the 9th week of life onwards, offspring of post-cafeeteria dams displayed lower body weight than controls; they also showed a lesser increase in body weight and body fat content than offspring of control dams after 2-months exposure to a WD.

Conclusion: Removal of CD in obese rats before gestation, although without complete reversion of body weight excess, may prevent the detrimental effects in the offspring associated to maternal obesity. Moreover, it is suggested that the greater protection of the offspring of post-cafeeteria dams against fat accumulation in adulthood, particularly when exposed to an obesogenic diet, might be related to the intake of greater amounts of leptin during the suckling period.

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T5.PO.013

Maternal obesity during pregnancy affects offspring telomere length at birth and in later life

Guzzardi M.A.1, Salonen M.1, Eriksson J.G.1, lazzo P.1
1Institute of Clinical Physiology, National Research Council (CNR), Pisa, Italy; 2National Institute for Health and Welfare, Helsinki, Finland; 3University of Helsinki, Helsinki, Finland

Introduction: We have shown that maternal obesity is associated with cardio-metabolic diseases in the adult offspring [1]. Overflow of nutrients and inflammatory molecules through the placenta during foetal development has been suggested as a causal mechanism. We aimed to investigate the association between maternal pregnancy body mass index and offspring early age by the assessment of their telomere length (TL) at birth and in adult life.

Methods: Leukocyte TL was measured in 80 newborn offspring (maternal BMI range 18.6–38.7 kg/m²) and in a cohort of 1082 subjects aged 67–79 years (maternal BMI range 18.6–38.7 kg/m²). All subjects underwent anthropometric, metabolic and inflammatory characterization. Information on general health and diseases were collected.

Results: Overweight/obese mothers with high pregnancy weight gain gave birth to offspring with shorter TL at birth compared with offspring born to mothers in whom BMI (p = 0.02) or weight gain (p = 0.03) was high. Increased maternal inflammatory TNF-alpha (p = 0.07) and MCP-1 (p = 0.03) levels were detected in the group with shorter offspring TL. In the adult cohort, a negative correlation was observed between maternal pregnancy BMI and TL in the female offspring (p = 0.04). Moreover, in the adult population short TL was a marker of worse health conditions (p = 0.05), type 2 diabetes (p = 0.04), history of myocardial infarction (p = 0.02), angina pectoris (p = 0.03), and high waist circumference (p = 0.004) and weight (p = 0.001).

Conclusion: We conclude that high BMI and excessive weight gain during pregnancy are associated with an increased inflammatory state and shorter offspring TL at birth extending into late adulthood, when short TL relates to metabolic and cardiovascular disease.

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T5.PO.015

Maternal consumption of High Esterified Pectins during pregnancy and lactation and protection from obesity and related disorders in the offspring

Rodríguez A.M.1,2, García-Carrizo F.1,2, Palau A.1,2
1CIBER Fisiopatología de la Obesidad y Nutrición, 2Laboratory of Molecular Biology, Nutrition and Biotechnology (University of the Balearic Islands), Palma de Mallorca, Spain

Prebiotics can modulate the composition of gut microbiota of progeny. We aimed to study the offspring effects of supplementation of rat dams with high esterified pectins (HEP), during the second half of pregnancy and throughout lactation, studying protection effects against obesity. Dams were fed with normal or 5% HEP supplemented diet from day 12 of pregnancy until the end of lactation. At day 25, weight and adiposity (by Echo MRI) of male and female progeny of control or pectin supplemented dams (offspring: C and P respectively) were measured; after sacrifice, tissue samples were collected. Blood levels of insulin, leptin, glucose, irisin and FGF21 were measured. Immunohistochemistry analysis of the brown adipocyte marker UCP1 was performed in inguinal white adipose tissue (iWAT). At 4 months, half of animals of each group were fed an obesogenic Western Diet (WD). Biometrical parameters were followed. At 6 months, general blood parameters were measured under fed and fasted conditions. At day 25, P animals showed increased insulin and decreased...
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Abstracts

T5:PO.016

Structural changes on bone a in male rat offspring depending on maternal diet
Perić Kačarević Ž.1, Snajder D.1, Marić A.1,1, Bijelić N.1, Radić R.1, Seitafer R.1
1Department of Anatomy and Neuroscience, Faculty of Medicine, University of Osijek, Osijek, Croatia,
2Clinical Institute of Nuclear Medicine and Radiation Protection, University Hospital Osijek, Osijek, Croatia,
4Department of Physical Medicine and Rehabilitation, University Hospital Osijek, Osijek, Croatia,
5Department of Histology and Embryology, Faculty of Medicine, University of Osijek, Osijek, Croatia

Introduction: Obesity as an epidemic problem induces many diseases including the metabolic syndrome. It causes low-grade systemic inflammation, which can also affect bone architecture. Proinflammatory cytokines are key mediators in osteoclast differentiation and bone resorption through the RANKL/RANK/OPG pathway. In our study we compared bone microstructure and TNF-α bone expression in animal subjects in dependence to diet exposed to in utero, during lactation and after lactation.

Methods: Ten female Sprague Dawley rats, nine weeks old, were randomly divided in two groups and fed either a control diet or food rich in saturated fatty acids during five weeks, and then mated with genetically similar male subjects. After birth and lactation male offspring rats from both groups were randomly divided in four groups depending on the diet they were fed until twenty-two weeks of age. Body weight throughout the experiment was measured and body mass index was calculated, total cholesterol, triglyceride level, IL-6 and TNF-α in serum were measured. Bone microstructure was analyzed in fifth lumbar vertebra (n=24) using digital photographic images. TNF-α expression was measured in bone samples using immunohistochemistry.

Results: The offspring of healthy female rats fed with high content of saturated fatty acid food (HFD) and the other one with standard laboratory chow (CD). Offspring from both groups were randomly divided in two subgroups after coupling and lactation period, subsequently there were four groups of offspring (n=6 each) with different feeding protocol: a) CD-CD – control diet mothers and offspring, b) CD-HFD – control diet mothers and high fat diet offspring, c) HFD-CD – high fat diet mothers and control diet offspring and d) HFD-HFD – high fat diet mothers and offspring. At the age of 18 weeks in female offspring bone microstructure was analyzed in fifth lumbar vertebra using digital photographic images.

Conclusion: Maternal nutritional status affects the future bone development of female offspring.

T5:PO.017

Changes in nutrition type between generations influence on bone structural changes in female offspring
Marić A.1,1, Perić Kačarević Ž.1, Vrselja Z.1,1, Radić R.1
1Department of Anatomy and Neuroscience, Faculty of Medicine, University of Osijek, Osijek, Croatia,
2Department of Physical Medicine and Rehabilitation, University Hospital Osijek, Osijek, Croatia,
3Department of Radiology, University Hospital Osijek, Osijek, Croatia

Introduction: It is believed that changes in feeding protocol between generations have influence on the balance of the whole organism. Epidemiological studies suggest that skeletal growth is programmed during intrauterine and early postnatal life. The aim of the study was to determine impact of maternal dietary fat excess and nutrition of female offspring on the bone structural changes.

Methods: Ten female Sprague Dawley rats were randomly divided in two groups. One group was fed with high content of saturated fatty acid food (HFD) and the other one with standard laboratory chow (CD). Offspring from both groups were randomly divided in two subgroups after coupling and lactation period, subsequently there were four groups of offspring (n=6 each) with different feeding protocol: a) CD-CD – control diet mothers and offspring, b) CD-HFD – control diet mothers and high fat diet offspring, c) HFD-CD – high fat diet mothers and control diet offspring and d) HFD-HFD – high fat diet mothers and offspring. At the age of 18 weeks in female offspring bone microstructure was analyzed in fifth lumbar vertebra using digital photographic images.

Results: The control diet female offspring of high fat fed mothers showed the highest values of trabecular thickness and trabecular number, while the CD-HFD offspring group had the highest values of trabecular separation and cortical thickness.

Conclusion: Infant eating behaviours- impact of age, maternal BMI and country
Shlaim M.1, Rudolf M.2, Feltbower R.1, Mohabati L.1, Hetherington M.1
1Institute of Psychological Sciences, University of Leeds, Leeds LS2 9JT, UK,
2Faculty of Medicine in the Galil, Bar Ilan University, Safed, Israel,
3Department of Epidemiology and Biostatistics, School of Medicine, University of Leeds, Leeds LS2 9JT, UK,
4Brigton and Sussex Medical School, Brighton, East Sussex, BN1 9PX.

Introduction: Rapid weight gain in infancy is positively associated with the development of later obesity. The present study aimed to address maternal perception of babies eating behaviours. Specific objectives were if mothers’ perceptions of their babies eating vary according to babies’ age, country and BMI. As mother’s well-being and satisfaction with body affect their own eating behaviours, this study explored if such associations affect mothers’ perceptions of babies’ eating.

Methods: 73 women and babies from Israel and the UK participated in a two years follow-up study. Data were collected every six months. Women filled out questionnaires assessing eating/ feeding behaviours, maternal wellbeing and satisfaction with body. Regression modelling was used to account for change and to assess the independent impact of BMI on outcomes.

Results: Healthy-weight mothers were more aware of their infant’s satiety cues whereas overweight and obese mothers were more likely to feed according to a schedule. UK mothers were more concerned for their babies hunger than Israeli counterparts. Mothers with high levels of self-esteem were more aware of their infants’ satiety cues. Mothers who were dissati-
fied with their body were more concerned for their baby being overweight or overeating.

**Conclusion:** Strong associations were identified between maternal psychological characteristics (including eating behaviours) and babies' eating behaviours.

**T5:PO.019**

**Prevalence of overweight and obesity and growth patterns in czech breastfed children**

Paulová M.1, Vignerová J.1, Shriver L.2, Riedlová J.3

1Department of Children and Adolescents, National Institute of Public Health, 100 42 Prague 10, Czech Republic,
2Department of Nutrition, University of North Carolina Greensboro, NC, 27412, USA,
3Department of Anatomy, 3rd Faculty of Medicine, Charles University, 100 00 Prague 10, Czech Republic

**Introduction:** Breastfeeding is considered to be one of the fundamental factors in children's obesity prevention. Because growth references are important for children's weight and nutritional status assessment, understanding potential practical consequences when using available tools is critical. Material and methods: In the Czech Republic, longitudinal data from a total sample of more than 1700 breastfed children aged 0 - 18 months were collected to assess prevalence of overweight and obesity. To compare a growth pattern of Czech breastfed children with the current WHO growth standards (2006) as well as with the Czech references (1991,2001) the sample of 960 Czech breastfed children was subsequently selected using the same criteria as in the WHO MGRS study.

**Results:** The prevalence of overweight and obesity in the sample of Czech breastfed children was significantly lower compared to the reference population. This difference was statistically significant at the age of 6 months and the number of obese and overweight breastfed children further decreased with age. Thus only 0.7% children fed according to the WHO recommendation (i.e. exclusively breastfed for 6 months) were diagnosed as obese at 18 months. Czech breastfed infants were longer with a greater head circumference at all percentiles compared to WHO standards and were similar to national references. The percentile weight-for-age and weight-for-length values of Czech breastfed infants differed from both the WHO standards as well as the national references. The differences compared to the current Czech references were smaller than differences compared to the WHO standards.

**T5:PO.020**

**Determinants of weight gain during the first two years of life - the gecko drenthe birth cohort**

Küpers L.K.1, L’Abée C.1,2, Bocca G.2, Stolk R.P.1, Sauer P.J.2, Corpeleijn E.1

1Department of Epidemiology, University Medical Center Groningen, University of Groningen, the Netherlands,
2Department of Pediatrics, Beatrix Children’s Hospital, University Medical Center Groningen, University of Groningen, the Netherlands

**Background:** Rapid weight gain in infancy is known to be related to childhood obesity. It is not clear exactly which period in infancy is most important for the development of overweight. To explain weight gain in the first two years of life, the predictive values of individual factors were compared within four different domains: prenatal, nutrition, lifestyle and socioeconomic factors.

**Methods:** In a Dutch population-based birth cohort, length and weight were measured in 2473 infants at 1.6, 12 and 24 months. Determinants were retrieved from medical files and parental questionnaires. Factors were compared with linear regression to best explain differences in weight gain, defined as changes in Z-score of weight-for-age and weight-for-length over 1–6, 6–12 and 12–24 months.

**Results:** Birth weight (prenatal domain) and type of feeding (nutritional domain) were most importantly related to weight gain in the first six months, see Figures 1–4. From six months onwards, the ability to explain differences in weight gain decreased substantially (from R2total=38.7% to R2total<7%). Breastfeeding vs. formula feeding showed distinct growth patterns in the first six months, but not thereafter. We found two categories of predictors. First, those related to Z-score deviations, e.g. paternal BMI. Second, those that predict baseline risk for future overweight and have a permanent effect on Z-scores, e.g. maternal BMI.

**Conclusion:** The prenatal and nutrition domain were most important to predict weight gain, mainly in the first six months of life. After these first six months other yet undetermined factors start to play a role.
**T5:PO.022**

**BMI in 1-year old children in relation to parental BMI: A cross-sectional study**

Lindkvist M.1,2, Ivarsson A.1, Silverbud S.A.1, Eureenius E.1

1Department of Public Health and Clinical Medicine, Epidemiology and Global Health, Umeå University, SE 901 87 Umeå, Sweden
2Department of Statistics, Umeå School of Business and Economics, Umeå University, SE 901 87 Umeå, Sweden
3Department of Clinical Science, Paediatrics, Umeå University, SE 901 87, Umeå, Sweden

**Background:** Overweight and obesity is accelerating throughout the world; a threat to population health and longevity. Healthy BMI and lifestyle need to be established early in life. In this study we aimed to determine BMI of 1-year-olds in relation to parental BMI.

**Methods:** Parents’ of 697 1-year-olds completed a questionnaire on parental and child health. For this study data on parental weight and height and socio-demographics were used, as well as child weight and height measured at an ordinary visit in child health care. We used thresholds for children’s BMI recommended for surveillance by the Royal College of Paediatrics and Child Health (RCPCH) in 2012, based on the WHO Child Growth standards derived from an international sample.

**Results:** Among 1-year-olds BMI was above the 85th percentile for 33%, and above the 95th percentile for 14%. Thus, these Swedish children of today had a considerably higher BMI than children in the reference population already at this early age. The probability of a child having a BMI above the 95th percentile was significantly increased if either the mother or father was overweight. Furthermore, we found a positive synergy effect between the mother and father being overweight and the child having a BMI above the 85th percentile. Overall, our findings seem largely valid for the whole country, except for country of origin, and can therefore probably be generalised outside the study area with less immigrants.

**Conclusion:** Overweight is common already at 1 year of age in this population. The risk increases if one parent is overweight, and even more if both parents are overweight. Health promotion activities early in life need to be strengthened.

**Acknowledgement:** Thanks to all personnel involved in the data collection, parents and children participating and the Salut team. Financial support for participation in this conference was gratefully acknowledged from the Research Unit of the Department of Medicine-Geriatrics at Skellefteå Hospital. The study was undertaken within the FAS Centre for Global Health Research at the Medical Faculty of Umeå University.

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**T5:PO.023**

**Strain-specific difference in maturation of amp-activated protein kinase in murine skeletal muscle during early postnatal development**

Hansikova J.1, Janovska P.1, Kopecky J.1

1Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic

**Introduction:** AMP-activated protein kinase (AMPK) is engaged in control of energy metabolism. Little is known about changes in AMPK subunits expression and AMPK activity in skeletal muscle during the early postnatal development, between birth and weaning. The aims of the study were to characterize the activity of AMPKα1 and AMPKα2 isoforms and gene expression of these subunits in skeletal muscle while comparing obesity-prone C57BL/6 (B/6) and obesity-resistant A/J mice.

**Methods:** Male (M) and female (F) pups of the B/6 and A/J mice were born and maintained at 30°C. Gastrocnemius muscle was collected by freeze-clamping and AMPK activity was determined using AMARA peptide substrate. Gene expression was assessed by real-time quantitative RT-PCR.

**Results:** Studies showed a strong association between pickiness and conflicts (OR: 3.55, p < 0.001) also after adjustment for possible confounders (OR: 3.55, p < 0.001). There were no significant differences in mean BMI between picky and non-picky children, at baseline (p = 0.04) or after 1-year follow-up (p = 0.48). A direct association was seen between conflicts at mealtimes and BMI at baseline, after adjusting for parental BMI (p < 0.01). No association were seen after follow-up (p = 0.18).

**Conclusion:** Our results suggest that conflicts around mealtimes and pickiness are highly related. Moreover, conflicted meals seemed to be related to lower BMI, whereas neither pickiness nor conflicted meals seemed related to development in BMI over 1-year follow-up period.

**Acknowledgement:** Conflict of Interest: The authors declare not having any conflict of interest. Funding: The Danish Heart Foundation, TrygFonden, Danish Medical Council and The Health Foundation.
Results: The activity of AMPKα1 at 10 days (D) was significantly higher in comparison with the AMPKα2 activity in all tested groups. Between 10D and 28D, the AMPKα1 activity decreased in mice of both strains except for A/J F. In A/J mice at 28D, activity of AMPKα2 was higher than that of AMPKα1. Total activity of AMPK (α1+α2) in B6 mice decreased significantly between 10D and 28D but it stayed constant in A/J mice. Expression of AMPKα1 gene was constant in both A/J and B6 mice between 10D and 28D. Expression of AMPKα2 gene increased between 5D and 28D in both strains.

Conclusion: During early postnatal development strain-specific changes in AMPK activity in murine skeletal muscle were observed. While in the obesity-resistant A/J mice the activity stayed constant, it declined in the obesity-prone B6 mice. Changes in AMPK activity in skeletal muscle during early postnatal development may affect propensity to obesity in adulthood, depending on the genetic background of the mice.

T5.P0.024  
Plasma acylcarnitines levels as an early complex biomarker of propensity to high fat diet-induced obesity

Horakova O.1, Hansikova J.1, Bardova K.1, Kuda O.1, Rossemel M.2, Kopecky J.3
1 Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic

Introduction: Induction of obesity by high-fat diet (HFD) in mice is associated with development of impaired glucose tolerance and dyslipidemia, i.e. characteristic features of metabolic syndrome in humans. Various inbred strains of mice vary in their propensity to HFD-induced obesity. Moreover, individual mice differ substantially in their responses to the obesogenic environment, resulting in large variations in their body weight gain, glycemic control, and plasma lipid profiles in spite of identical genetic background. Well characterized C57BL/6J (B6) mice represent a suitable model for studying the mechanisms underlying propensity to obesity and insulin resistance.

Methods: We have explored a possibility to use complex changes in plasma metabolome, namely in the acylcarnitine levels, as a biomarker of propensity to dietary obesity and associated disorders. B6 mice (n=200) were fed since 3 months of age either HFD or standard Chow, and plasma samples and physiological data were collected at 2, 4, 12, 22, 24 weeks of age. Spearman pairwise correlations between plasma metabolite levels and various physiologic parameters were performed with respect to age, gender and feeding status.

Results: It was found that C6 and C18:1 plasma acylcarnitine levels at 4 weeks of age positively correlated with body weight at 24 weeks of age independently of gender. The links between circulating acylcarnitines at young age and glucose homeostasis in the adult animals are being further analyzed.

Conclusion: Our results document that plasma acylcarnitines levels could serve as biomarkers of propensity to obesity and possibly as a complex biomarker of obesity-associated metabolic disorders.

T5.P0.026  
Web-based interactive material for dietary intervention among primary-school children

Thalassinos N.1, Chatzi V.1, Kalamari A.1, Markaki A.1, Dimitropoulakis P.1, Mavrikakis I.1, Manios Y.2, Kafatos A.3, Fragkiadakis G.A.1, Zafropoulos V.1
1 Department of Nutrition & Dietetics, Technological Educational Institute of Crete (TEI of Crete), 723 00 Sitia, Greece
2 Preventive Medicine and Nutrition Clinic, Department of Social Medicine, Faculty of Medicine, School of Health Sciences, University of Crete, Heraklion, Greece
3 Department of Dietetics & Nutritional Science, Harokopio University, Kallithea, Greece

Introduction: Primary prevention of obesity in elementary schools can be applied by developing and introducing modern computer/information applications. The Project „Evaluation of a Web-based Dietary Intervention among primary school children“, also aims to develop digital-interactive material for dietary interventions. Objective: The aim was to establish and validate a public digital-interactive site for dietary intervention in elementary schools, focusing in fruit and vegetable consumption.

Methods: An HTML and CSS based website, providing presentations and games concerning nutrition, through PowerPoint, VISUAL BASIC programming and Flash, was designed and utilized for nutritional intervention in a number of primary schools.

Results: In the web-based approach developed, the students attend multimedia presentations on nutrition and play respective interactive games, assisted by their teachers. The designed website is divided in two main sections; the first provides guidance for parents and teachers, while the second includes the digital presentations and interactive games, combining thus information and practice. To become children-friendly, the multimedia design utilizes vitamin super-heroes, animations, voices, funny sounds, and short tales with options for the children to choose correctly or not; still, showing the health consequence of each choice.
Conclusions: The developed educational material concerning dietary intervention in children is of public domain and may be used freely in Greek schools to prevent obesity.

Acknowledgement: We would like to thank the teachers and the directors of schools whose children participated to the survey. The current project is implemented through the Operational Program „Education and Lifelong Learning“ action Archimedes III and is co-financed by the European Union (European Social Fund) and Greek national funds (National Strategic Reference Framework 2007–2013).

T5 – Childhood and adolescence

T5.PO.027

Development of the Child Three Factor Eating Questionnaire

Bryant E.1, Marshall V.1, Shafiq I.1, Ayaz-Shah A.1, Jozwiak P.1, Gately P2

1Division of Psychology, University of Bradford, UK
2MoreLife, Leeds Beckett University, UK

Introduction: The revised TFEQ 21 item questionnaire (TFEQr21: Cappelleri et al. 2009) is a more psychometrically robust version of the original TFEQ. The TFEQr21 measures Cognitive Restraint (CR), Uncontrolled Eating (UE) and Emotional Eating (EE).

Method: 182 children (89 males, 93 females, aged 8–14 years, BMI 15.82 – 32.36 kg/m<sup>2</sup>) were recruited from schools and the MoreLife weight loss programme. Anthropometric data were collected and was height and weight measured. A subsample took part in structured interviews to determine understanding of the TFEQ. Results: The results from the feasibility study informed the development of the child version of the TFEQ (CTFEQ). Recruitment is still underway for validation of the CTFEQ.

Results: Preliminary data suggest children below 11 years do not have adequate understanding of the TFRQr21. For children 11 years and above, body weight was significantly and positively related to UE, females scored sig. higher on EE and a lower self-esteem was associated with higher CR and EE scores, particularly in females. A number of items were identified as problematic, through both item analysis and the interviews. These items were subsequently simplified in the development of the CTFEQ to aid comprehension whilst maintaining original meaning.

Conclusion: The TFEQr21 is not accurately comprehended in children. A child version of the questionnaire has thus been developed and is undergoing validation. The results from the feasibility study suggest that the factors of the TFEQ functions similarly in children compared to adults. This will be particularly important for assessing eating behaviour traits across childhood to adulthood.

T5.PO.028

Epicardial fat thickness: Threshold values and lifestyle correlation in male adolescents

Cena H.1, Fonte M.L.1, Casali P.M.1, Maffoni S.1, Roggi C.1, Biino G.2

1Department of Public Health, Experimental and Forensic Medicine - Unit of Human Nutrition, University of Pavia, Italy
2Medical Sport Centre “Medica Sport Minerva”, Institute of Molecular Genetics, National Research Council of Italy, Pavia, Italy

Background: Obese adolescents with high proportion of visceral fat are at higher risk of developing the metabolic syndrome.

Objectives: The study aims to investigate if echocardiographic epicardial fat thickness (EF) could be predictive of visceral obesity (VO) in the early in life and to provide EF threshold values specific for male adolescents. Further aim was to investigate the association between EF, lifestyle and metabolic disease familiarity.

Methods: Anthropometric data were collected from 102 normal weight and overweight, healthy male adolescents (mean age: 14.91 ± 1.98 years); bioelectrical impedance analysis and transthoracic echocardiogram were performed in the same sample. Each participant fulfilled a validated self-administered lifestyle questionnaire.

Results: We found higher EF values in sedentary adolescents (P < 0.05), in those who never eat fruit and vegetables (P < 0.05), and in those with overweight mothers (P < 0.05). The strongest independent predictor of EF was waist circumference (P < 0.0001). Using the waist to height ratio as a marker of VO, logistic regression analysis revealed that 1 mm EF gain is responsible for seven times higher VO risk (P < 0.0001). Receiver Operating Characteristic (ROC) analysis showed that the optimal cut-off for EF thickness associated to youth VO is 3.2 mm.

Conclusion: Ultrasoundography EF measurement might be a second-level assessment tool, useful to detect early cardiometabolic damage stage.

T5.PO.029

Weight-loss treatment in children and adolescents: Systematic review and evaluation of effect of conservative treatment on weight status

Mühlig V.1, Hebebrand J.1

1Department of Child and Adolescent Psychiatry and Psychotherapy, LVR-Klinikum Essen, University Duisburg-Essen

Introduction: In Europe, prevalence rates for childhood obesity have plateaued at a high level. Due to the elevated risk of long-lasting somatic and psychiatric comorbidities, effective interventions are in frequent demand. Weight loss treatment has been shown to be effective, yet the overall outcome concerning weight status has not been sufficiently highlighted. The objectives of this review were a literature update and the deduction of clinical implications.

Methods: A systematic literature research was performed for studies published between May 2008 (terminating date of a 2009 Cochrane review) and December 2013 in Medline via PubMed. Studies were assessed on the basis of defined inclusion criteria and relevant criteria for methodological quality.

Results: 48 randomized controlled trials with a total of 5025 participants were included. With regard to eligible studies fulfilling predefined methodological quality criteria, weight losses between 0.05 and 0.42 BMI z-score within 24 months after starting treatment were reported. 41 studies included data on dropout rates before the end of the intervention. These were 10% or higher in 27 studies (66%) and 25% or higher in 9 studies (22%).

Conclusion: Based on consistent evidence, treatment seeking families should be informed about the limited effect of conservative obesity treatment on weight status. The investigation of predictors for treatment success and the evaluation of additional treatments focusing on coping with obesity warrant future research.


Acknowledgement: This study was supported by the German Federal Ministry of Education and Research and was integrated within the German Competence Network Obesity (Consortium „Youth with Extreme Obesity“).
Abstracts

Experience of major life events during childhood and development of obesity in adulthood: A co-twin control study.
Jindong D., Heitmann B.L., Kyle R., Vamosi M.1
1University of Southern Denmark, Institute of Public Health, Department of Nursing Science.
2University of Aarhus, Research Unit for Dietary Studies, Bispebjerg and Frederiksberg Hospitals, Copenhagen.
3University and National Institute of Public Health, University of Southern Denmark, Denmark.
4Institute of preventive medicine, Research Unit for Dietary Studies, Bispebjerg and Frederiksberg Hospitals, Denmark.

Background: The etiology of adult obesity is still poorly understood, even if often simply attributed to too much food and too little exercise. A few studies have suggested that adverse psychological factors may predispose the development of adult obesity among normal weight children. The aim of this study was to examine if separation from parents, parental loss and living in a "children's home" during childhood could be associated with development of adult obesity.

Methods: A total of 146 complete adult twin pairs discordant for BMI (one had a normal BMI and the co-twin a BMI > 30 kg/m²) were identified from the Danish Twin Registry. The twins gave an interview and a physical examination in 2006. The Childhood Family Relationship Questionnaire (CFRQ) was used to assess life events.

Results: Before age 17, 20.8% of the participants had been separated from mother, 26.1% had been separated from father for a period on average 4.5 years during childhood. Furthermore, 9.3% of the children had experienced living in children's home and 6.8% had lost their father. There was a tendency that staying in a children's home and separation from father was related to discordance for BMI in adulthood, whereas separation from mother and paternal death was related to less discordance. However, none of these differences were significant.

Conclusion: The present study did not demonstrate independent effects of major life events during childhood and development of obesity in adulthood.

Assessment of vitamin D status in obese and nonobese Turkish adolescents: Its relation to insulin resistance and nutritional status.
Sağlam D., Samur G., Turan S.1
1Health Science Faculty, Department of Nutrition and Dietetics, Acıbadem University, Istanbul, Turkey.
2Health Science Faculty, Department of Nutrition and Dietetics, Hacettepe University, Ankara.
3Department of Pediatric Endocrinology, Marmara University, Istanbul.

Introduction: There is increasing epidemiological evidence linking sub-optimal vitamin D status with overweight and obesity. Although increasing BMI and adiposity have also been negatively associated with the change in vitamin D status following supplementation, results have been equivocal.

Methods: The research was carried out with 39 obese (BMI>95th percentile) and 30 nonobese adolescents (n=69), aged between 12 and 17 years. The questionnaire was developed including the demographic status, nutritional status and dietary habits, physical activities of adolescents, anthropometric measurements were taken and body composition was measured by bioelectric impedance analysis. In the third stage, biochemical analysis were measured.

Results: There was no statistical differences between obese serum 25(OH) D (16.2 ± 6.2 ng/ml) and nonobese (18.1 ± 5.9 ng/ml) serum 25(OH)D (p > 0.05). We sought to evaluate the prevalence of low levels of 25(OH) D by examining hypovitaminosis D (<30 ng/L), vitamin D sufficiency (>or =30 ng/L) in obesity. Serum 25(OH) D level was inversely correlated with anthropometric measurements in obese and nonobese adolescents (p > 0.05). While there was no significant difference between serum 25(OH)D levels and HOMA-IR; there was a positive correlation between serum calcium and HOMA-IR (r=0.276 p < 0.05) independent of body adiposity. There was a positive correlation between serum 25(OH)D levels and amount of daily dietary calcium (r=0.371) and phosphorus intake (r=0.438) (p < 0.05).

Conclusion: Low vitamin D status is prevalent among adolescents. The results suggest that the importance of vitamin D fortification and increased dietary calcium in the Turkish diet to meet RDA requirements and avoid onset of vitamin D deficiency-related diseases in Turkish adolescents.

Evaluation of childhood obesity assessments in secondary care paediatric clinic reference: Obesity services for children and adolescents (osca) network group uk guidelines
Moodambail A.R., Begum M.R.
1Consultant & Honorary Senior Lecturer, Department of Paediatrics, Barts Health NHS Trust in London & Queen Mary University of London, UK.
2Barts and the London Medical School, Queen Mary University of London, UK.

Aim of Study: to evaluate clinical assessment of obesity in a secondary care paediatric set up against current OSCA Guidelines for childhood obesity assessments in UK.

Method: 72 children (1-16 yrs) were primarily assessed for obesity; data entered on to a pro forma based upon OSCA guidelines, for analysis.

Results: 33 patients (46%) were classified as morbidly obese, 24(33%) severely obese, 15(21%) obese. Evaluation showed 46% of children and young persons with obesity had not been assessed well and adequately. Clinical examination (in 85%) and investigations (in 76%) were adequate in majority of patients, but adequate history assessment was lacking in 90% of patients. This would lead to non-identification of causation and co-morbidities, and further leading to possible lack of adequate timely interventions. The most common co-morbidity newly identified was Vitamin D deficiency (40%). Significant co-morbidities like PCOS (36% of adolescent girls), Type 2 Diabetes, Impaired glucose tolerance, hypertension, dyslipidaemia and psychological distress/bullying were also newly identified through the assessments. Children with neurodevelopmental/behavioural/learning difficulties were at higher risk to develop obesity. The clinical assessment for obesity related sleep disorders was grossly inadequate, and did not use recommended Paediatric Sleep Questionnaires.

Conclusion: We suggest use of a Obesity Assessment Pro-forma in clinics to improve assessments in secondary care. The Study suggests pragmatic approach to check Vitamin D level in all, and sex hormone profile in pubertal girls (to exclude PCOS) with obesity. The evaluation highlights lack of customised physical activity programmes; some children will benefit from psychology support while dealing with their weight management.

Acknowledgement: Ms J Leung, Paediatric Dietician, Department of Paediatrics, Barts Health NHS Trust in London, UK Mrs W Hawkins, Patient Pathway Co-ordinator in Paediatrics, Barts Health NHS Trust.

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Acknowledgement: Ms J Leung, Paediatric Dietician, Department of Paediatrics, Barts Health NHS Trust in London, UK Mrs W Hawkins, Patient Pathway Co-ordinator in Paediatrics, Barts Health NHS Trust.
**Introduction:** Preschool age is perceived as a strategic preventive target regarding long-standing obesity. This study aims to evaluate the association between preschool obesity, fat distribution and future risk factors.

**Methods:** A total of 25 healthy children, aged 5.2 ± 0.61 (4.2–7 years, 36% boys) were investigated in 2014. Standard anthropometry (body weight, height and waist circumference (WC)) was performed, blood pressure (BP) was measured. A history and child’s behavior patterns questionnaire was filled by caregivers. Fat mass was estimated by DXA. Overweight and obesity were defined according to the IOTF references (Cole et al., 2000). The presence of hypertension was defined according to NHBPEP (2004) as a measure above 95th percentile for age, sex and height.

**Results:** One third of the participants (32%) were overweight or obese, and 76% of all had family history of obesity. Two of the children (8.3%) had elevated systolic BP (SBP). The total fat tissue (%) measured by DXA scan correlated with BMI, WC (p = 0.001) and with SBP (p = 0.004, with elevated SBP - p = 0.009). Both android and gynoid fat distribution correlated positively with elevated SBP, although the stronger correlation was with android fat distribution (p = 0.006). The only child (a boy) with elevated both systolic and diastolic BP was born small for gestational age and had android fat distribution. There was a significant negative correlation between systolic and diastolic BP and reported sports training (p = 0.019, p = 0.003 resp.).

**Conclusion:** The current findings suggest early development of obesity related risk factors in preschool healthy children who have android fat distribution and positive family history of obesity. Sports training has favorable effect on BP even at this young age.

**Prevalence of obesity in students of elementary schools. Impact of socioeconomic factors.** Data from the hellenic national action plan for the assessment, prevention and treatment of childhood obesity


1Dept. of Endocrinology, Children’s Hosp. P. A. Kyriakou, Athens, Greece,
2Dept. of Hygiene, Epidemiology and Medical Statistics, Univ. of Athens, Athens, Greece,
3School of Physical Education and Sports Science, Univ. of Athens, Athens, Greece,
4Dept. of Nutrition and Dietetics, Haracopion Univ. of Athens, Athens, Greece,
5Dept. of Biometrics, Technological Educational Institute of Athens, Athens, Greece,
6Dept. of Social Pediatrics, Children’s Hosp. P. A. Kyriakou, Athens, Greece

**Introduction:** The aim of the study is to assess the prevalence of overweight/obesity of elementary school students and evaluate correlations with socioeconomic parameters.

**Materials and methods:** This is a cross-sectional study conducted from 10/2012- 12/2013. A pre-selected, representative elementary school cohort (N=18.648, age range 5.9–12.3 years) was derived, using stratification and PPS methodology. Parents responded to questionnaire and students were measured with high sensitivity methods (Ht 0.1cm, Wt 0.1kg, BMI calculated). IOTF cut offs were used to classify the children. Socio-economic status index was calculated (SES index range 0–13) on years of parental education, rented vs owned residence, m²/person, number of vehicles. Logistic regression was applied using STATA 11.0.

**Results:** A 9.4% of students were overweight and 25.0% were obese, for a total of 34.4% being overweight or obese. Rural area students were sig-

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**Number of patients identified with Co-Morbidities**

**Fig. 2.** Childhood obesity Co-morbidities

**TS-PO.033**

Children's BMI is strongly effected by family income at birth – but parental education is of major importance for the growing social gap up to 8 years of age

**Bramssved R, Regber S, Mehlig K, Novak D, Lissern L, Milrid S**

1Department of Pediatrics, Institute of Clinical Sciences, Sahlgrenska Academy, Gothenburg University, Gothenburg, Sweden,
2School of Health and Education, University of Skovde, Skovde, Sweden, Sweden

**Background:** The development of BMI in early childhood is dependent on socioeconomic factors. Our aim was to explore the impact of parental education level and family income for development of BMI from birth to 8 years age.

**Methods:** 3018 children born in 1998–2006 from the IDEFICS study and register controls were included. Weight and height measurements from birth up to 8 years of age were obtained from the Child Health Services. Parental education and family disposable income, obtained from Statistics Sweden and the Medical Birth Register, were defined as high/low. Obesity was defined by WHO references. Confounders were sex and age of the child, parental origin, maternal smoking and maternal BMI.

**Results:** At birth, the children’s mean BMI (SD) was lower in families of low vs. high income (13.74 (1.30) vs. 13.94 (1.36), p < 0.0001). Results remained significant after adjusting for confounders. No differences in birth BMI were detected between children of low and high-educated parents (13.87 (1.37) vs. 13.83 (1.35), p = 0.48). From 6 months onwards, children of low-educated parents showed higher mean BMI than children of high-educated. At 8 years, mean BMI in the low/high educated groups were 17.12 (2.44) and 16.38 (1.94), p < 0.0001. Results remained significant after adjusting for confounders. Prevalence of obesity in the low and high-educated groups were 11% and 4.1%, p < 0.0001. The difference in BMI at 8 years seen in the low/high income group disappeared after adjusting for confounders (17.5 vs. 17.6, p = 0.63).

**Conclusion:** Impact of family socioeconomic factors on children’s BMI differs by income and education. The effect of parental education becomes more evident by age up to 8 years of age. Interventions for healthy weight development must start very early in life.

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**TS-PO.034**

Preschool children, dxa fat parameters and obesity risk factors

Lateva M, Popova R, Galcheva S, Georgieva V, Iotova V

1Department of pediatrics and medical genetics, Medical University Varna, Varna, Bulgaria,
2Department of imaging diagnostics and radiotherapy, Medical University Varna, Varna, Bulgaria

**Introduction:** Preschool age is perceived as a strategic preventive target regarding long-standing obesity. This study aims to evaluate the association between preschool obesity, fat distribution and future risk factors.

**Methods:** A total of 25 healthy children, aged 5.2 ± 0.61 (4.2–7 years, 36% boys) were investigated in 2014. Standard anthropometry (body weight, height and waist circumference (WC)) was performed, blood pressure (BP) was measured. A history and child’s behavior patterns questionnaire was filled by caregivers. Fat mass was estimated by DXA. Overweight and obesity were defined according to the IOTF references (Cole et al., 2000). The presence of hypertension was defined according to NHBPEP (2004) as a measure above 95th percentile for age, sex and height.

**Results:** One third of the participants (32%) were overweight or obese, and 76% of all had family history of obesity. Two of the children (8.3%) had elevated systolic BP (SBP). The total fat tissue (%) measured by DXA scan correlated with BMI, WC (p < 0.001) and with SBP (p = 0.004, with elevated SBP - p = 0.009). Both android and gynoid fat distribution correlated positively with elevated SBP, although the stronger correlation was with android fat distribution (p = 0.006). The only child (a boy) with elevated both systolic and diastolic BP was born small for gestational age and had android fat distribution. There was a significant negative correlation between systolic and diastolic BP and reported sports training (p = 0.019, p = 0.003 resp.).

**Conclusion:** The current findings suggest early development of obesity related risk factors in preschool healthy children who have android fat distribution and positive family history of obesity. Sports training has favorable effect on BP even at this young age.

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**Prevalence of obesity in students of elementary schools. Impact of socioeconomic factors.** Data from the hellenic national action plan for the assessment, prevention and treatment of childhood obesity


1Dept. of Endocrinology, Children’s Hosp. P. A. Kyriakou, Athens, Greece,
2Dept. of Hygiene, Epidemiology and Medical Statistics, Univ. of Athens, Athens, Greece,
3School of Physical Education and Sports Science, Univ. of Athens, Athens, Greece,
4Dept. of Nutrition and Dietetics, Haracopion Univ. of Athens, Athens, Greece,
5Dept. of Biometrics, Technological Educational Institute of Athens, Athens, Greece,
6Dept. of Social Pediatrics, Children’s Hosp. P. A. Kyriakou, Athens, Greece

**Introduction:** The aim of the study is to assess the prevalence of overweight/obesity of elementary school students and evaluate correlations with socioeconomic parameters.

**Materials and methods:** This is a cross-sectional study conducted from 10/2012- 12/2013. A pre-selected, representative elementary school cohort (N=18.648, age range 5.9–12.3 years) was derived, using stratification and PPS methodology. Parents responded to questionnaire and students were measured with high sensitivity methods (Ht 0.1cm, Wt 0.1kg, BMI calculated). IOTF cut offs were used to classify the children. Socio-economic status index was calculated (SES index range 0–13) on years of parental education, rented vs owned residence, m²/person, number of vehicles. Logistic regression was applied using STATA 11.0.

**Results:** A 9.4% of students were overweight and 25.0% were obese, for a total of 34.4% being overweight or obese. Rural area students were sig-
**Subclinical hypothyroidism in Danish overweight and lean children and youths**

Jensen M.D.1, Obt J.D.1, Fonvig C.E.1,2, Kloppenborg J.T.1,3, Pedersen O.1, Hansen T.2,3, Holm J.C.4,5

1The Children's Obesity Clinic, Department of Pediatrics, Holbaek Hospital, Holbaek, Denmark,
2The Novo Nordisk Center for Basic Metabolic Research, Section of Metabolic Genetics, University of Copenhagen, Copenhagen, Denmark,
3Department of Pediatrics, Herlev Hospital, Herlev, Denmark,
4University of Southern Denmark, Faculty of Health Sciences, Odense, Denmark,
5University of Copenhagen, Faculty of Medical and Health Sciences, Copenhagen, Denmark

**Introduction:** The aim of the study was to investigate the prevalence of subclinical hypothyroidism (SH) and examine possible associations between thyroid hormones and anthropometric measures in Danish overweight and lean children and youths.

**Methods:** In this cross-sectional study, 1948 overweight children and youths (873 boys), aged 2–24 years, and 1339 lean controls (517 boys), aged 6–22 years, were included from the Registry of the Danish Childhood Obesity Biobank. All participants were characterized by anthropometrics and serum thyroid-stimulating hormone (TSH), triiodothyronine (T3), free T3, and free thyroxine (T4). SH was defined as TSH in the range 4.5–10.0 mIU/L, which is above the normal range, and free T4 and free T3 within the normal range (free T4: 13.0–21.0 pmol/L, free T3: 3.9–7.7 pmol/L).

**Results:** The prevalence of SH among overweight participants was 10.9% (213 of 1948) vs. 6.9% (93 of 1339) in the lean group (OR: 1.6, 95% CI: [1.3;2.1], p = 0.0001). The overweight group had higher BMI SDS (median 2.77 (range 1.28–6.65) vs. 0.07 (–3.16–1.28)), higher concentrations of serum TSH (median 2.60 (range 0.02–62.36) vs. 2.30 (0.50–30.0), p < 0.0001), and free T3 (median 5.6 (range 3.6–8.9) vs. 5.6 (2.6–9.8), p < 0.0001). Linear regression analysis demonstrated a positive association between serum TSH concentrations and BMI SDS (p < 0.0001) and waist/height-ratio (p < 0.0001) across both groups, independent of sex and age.

**Conclusion:** The prevalence of subclinical hypothyroidism is more frequent in Danish overweight children and youths than lean. Furthermore, serum concentrations of TSH and free T3 are positively associated with BMI SDS indicating a relationship between obesity and disregulated thyroid homeostasis.

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**Predictive validity of the core index in predicting obesity. Data from the hellenic national action plan for the assessment – prevention and treatment of childhood obesity**

Manios Y1, Vlachopapadopolos E2, Karachaliou F2, Psaltopoulou T1, Koutsouki D2, Moschonis G3, Bogdanis G4, Karagianni V5, Hatzakis A4, Michalakos S5

1Dept. of Nutrition and Dietetics, Harokopio Univ. of Athens, Athens, Greece,
2Dept. of Endocrinology, Children’s Hosp. P & A. Kyriakou, Athens, Greece,
3Dept. of Hygiene, Epidemiology and Medical Statistics, Univ. of Athens, Athens, Greece,
4School of Physical Education and Sports Science, Univ. of Athens, Athens, Greece,
5Dept. of Biometrics, Technological Educational Institute of Athens, Athens, Greece

**Introduction:** As the prevalence of childhood obesity increases, a tool for risk prediction of childhood overweight/obesity is of utmost importance. The aim of this study, is to validate the CORE (Childhood Obesity Risk Evaluation)index, introduced by the Healthy Growth Study, as a predictor of obesity development in late childhood.

**Materials and methods:** This is a cross-sectional study conducted from 10/2012- 12/2013. A pre-selected, representative elementary school cohort (N=18.648, age range 5.9–12.3 yrs) was evaluated. It was derived by using stratification and PPS methodology. Students with fully completed questionnaires were eligible for this analysis (N=5.946. 2822 boys, mean age 11.1 ± 2.2 yrs). Information requested included: Mother's pre-pregnancy weight status, maternal smoking during pregnancy, maternal educational level and infant weight gain in the first 6 months of life and the children's gender for the development of theCORE Index.

**Results:** A 27.4% of them (28.6% boys and 26.2% girls) were overweight and 9.1% (9.6% boys and 8.8% girls) were obese, for a total of 36.5% (38.1% boys and 35% girls) of the students being overweight or obese. The CORE index was 3.06 ± 1.9 (boys 3.49 ± 1.84, girls 2.65 ± 1.91), range: 0–1.10. The likelihood of developing obesity by unit increase of the CORE index is 1.3 (O.R 1.3, 95%, CI 1.18–1.33). The optimal cut off point of CORE index for obesity risk reduction is 3.5, with 58.6% sensitivity and 63.6% specificity.

**Conclusions:** CORE index is a simple and inexpensive tool that can be used by paediatricians and practitioners enabling valid parent counselling regarding their child's risk of developing obesity. Ref. Manios et al. Childhood Obesity Risk evaluation based on perinatal factors and family sociodemographic characteristics: CORE Index , Eur.J of Peds, 2013

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**Prevalence Obesity among Saudi College Students**

Alrowaily M.A.

Department of Family medicine and Primary health care

**Abstract:** Aim: (i) To estimate the prevalence of the metabolic abnormalities among Saudi college students in Riyadh, Saudi Arabia, and (ii) to investigate the association between different indicators of body composition and these abnormalities.

**Methods:** A total of 501 college students participated in a cross-sectional study. Anthropometric assessments, BP measurements, and biochemical assessment were done. Metabolic abnormalities were identified.

**Results:** Applying BMI, 21.9% and 20.6% of students were classified as overweight and obese, respectively. Central obesity was prevalent in 26.9% and 42.2% of students based on WC and WHR, respectively. Other metabolic abnormalities were hypertension (23.6%) and abnormal FPG level (22.6%). Three or more abnormalities were prevalent in 7.8% of students and increased significantly to 26.4%, 20%, and 17.6 in obese subjects based
Abstracts

T5:PO.039 Preventive project „with infants against obesity” – skojenciprotiobezite.cz

Marinov Z.1, Marinová C., Vyhnalová P., Fikrová L.2

1Children obesitological clinic, Department of Pediatrics, University Hospital Motol and 2nd Faculty of Medicine, Charles University in Prague, Czech Republic,
2Medical Access Solutions s.r.o., Prague, Czech Republic

Introduction: Serious consequences are to be awaited since the pandemic of childhood obesity in 21st century. Prevention and treatment of childhood obesity by physician for children have significant potential if it is started early. The prevalence of overweight is in 6.9% of infants in 6 months in Czech Republic, which represents the absolute number of about 7000 infants per year.

Methods: The preventive program „With Infants Against Obesity” is designed for physicians for children in the context of preventive examinations. The website html://skojenciprotiobezite.cz presents the tool for effective communication and collaboration between pediatricians, nurses and parents. The main objective of the project is to enable parents and physicians understand the problems of overweight and obesity prevention in key preventable period, in infancy.

Results: The website html://skojenciprotiobezite.cz is a free accessible website to the general information. For health care professionals there is an established registered access to expert information of Guideline for Prevention of Overweight and Obesity in Infancy. For parents of infants this is a practical approach to preventive and curative measures of child- hood overweight.

Conclusion: The preventive project “With Infants Obesity” is an original and innovative prevention website, which offers a comprehensive view of the prevention of overweight and obese children. The project offers useful guidance that can be used in the everyday clinical practice for infants with risks of developing obesity, including their family background.

Acknowledgement: Research relating to this abstract was funded by Všeobecná zdravotní pojišťovna České republiky, The Health Preventive Project 2014 and Med- zdravotní pojišťovna České republiky, The Health Preventive Project 2014 and Med-

T8 – Comorbidities (inc diabetes, hypertension, lipids, sleep apnea, sexual dysfunction)

T8:PO.001 Assessment of nutritional status in patients with non- alcoholic fatty liver disease

Rusu E.1, Dрагут Р.2, Rusu F.1, Jinge M.1, Enache G.1, Nan R.2, Popescu Valceanu H.2, Teodoru I.1, Homentcovschi C.1, Costache A.1,2, Radulian G.1,2

1National Institute of Diabetes, Nutrition and Metabolic Diseases “Prof. N. Paulescu”, Bucharest,
2University of Medicine “Carol Davila”, Bucharest,
3Emergency Clinical Hospital “Carol Davila”, Bucharest,
4Emergency Hospital Calarasi

Background: Childhood obesity is an important problem in the twenty-first century. Pediatric nurses have a key role in the prevention, diagnosis and management of childhood obesity. Objectives: The aim of this study is to determine the prevalence and the risk factors of obesity among elementary school children.

Methods: This is a descriptive and cross-sectional study. The research population includes 36,082 elementary school children in Adiyaman, Turkey. The research sample includes 3,028 children from seven schools selected according to stratified random sampling. Research participation was voluntary. The data was obtained from a demographic form and a 25 question-survey which was sent to the families. Children's height and weight were measured by the researchers. To analyze the data, SPSS and Excel were used. The values for frequency, mean, standard deviation, chi-square, one way anova, and logistic regression were calculated.

Results: The children were all between 5 and 15 years old. Of them, 51.2% were male, 13.4% were overweight (between 85 and 95 percentile) according to the Body Mass Index (BMI), and 8.7% were obese (above 95 percentile). Risk factors for childhood overweight and obesity include being male, having average or high socioeconomic status (SES), traveling to school by car or bus, parents with higher levels of education and parents who are overweight.

Conclusion: Childhood obesity is an important problem which needs to be resolved. To create a plan of care for obese children, nurses need to consider the risk factors defined in this study.

Keywords: Childhood obesity, overweight, risk factors, nurse.

T5 – Child protection and welfare

T5:PO.040 The prevalence and the risk factors of obesity among elementary school children in adiyaman, turkey

Geçkil E., Aslan S., Ister Derya E., Kışcıkkeleçpeşmişek D., Şahin T., Erdemir F.

1Nursing Department, Faculty of Health Sciences, Necmettin Erbakan University in Konya, Konya, Turkey,
2Nursing Department, Health School, Adiyaman University in Adiyaman, Adiyaman, Turkey

Background: Childhood obesity is an important problem in the twenty-first century. Pediatric nurses have a key role in the prevention, diagnosis and management of childhood obesity. Objectives: The aim of this study is to determine the prevalence and the risk factors of obesity among elementary school children.

Methods: This is a descriptive and cross-sectional study. The research population includes 36,082 elementary school children in Adiyaman, Turkey. The research sample includes 3,028 children from seven schools selected according to stratified random sampling. Research participation was voluntary. The data was obtained from a demographic form and a 25 question-survey which was sent to the families. Children's height and weight were measured by the researchers. To analyze the data, SPSS and Excel were used. The values for frequency, mean, standard deviation, chi-square, one way anova, and logistic regression were calculated.

Results: The children were all between 5 and 15 years old. Of them, 51.2% were male, 13.4% were overweight (between 85 and 95 percentile) according to the Body Mass Index (BMI), and 8.7% were obese (above 95 percentile). Risk factors for childhood overweight and obesity include being male, having average or high socioeconomic status (SES), traveling to school by car or bus, parents with higher levels of education and parents who are overweight.

Conclusion: Childhood obesity is an important problem which needs to be resolved. To create a plan of care for obese children, nurses need to consider the risk factors defined in this study.

Keywords: Childhood obesity, overweight, risk factors, nurse.
Conclusions: The prevalence of combined obesity and malnutrition in patients with NAFLD is higher than estimated.

Acknowledgement: This paper is supported by The Sectoral Operational Programme Human Resources Development (SOP HRD), financed from the European Social Fund and by the Romanian Government under the contract number POS-DRU/159/1.5/S/137390.

T.B.P.0.002
Diabetes Remission Clinical Trial (DIRECT): Protocol for cluster randomised controlled trial
Leslie W.1, Brosnanan N.1, Barnes A.2, Thom G.1, McCombie L.1, Ross H.1, Taylor R.2, Lean M.2
1University of Glasgow, Scotland, 2Newcastle University, Newcastle-Upon-Tyne, England, 3Counterweight Ltd

Introduction: Type 2 diabetes mellitus (T2DM) can be reversed by an energy restricted diet and around 15kg weight loss. This non-surgical approach can be provided at relative low cost in Primary Care, where obesity and T2DM can be routinely managed, using a structured weight management programme. This 5 year study will establish the frequency with which it is possible to produce remission of T2DM at 12 months and sustain this over 2 years.

Methods: Cluster-randomised design with GP practices the unit of randomisation. 280 patients from c.30 practices in Scotland and Tyneside will be recruited. All participants will be followed up at 1 and 2 years.

Results: Co-primary endpoints: weight reduction 15kg or more and reversal. All participants will be followed up at 1 and 2 years.

Conclusion: This study will establish if a structured weight management programme, delivered in Primary Care by practice nurses or dietitians, is a viable treatment to achieve T2DM remission and guide future management. Results will be available from 2018. Trial Registration ISRCTN03267836

T.B.P.0.003
Treatment with continuous positive airway pressure (CPAP) decreases plasma Heme Oxygenase 1 (HO1) levels in morbidly obese patients (MO) with severe obstructive sleep apnea (OSA)
Tirado R.1, Vigil L.1, Masdeu M J.2, Villaplana M.1, Couto Y.1, Hurtado M.1, Pareja R.1, Pons B.1, Rigla M.1, Caixs A.1
1Department of Endocrinology and Nutrition, Hospital de Sabadell, Corporació Sanitaria Parc Taulí, Sabadell, UAB, Campus Excel·lència Internacional, Bellaterra, Spain, 2Pneumology Department, Hospital de Sabadell, Corporació Sanitaria Parc Taulí, Sabadell, UAB, Campus Excel·lència Internacional, Bellaterra, Spain


Methods: we studied 57 MO with sever OSA, 40 women and 17 men (age 46.2 ± 10.0 years, BMI 46.8 ± 7.06 kg/m², AH (Apnea hipoapnea index) 64.1 ± 27.6 events/hour). Thirty were treated with CPAP. 24% were smokers, 67% had hypertension and 38% type 2 diabetes. Levels of HO1 were measured by ELISA (Elisa Kit bioNova científica, s.l.Madrí). Epworth sleepiness scale (ESS) score, AH and percentage of total sleep time with oxygen saturation < 90% were determined by overnight conventional polysomnography (CE-Series Compumedics, Victoria, Australia). Waist circumference, % body fat by bioelectrical impedance (TANITA) and HOMA insulin resistance index were also measured. For statistical analysis SPSS-PC-plus version 19 was used.

Results: patients treated with CPAP had lower plasma levels of HO1 compared with patients without treatment (5.89 ± 1.29 vs 8.84 ± 6.70pg/mL, p = 0.029). The only variables that were different between both groups were the presence of DM2 (52% vs 26%, p = 0.038) and the ESS score (13.5 ± 5.74 vs 9.70 ± 3.64, p = 0.007) in the treated vs untreated groups.

Conclusion: CPAP treatment reduces HO1 plasma levels in MO with sever OSA.

Acknowledgement: Funding: Supported by CIRI Grants 2014 Fundació Parc Tauli

T.B.P.0.004
Sleep architecture, body composition and metabolic profile after one month of weight loss intervention in obese people with Obstructive sleep apnea
de Melo C.M.1, del Re M.P.1, dos Santos M.V.1,2, Antunes H.K.1, Tufik S.1, de Mello M.T.2
1Federal University of Sao Paulo – Department of psychobiology, 2Federal University of Sao Paulo – Department of Biosciences

Introduction: Weight loss has been extensively recommended for obese people with obstructive sleep apnea. This work aims to compare sleep architecture, body composition and metabolic profile of obese individuals with obstructive sleep apnea (OSA) after one month of weight loss intervention.

Methods: 23 obese men, 41.6 ± 7.9 years old were submitted to one month of caloric restriction. Energy deficit was 30% of total energy expenditure. Before and after intervention the following evaluations were made: laboratory polysomnography, body composition by plethysmography and blood collection for lipid profile, glycemia and hormones insulin and IGF-1 determination.

Results: One month intervention resulted in improvements in all anthropometric and body composition parameters as body mass (103.8 ± 12.5 to 99.8 ± 12.7kg, p = 0.000), BMI (35.4 ± 4.2 to 33.8 ± 4.2 kg/m², p = 0.000), % of fat mass (38.1 ± 5.6 to 36.8 ± 6.4%, p = 0.012), % of fat free mass (61.5 ± 5.9 to 63.3 ± 5.8%, p = 0.000) and waist circumference (112.3 ± 9.4 to 107.3 ± 8.7 cm, p = 0.000). Glycaemia (108.4 ± 7.7 to 101.1 ± 5.1 mg/dL, p = 0.000), Total Cholesterol (187.2 ± 29.0 to 166.6 ± 22.3 mg/dL, p = 0.001), LDL Cholesterol (112.5 ± 25.9 to 102.4 ± 18.4 mg/dL, p = 0.022), Insulin (36.0 ± 16.1 to 27.4 ± 10.8 uIU/mL, p = 0.000) and HOMA-IR (5.32 ± 2.58 to 3.17 ± 1.27, p = 0.002) were improved. No differences were found in HDL-cholesterol. In relation to sleep architecture were improved: Apnea-Hypopnea Index (AHI, 46.4 ± 25.6 to 40.2 ± 27.2 events/h, p = 0.028), hypopneas events per night (111.7 ± 57.1 to 76.2 ± 65.4 events, p = 0.027), oxyhemoglobin saturation (93.6 ± 1.5 to 94.8 ± 1.6%, p = 0.009) and desaturation index during NREM sleep (45.8 ± 24.9 to 34.2 ± 25.6, p = 0.001).

Conclusion: One month of weight loss intervention is sufficient to cause a significant reduction on body weight, improvements in body composition and lipid and insulin resistance profile, AHI and oxyhemoglobin saturation.
The prevalence of co-morbidities in obese individuals embarking on a very low calorie diet (VLCD) weight loss programme at lighterlife

Johnston K.L., Dyson L., Cox J., Hewlett B., Capehorn M.

1LighterLife, Cavendish House, Parkway, Harlow Business Park, Harlow, Essex, CM19 5QF

LighterLife is a commercial weight loss provider offering a range of programmes for overweight and obese individuals. Those with conditions which are contra-indicated for a VLCD are refused entry onto this programme and those with certain co-morbidities must see their general practitioner for monitoring. There are strict rules within the UK on the marketing of products which facilitate weight control. Administered by the Advertising Standards Authority (ASA), the Committee for Advertising Practice (CAP) states that ‘Obesity is frequently associated with a medical condition and a treatment for it must not be advertised to the public unless it is to be used under suitably qualified supervision.’ The prevalence of co-morbidities which require medical monitoring in obese individuals embarking on the LighterLife Total VLCD weight loss programme has not previously been investigated. Cross-sectional analysis of client baseline medical data was performed to assess the prevalence of co-morbidities in all obese individuals who applied to embark on the LighterLife VLCD programme in 2014. Data from 14,855 individuals with a mean age of 44.6 (±11.7) years and mean BMI of 36.9 (±6.0) were analysed. 970 individuals (7.3%) without contra-indications (7%) presented with contra-indications for a VLCD and were refused entry onto this programme. 1084 individuals (8.6%) of obese individuals who sought to join the LighterLife VLCD programme in 2014 presented with no obesity related co-morbidities and did not require medical supervision. These data provide insight into the prevalence of co-morbidities in obese individuals prior to joining a weight loss programme which is significantly lower than that suggested by CAP. To ensure that the rules regarding the advertising of weight loss products and programmes to obese individuals are evidence-based, these data should be taken into consideration.

Effect of a dietary weight loss intervention on the lipid profile of obese individuals with signs of non-alcoholic fatty liver disease: Beyond standard lipids.

Verrijken A.,1 Francque S.J., Hilden H.,1 Mertens I.,1 Van Gils C.,1 Dirinck E.,1 Van Marck E.,1 Wouters K.,2 Michielsen P.,1 Taskinen M.R.,1 Van Gaal L.1

1Department of Endocrinology, Diabetology and Metabolic Diseases, Antwerp University Hospital, University of Antwerp, Edegem, Belgium
2Department of Gastroenterology and Hepatology, Antwerp University Hospital, University of Antwerp, Edegem, Belgium
3Division of Cardiology, Department of Medicine, Helsinki University Central Hospital and Biomedicum, Helsinki, Finland
4Department of Pathology, Antwerp University Hospital, University of Antwerp, Edegem, Belgium
5Department of Scientific Coordination and Biostatistics, Antwerp University Hospital, University of Antwerp, Edegem, Belgium

Introduction: Cardiovascular disease (CVD) is an important cause of morbidity and mortality in non-alcoholic fatty liver disease (NAFLD). Dyslipidaemia is one of the suggested mechanisms linking CVD and NAFLD. We assessed an extensive lipid profile in obese patients with NAFLD signs and looked at dietary impact.

Methods: Obese patients had a metabolic and liver assessment. If NAFLD was suspected, liver biopsy was proposed. After 6 months of diet, patients were re-evaluated, including an extensive lipid profile with apolipoproteins, LDL and HDL subspecies.

Results: We selected 73 patients that completed a 6-month weight loss program, with baseline BMI 35.1kg/m² (Q1-Q3:32.4–39.6) and age 48 ± 12y. In 69 patients at least one standard lipid parameter was disturbed at baseline. Biopsy proven liver steatosis was associated with smaller LDL (p = 0.056) and HDL particle size (p = 0.040). This was also reflected by the inverse associations between liver scores for NAFLD/NASH and LDL and HDL particle size. Serum GGT (p < 0.001), Fatty Liver Index (p < 0.001), calculated liver percentage (p < 0.001) and NAFLD liver fat score (p = 0.001) were higher in patients with a hypertriglyceridemic waist. Patients achieved a weight loss of 9.1 ± 5.6% and most parameters of lipid metabolism improved. Changes in some lipids (TG, HDL, HDL2b, HDL3a, HDL3b, HDL mean particle size, ApoB, ApoE, RLP) were related to change in visceral adipose tissue.

Conclusion: We confirm the proatherogenic lipid profile in NAFLD, with high total cholesterol, high LDL and smaller LDL peak particle size. This lipid profile is associated with markers of steatosis and fibrotic NASH, suggesting that dyslipidaemia may play a role in the link between NAFLD and CVD. We observed that weight loss improves most parameters of lipid metabolism.

Diagnosis of diabetes mellitus in a population of obese patients: Ogtt or a1c/fasting plasma glucose

Oliveira I.,1,2 Lau E.,1,3 Cunha F.M.,1,3 Saavedra A.,1,3 Costa M.M.M.,3 Bettencourt-Silva R.,1 Magalhães D.,1 Freitas P.1,2,3 Varela A.1,2,3 Queirós J.1,4 Correia F.1,4 Carvalho O.1,2,3,4 AMTCG Group1

1Endocrinology, Diabetes and Metabolism Department of Centro Hospitalar São João, Porto, Portugal, 2Multidisciplinary Assessment of Surgical Treatment of Morbid Obesity of Centro Hospitalar de São João, Porto, Portugal, 3Faculty of Medicine of University of Porto, Portugal, 4Faculty of Nutrition and Food Sciences of University of Porto, Portugal, 5Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Portugal

Introduction: Obesity is associated with an increased risk of type 2 Diabetes Mellitus (DM). Oral glucose tolerance test (OGTT), fasting plasma glucose (FPG) and A1c test can be use to diagnose the condition. As the OGTT is more expensive and time consuming than alternative tests is questionable to perform the test in all obese patients. Objective: To compare OGTT with A1c and FPG in the diagnosis of DM in obese patients.

Methods: Cross-sectional study of a population of 717 morbidly obese adults evaluated in a Multidisciplinary Assessment of Surgical Treatment of Morbid Obesity between January/2010-December/2013. Demographic, anthropometric and metabolic parameters were evaluated. Diabetes was defined according to ADA criteria.

Results: In a cohort of 717 patients, 629 (87.7%) were female, with a median age of 41 years (IQR 35–51) and a median BMI of 43.5kg/m² (IQR 40.6–47.1). Of 707 patients who performed FPG, 18 (2.5%) met DM criteria; of 657 patients who underwent OGTT, 37 (5.6%) fulfilled DM criteria; of 673 who performed A1c, 25 patients (3.7%) had DM by this criterion. 629 patients performed the three diagnostic tests. Of those, 18 patients (2.9%) did not meet criteria for DM by A1c or FPG, but they were diagnosed by OGTT. The FPG and A1c diagnosed DM in 12 patients (1.9%) with a normal OGTT. The FPG and A1c test showed a specificity of 98% and a sensitivity of 48.6% for the identification of patients with DM compared with OGTT.

Conclusion: OGTT diagnosed diabetes in patients with normal FPG and A1c. FPG or A1c showed a low diagnostic sensitivity, which highlights the importance of performing OGTT in obese patients, in order to reduce the number of undiagnosed cases of diabetes.
Improved cartilage quality indicated by dgemric after more than 12% weight loss with a 16 week formula diet programme in elderly obese with knee osteoarthritis: A cohort study

Hangaard S.1, Gudbergsen H.2,3, Skougaard M.2, Bliddal H.2, Bouert R.1, Riis R.G.1,2, Siversson C.1, Tiderius C.J.2,1, Boesen M.1.
1Department of Radiology, Copenhagen University Hospital, Bispebjerg-Frederiksberg, Denmark,
2The Parker Institute, Department of Rheumatology, Copenhagen University Hospital, Bispebjerg-Frederiksberg, Denmark,
3Knowledgecentre for Telemedicine, Capital Region, Denmark,
4Medical Radiation Physics, Department of Clinical Sciences, Lund University, Skåne University Hospital, Malmö, Sweden

Purpose: To assess if weight loss can improve the quality of hyaline cartilage in patients with Knee osteoarthritis (KOA). Cartilage quality was assessed by delayed Gadolinium Enhanced MRI of Cartilage (dGEMRIC) in 1.5 tesla (T) MRI scanner.

Method and materials: 19 patients (BMI>30) with symptomatic KOA from a 16-week formula diet (Cambridge Weight Plan, Northants., UK) weight loss intervention study were included from the CAROT trial (NCT00655941). Included patients had K/L (Kellgren/Lawrence) grade 1–2 in the lateral tibiofemoral compartment. Inversion recovery dGEMRIC with four inversion times was performed using intra articular contrast at baseline and after 16 weeks. Weight-bearing posterior femoral condyle dGEMRIC with four inversion times was performed using intra articular contrast at baseline and after 16 weeks. Weight-bearing posterior femoral condyle dGEMRIC with four inversion times was performed using intra articular contrast at baseline and after 16 weeks. Weight-bearing posterior femoral condyle dGEMRIC with four inversion times was performed using intra articular contrast at baseline and after 16 weeks.

Results: 9 patients with K/L 1 and 10 patients with K/L 2 were included. No group differences at baseline: dGEMRIC T1-values: 467 ms for K/L 1, and 518 ms for K/L 2 (p = 0.11); at 16 weeks: weight loss: 12.3% of BMI for K/L 1 and 14.3% of BMI for K/L 2 (p = 0.37). Average dGEMRIC T1-value increased with approximately 28 ms (CI: –29; 86) in K/L-group 1, and decreased 61 ms (CI: –116;7) in K/L-group 2 (p = 0.03). Taking baseline dGEMRIC into account, the changes showed the same trend, although less pronounced (p = 0.10). Reproducibility was similar to previous publications: ICCs of 0.96 for intra-reader and 0.92 for inter-reader variability.

Conclusion: Our results indicate that improvement of cartilage quality after more than 12% weight loss may be possible in early stage but not in later stage KOA. The results may indicate a point of no return for improvement of cartilage quality.

Acknowledgement: Supported by the Oak Foundation, the Velux Foundation, Cambridge Weight Plan, Northants., UK, the Danish Rheumatism Association, the Augustinus Foundation, the A.P. Möller Foundation for the Advancement of Medical Science, Erik Hirsch ré and hustru Birgit Hirsch ré fon, Aase og Ejnar Danielsons fond and Bjørne J ensens fond.

Decrease of microalbuminuria (mi) by weight loss induced by bariatric surgery (bs) in patients with morbid obesity (mo)

Hoeißler E.1, Brix J.M.1, Barnas U.1, Kopp H.P.1, Sperker C.1, Scherntner H.G.1, Scherntner G.1, Ludvik B.1.
1Department of Medicine I, Rudolfstiftung Hospital, Vienna, Austria,
2Department of Surgery, Rudolfstiftung Hospital, Vienna, Austria,
3Department of Medicine II, Division of Angiology, Medical University of Vienna, Vienna, Austria

Introduction: Since MI is an important risk factor for both kidney and cardiovascular disease, we investigated albumin excretion rate (AER) and renal parameters and lipids were assessed. HOMA-IR and eGFR (CKD-Epi formula) were calculated, AER was quantified by collecting 24h urine on 3 consecutive days. Hyperfiltration was defined as eGFR > 90ml/min/1.73m².

Results: 246 of 1280 (19.2%) patients had MI (16.1%) or macroalbuminuria (MA;3.1%) and 623 (48.7%; mean eGFR 105.4±15.0ml/min/1.73m²) had hyperfiltration. Patients with diabetes (n=274), had more often (x²=34.712; p<0.001) an increased AER (30.9% vs 14.6%) compared to patients without (n=733). Patients with MI were more obese (p<0.001), older (p = 0.002), had a higher systolic (p<0.001) and diastolic blood pressure (p = 0.001), fasting blood glucose (p = 0.001) and 1h postprandial (pp) blood glucose levels (p = 0.001), HbA1c (p<0.001), fasting (p<0.001), 1h pp (p = 0.001), 2h pp insulin levels (p = 0.010) and HO-MA-IR (p<0.001), triglycerides (p<0.001) and HDL cholesterol levels (p<0.001) compared to normoalbuminuria. After BS (mean weight loss 41±12kg), AER decreased from 12.2 (6.8–23.1) to 8.9 (5.3–14.8) mg/24h (p<0.001) in the whole and from 59.9 (39.6–104.1) to 12.1 (8.2–28.4) mg/24h (p<0.001) in the MI group and only 9.7% (n=28) had still MI or MA.

Conclusion: Increased AER and hyperfiltration are present in a substantial portion of patients with MI. Weight loss induces a dramatic decrease of AER by about 50%, which parallels reduction of risk factors.

**TB.P0.011**

**Bariatric surgery as hypouricemiant therapy in a population of obese**

Costa M.M.1,2, Saavedra A.M.1,2, Oliveira J.1,3, Cunha F.1,3, Lau E.1,3, Silva R.1, Magalhães D.1, Santos A.C.1, Freitas P.1,2, Varela A.1,3, Queiros J.1, Correia F.1, Carvalho D.1,2

1Department of Endocrinology, Centro Hospitalar Sao Joao, Porto, Portugal, 2Department of Clinical Epidemiology, Predictive Medicine and Public Health, Faculty of Medicine, Porto, Porto, Portugal, 3Faculty of Medicine, Porto University, Portugal, 4Faculty of Nutrition and Food Sciences, Porto University, Portugal

**Introduction:** Hyperuricemia is considered by some authors as a risk factor for cardiovascular disease and several studies demonstrated association between hyperuricemia and increased cardiovascular mortality. Bariatric surgery (BS) in addition to the reduction in weight can lead to improvement in obesity comorbidities including hyperuricemia.

**Objective:** Evaluation of the prevalence of hyperuricemia in a population of obese patients underwent BS before and 12 months after the procedure.

**Methods:** Retrospective study of patients who underwent BS between January 2010 and June 2013. We included only patients with uric acid assay at 0 and 12 months after surgery. We compared the uric acid (UA) and the prevalence of hyperuricemia before and after the procedure. Hyperuricemia is defined by uric acid value greater than 6.8 mg/dL.

**Results:** 791 patients were included, with mean age of 42.7 ± 10.8 years and BMI 44.4 ± 5.6 kg/m². We observed decreased of uricemia in the total sample (before 5.9 vs 12m 4.6 mg/dL, p <0.001), in females (before 5.8 mg/dL vs 12m 4.3 mg/dL, p <0.001) and in males (before 6.6 mg/dL vs 12m 6.5 mg/dL, p <0.001). For hyperuricemia there was a reduction in the prevalence (total sample – before 12.9% vs 12m 4.2%; Female gender - before 8.2% vs 12m 1.8%; Male - before 44.7% vs 12m 20.4%, p <0.001 for all).

**Discussion:** The UA values and the prevalence of hyperuricemia were higher in males, which is in agreement with other studies. The BS was shown to be useful in reducing the UA values and decreased prevalence of hyperuricemia. These results demonstrate the effectiveness of BS as hypouricemiant therapy. In obese patients with gout treated with hipouricemic drugs, the BS can be an opportunity for suspension of these drugs.

**TB.P0.012**

**The diagnostic dilemma for type 2 diabetes in patients with morbid obesity**

Feder A.1, Kopp H.P.2, Brix J.M.3, Scherthanher G.H.1, Scherthanher G.1, Ludvik B.1

1Department of Medicine I, Rudolfstiftung Hospital Vienna, Vienna, Austria, 2Department of Medicine II, Division of Angiology, Medical University of Vienna, Vienna, Austria

**Background:** The incidence of type 2 diabetes (T2DM) amongst patients undergoing bariatric surgery ranges from 15–23%. In 2010 HbA1c was recommended for use as a diagnostic test for diabetes by the ADA. This is the first study comparing the different diagnostic criteria (DC) for diabetes in a large cohort of patients with MO

**Methods:** In total 926 patients with MO (mean age 40 ± 12 years) were included, of whom 14.2% (n=145) had a known T2DM and were therefore excluded. All patients with unknown T2DM (n=781) underwent an oral glucose tolerance test (OGTT; 75g glucose) and were included. The thresholds of DC for diabetes were HbA1c≥6.5%, fasting plasma glucose (FPG) ≥126mg/dL and 2 hour post-challenge glucose ≥200mg/dL. Insulin levels were assessed in the fasting state as well post OGTT and HOMA-IR was 8 (5;13) in the group defined by HbA1c, 9 (8;14) in the 2 hour post-challenge glucose and 10 (7;18) in the group defined by FPG.

**Conclusion:** The present study indicates a significantly higher prevalence of diabetes when HbA1c or 2 hour glucose are used as DC in comparison with FPG indicating that the previously used FPG criteria underestimate the existence of diabetes in patients with morbid obesity.

**TB.P0.013**

**Anthropometric Approach to Insulin Resistance: Neck Circumference Measurement**

Kaner G.1, Soylu M.1, Pamuk C.1, Inanc N.1,2

1Department of Nutrition and Dietetics, Faculty of Health Sciences, University of Nuh Naci Yazgan, Kayseri, Turkey, 2Department of Nutrition and Dietetics, Faculty of Health Sciences, University of Nuh Naci Yazgan, Kayseri, Turkey

**Insulin resistance is associated with visceral fat content. Neck circumference is an index for upper body subcutaneous adipose tissue distribution. In addition, neck circumference has been evaluated in relation to insulin resistance.** The aim of the present study was to determine the relationship between neck circumference and insulin resistance. A total of 104 women in normal weight (BMI: 18.5–24.9 kg/m², n=51), and obese (BMI: ≥30 kg/m², n=53) aged 20–49 years, were included in the study. In this study, biochemical parameters (glucose, insulin, HbA1C) were performed after 8–10 hours fasting. Homeostasis model assessment of insulin resistance (HOMA-IR) was calculated as fasting glucose level (μU/mL)/fasting insulin level (mg/dL) /405. Neck circumference (at the level of the thyroid cartilage) were measured and cut off value was accepted 35 cm for women. Mean BMI of normal weight and obese women were 23.8 ± 3.4 kg/ m², 35.2 ± 1.2 kg/m², respectively. It was determined that all of the obese women's neck circumference were above the 35 cm. Mean neck circumference of obese and normal weight women were 37.2 ± 1.9 cm and 31.0 ± 1.6 cm, respectively. Mean HOMA value of obese and normal weight women were 2.7 ± 1.3, 1.2 ± 0.57. Obese women's HOMA value was above the normal range (<2.5). A significant relationship was found between HOMA, HbA1C, BMI, glucose and insulin levels and neck circumference (p < 0.05). It was determined that neck circumference strongly correlated with BMI, glucose, insulin, HOMA (p = 0.000). At the end of this study, it was concluded that neck circumference is associated with BMI and insulin resistance. Neck circumference measurement could be used in clinical screening of obese patients. Moreover, determination of beneficial effects of neck circumference may be valuable for studies in future.
Methods: 3485 obese individuals receiving bariatric surgery or conventional treatment were included in this report. Individuals were grouped into four BMI categories according to baseline BMI (<35; 35–40; 40–45; or ≥45 kg/m²) and five weight change categories depending on the resulting BMI at 2 years (weight increase [≥1 BMI unit increase], weight stable (less than 1 BMI unit change), minor weight reduction (~1 to ~9 BMI units), medium weight reduction (~0 to ~14 BMI units), and major weight reduction (more than ~15 BMI units). The incidence and remission of T2D at 2 years was assessed.

Results: Among weight stable individuals, T2D incidence rates were 5.5, 7.4, 8.3 and 5.2%, in the four baseline BMI categories, respectively. Among those with an initial BMI of 35–40, 40–45 and ≥45 attaining a minor reduction of weight, the corresponding rates were 1.3, 1.2 and 3.4%, respectively. In the medium/major weight reduction groups, T2D incidence was ≤0.5%. Among weight stable individuals with T2D at baseline, the T2D remission rates were 15.3–26.9%, and for individuals attaining a minor weight reduction, remission rates were 48.1–70%. In the medium/major weight reduction groups, the remission rates were 77–97%. There were no differences in the 2-year incidence and remission rates between the different baseline BMI groups obtaining the same degree of weight reduction.

Conclusion: Our results suggest that, in obese subjects, the favourable effect of weight reduction on T2D incidence and remission is independent of the initial degree of obesity.

Acknowledgement: We thank the staff members at 480 primary health care centers and 25 surgical departments in Sweden that participated in the study.

T8:PO.015
Weight loss success in obese knee osteoarthritic patients is independent of pressure-pain sensitivity at enrolment: A prospective cohort study
Jørgensen TS,1 Henriksen M,1 Christensen R,1 Bliddal H,1 Jespersen A.1
1The Parker Institute, Department of Rheumatology, Copenhagen University Hospital, Bispebjerg and Frederiksberg, Denmark

Purpose: Weight loss is a recommended treatment for adipose patients with knee osteoarthritis (KOA). It is unknown if sensitization of the nociceptive system prevents improvement in pain induced by weight loss. The aim of the study was to investigate if baseline pressure-pain sensitivity of the lower leg influences weight loss success of a diet intervention in obese KOA patients.

Methods: 168 out of 192 participants from a prospective cohort were included (ClinicalTrials.gov identifier: NCT00655941). A computerized tourneiquet cuff pressure algometer was used to determine pressure pain sensitivity. Pressure-pain threshold (PPT), pressure-pain tolerance threshold (PTT) and tolerance threshold pain score (TTPvas) was measured before a 16-week diet intervention. We dichotomised the changes in pain and body weight into treatment response (y/n) knee pain improvement >30%, and weight loss success (y/n) defined as a weight loss >10%. We assessed the associations between baseline pain sensitivity variables and the binary variables predicting response/success.

Results: 30% achieved an improvement in knee pain above 30% (mean change: 9.6 [SD 14.5]/mm). Baseline pressure pain sensitivity could not predict improvements in knee pain above 30% (PPT: OR=1.03 [95% CI 0.99 to 1.08]/kPa; PTT: OR=1.01 [95% CI 0.98 to 1.04]/kPa; TTPvas: OR=1.06 (95% CI 0.85 to 1.32)/mm). 74% achieved a weight loss above 10% (mean change: –12.6 [SD 6.1]/kg). Baseline pressure pain sensitivity could not predict weight loss success either (PPT: OR=1.01 [95% CI 0.97 to 1.06]; PTT: OR=1.01 [95% CI 0.98 to 1.04]; TTPvas: OR=1.03 [95% CI 0.84 to 1.27]).

Conclusions: Pressure pain sensitivity at baseline does neither have a prognostic value for predicting the clinical outcome nor the weight loss success of a diet intervention in obese KOA patients. These results suggest that all obese patients with KOA will benefit from weight loss intervention treatment independently of any sensitization of their nociceptive system.

Acknowledgement: This study was supported by grants from The Oak Foundation, The Cambridge Health and Weight plan UK, The Danish Rheumatism Association, The Augustinus Foundation, The A.P. Møller Foundation for the Advancement of Medical Science, Herslev Foundation, Bjarne Jensens Foundation and Aase and Ejnar Danielsen Foundation

T8:PO.016
Determinants of evolution of glomerular filtration rate one year after bariatric surgery
Coupaye M,1 Flamont M,1 Sami O,1 Calabrese D,1 Ledoux S.1
1Service des Explorations Fonctionnelles-Centre de l’obésité (CINFO), Hôpital Louis Mourier, Faculté Paris Diderot, 92700 Colombes, France
2Service des Explorations Fonctionnelles-Hôpital Bichat, Faculté Paris Diderot, 75018 Paris, France
3Service de Chirurgie-Centre de l’obésité (CINFO), Hôpital Louis Mourier, Faculté Paris Diderot, 92700 Colombes, France

Introduction: Many studies have shown that hyperfiltration induced by obesity decreases after bariatric surgery, but some studies also shown an increase of glomerular filtration rate (GFR). Furthermore, the factors that influence GFR after bariatric surgery have been poorly studied.

Methods: We studied the evolution of GFR in 323 candidates for bariatric surgery (age 43 ± 11 yr, MJF 49/274, BMI 46 ± 7 kg/m²), by measuring creatinine clearance (assessment of plasma and 24h-urinary creatinine) before and one year after surgery. The links between creatinine clearance and clinical and biological parameters were also studied.

Results: Excess weight loss was 61 ± 24%. Body surface decreased from 2.26 ± 0.23 to 1.98 ± 0.21 m² (p < 0.001). Plasma creatinine decreased from 72 ± 16 to 69 ± 36 µmol/l (p < 0.001) and 24h-urinary creatinine from 13.4 ± 4.8 to 11.5 ± 4.5 mmol/24h (p < 0.001). Mean GFR decreased from 133 ± 37 to 122 ± 49 ml/min (p < 0.001) in parallel to body surface. GFR decreased in subjects with preoperative GFR > 120 ml/min (p < 0.001), but was stable in those with 90–GFR 120 ml/min and increased in those with GFR-90 ml/min (p < 0.01). In multivariate analysis, GFR did not correlate with blood pressure or metabolic parameters, but correlated positively with body surface (p < 0.001) and protein intake (p < 0.01) and negatively with age (p < 0.001) and persistence of antihypertensive drugs (p < 0.001) after surgery.

Conclusion: GFR decreased after bariatric surgery in subjects with hyperfiltration, but increased in subjects with renal failure. The main determinants of creatinine clearance after surgery were surgery body surface, age, protein intake and antihypertensive treatment.

T8 – Metabolic outcomes (diabetes, lipids, hypertension)

T8:PO.017
Effect of metformin on cardiometabolic risk factors in patients with abdominal obesity and non-alcoholic fatty liver disease (NAFLD)
Komishlova KA,1 Trushina EA,2 Ershova EV,1 Mazarina NV.1
1Endocrinology Research Center, Moscow, Russian Federation

Introduction: NAFLD is the chronic disease associated with obesity, insulin resistance and cardiometabolic diseases. Aim: to study the efficacy of metformin and its impact on cardiometabolic risk factors in patients with abdominal obesity with NAFLD according to liver biopsy.

Methods: 77 patients aged 30–50 were divided into a control group of non-pharmacological treatment (n=37) and primary (n=40) with metformin 2 g per day for 1 year.

Results: The group with metformin: the median weight loss in the study and control groups was 6.3 and 3.0 kg (p = 0.002), BMI - 2.3 and 1.2
Introduction: The objective of study was the assessment of obesity and insulin resistance (IR) in patients with type 1 Diabetes Mellitus (DM) with and without chronic kidney disease (CKD).

Methods: We analysed a random sample of 140 patients with type 1 DM, 40% women and 60% men, to whom were recorded: age, gender, duration of DM, IR parameters ((waist circumference (WC), body mass index (BMI), waist-hip ratio (WHR), glycated hemoglobin (HbA1c), estimated Glomerular Filtration Rate (eGFR)(MDRD-4). CKD was defined as eGFR < 60 ml/min/1.73 m² or urinary albumin to creatinine ratio ≥ 30 mg/g.

Results: The prevalence of CKD was 58.57% (42.85% of women and 60% men, to whom were recorded: age, gender, duration of DM, IR parameters ((waist circumference (WC), body mass index (BMI), waist-hip ratio (WHR), glycated hemoglobin (HbA1c), estimated glucose disposal rate (eGDR), the daily insulin requirement, C peptide, hypertensive status, dyslipidaemia, poor glycemic control, C peptide, the daily insulin requirement, smoking status, retinopathy were significantly associated with BCR (P < 0.005). IR parameters are associated with CKD.

Conclusion: A therapy with metformin in patients with abdominal obesity contributes to a significant reduction in body weight and correction associated with NAFLD cardiometabolic disorders.
improvements in two serum biomarkers for CRC risk. Analysis of tissue biopsies is underway and will provide insight into the effect of weight loss on molecular markers in target tissues for CRC.

Acknowledgement: Research relating to this abstract was funded by Cancer Research UK. Meal replacement products were supplied by the Cambridge Weight Plan®, Northants, UK.

T8:PO.021
Association between obstructive sleep apnea screening and adverse pregnancy outcomes among obese gravidas

Weatherford R.D.1, Henderson J.L.1, Goldshore M.A.2,3, Weatherford J.S.4
1Department of Gynecology and Obstetrics, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA,
2Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland, USA,
3The School of Medicine and Health Sciences, George Washington University, Washington, DC, USA,
4Department of Professional Studies, University of Wyoming, Laramie, Wyoming, USA

Background: Obstructive sleep apnea (OSA) in pregnancy may be associated with preeclampsia (PEC), cesarean delivery (CD) and gestational diabetes mellitus (GDM). We implemented the STOPBANG Questionnaire (SB), a common screening tool for OSA, in a subspecialty obstetrics clinic established to mitigate gestational weight gain in low-income, urban obese gravidas. Subjects met biweekly with a maternal-fetal medicine specialist, a nutritionist and a social worker to enact lifestyle changes for enhanced health.

Objective: To evaluate the association between the SB findings and adverse maternal outcomes among an obese, pregnant cohort.

Methods: Of the 297 women prospectively enrolled in the cohort, 157 had both delivery and SB data and thus were included in the current analysis. BMI was measured at the time of SB screening. The associations between SB findings and adverse maternal outcomes were analyzed using multiple logistic regression to control for potential confounders, including age, parity, hypertension, and BMI.

Results: BMI ranged from 30 to 71 kg/m^2 (M=41, SD=7.5), age from 15 to 42 years (M=26.7, SD=5.6) and 93% were African American. 46% of women screened positive for OSA using SB. A + SB screen was associated with an increased risk of GDM (OR=2.71, CI=1.02–7.21) but was not associated with preeclampsia (OR=0.9, CI=0.3–2.6) or with BMI ≥30 kg/m^2, were randomised 2:1 to once-daily liraglutide 3.0 mg (n=2487) or placebo (PBO) (n=1244). Data are observed means for the full analysis set (with LOCF at week 56, unless stated otherwise. Statistical analyses are estimated treatment differences (ETD; ANCOVA, continuous variables) or odds ratios (OR; logistic regression, categorical). Baseline BMI subgroups were ≤29.9, 30–34.9, 35–39.9 and ≥40 kg/m^2. Baseline characteristics were age 45y, 79% female, body weight (BW) 106 kg, BMI 38 kg/m^2 and 61% with prediabetes. A total of 92% of patients on liraglutide lost BW vs 65% on PBO (figure). Completers on liraglutide (n=1789, 72%) lost 9.2% (9.7 kg) of BW vs 3.5% (3.8 kg) on PBO (n=801, 64%); ETD:−5.7% (p < 0.0001). In total, 73% of completers on liraglutide lost ≥5% BW vs 35% on PBO (OR 5.0, p < 0.0001). BW loss of >10% occurred in 41% vs 14% (OR 4.0, p < 0.0001) of liraglutide-treated vs PBO-treated patients. Overall, BW loss with liraglutide was similar in those with and without prediabetes at screening (−8.0% vs −7.9%, respectively, p = 0.59) and across baseline BMI subgroups (% p = 0.054; kg, p = 0.54). Non-completion was mainly due to GI AEs and lack of efficacy for liraglutide and PBO groups respectively. In conclusion, liraglutide 3.0 mg, as adjunct to diet and exercise, induced significant BW loss compared to placebo; 92% of subjects treated with liraglutide lost weight. For liraglutide-treated patients completing the study, mean BW loss was 9.2% vs 3.5% on PBO. BW loss with liraglutide was independent of baseline prediabetes status and BMI.

Acknowledgement: Supported by Novo Nordisk

Fig. 1. Distribution of weight loss over 56 weeks in the SCALE Obesity and Prediabetes randomised trial.

T8:PO.022
Additional analyses of the weight-lowering efficacy of liraglutide 3.0 Mg in overweight and obese adults: The scale obesity and prediabetes randomised trial

Krempf M.1, Astrup A.2, Fujioka K.3, Greenway F.4, Halpern S.5, Le Roux C.6, Violante Ortiz R.7, Wilding J.P.1, Jensen C. B.8,9, Svendsen C. B.10, Pi-Sunyer X.11
1Université de Nantes, Nantes, France,
2University of Copenhagen, Copenhagen, Denmark,
3Scipiis Clinic, La Jolla, CA, USA,
4Pennington Biomedical Research Center, Louisiana State University, Baton Rouge, LA, USA,
5University of São Paulo Medical School, São Paulo, Brazil,
6University of Calgary, AB, Canada,
7University College Dublin, Dublin, Ireland,
8Instituto Mexicano del Seguro Social, Ciudad Madero, México,
9University of Liverpool, Liverpool, UK,
10Novo Nordisk A/S, Sørborg, Denmark,
11Columbia University, New York, NY, USA

This trial investigated the safety and efficacy of liraglutide 3.0 mg for weight management as adjunct to a 500 kcal/day deficit diet and exercise program (NCT01272219). Adults with BMI ≥27 kg/m^2, and ≥1 comorbidity or with BMI ≥30 kg/m^2, were randomised 2:1 to once-daily liraglutide 3.0 mg (n=2487) or placebo (PBO) (n=1244). Data are observed means for the full analysis set with LOCF at week 56, unless stated otherwise. Statistical analyses are estimated treatment differences (ETD; ANCOVA, continuous variables) or odds ratios (OR; logistic regression, categorical). Baseline BMI subgroups were ≤29.9, 30–34.9, 35–39.9 and ≥40 kg/m^2. Baseline characteristics were age 45y, 79% female, body weight (BW) 106 kg, BMI 38 kg/m^2 and 61% with prediabetes. A total of 92% of patients on liraglutide lost BW vs 65% on PBO (figure). Completers on liraglutide (n=1789, 72%) lost 9.2% (9.7 kg) of BW vs 3.5% (3.8 kg) on PBO (n=801, 64%); ETD:−5.7% (p < 0.0001). In total, 73% of completers on liraglutide lost ≥5% BW vs 35% on PBO (OR 5.0, p < 0.0001). BW loss of >10% occurred in 41% vs 14% (OR 4.0, p < 0.0001) of liraglutide-treated vs PBO-treated patients. Overall, BW loss with liraglutide was similar in those with and without prediabetes at screening (−8.0% vs −7.9%, respectively, p = 0.59) and across baseline BMI subgroups (% p = 0.054; kg, p = 0.54). Non-completion was mainly due to GI AEs and lack of efficacy for liraglutide and PBO groups respectively. In conclusion, liraglutide 3.0 mg, as adjunct to diet and exercise, induced significant BW loss compared to placebo; 92% of subjects treated with liraglutide lost weight. For liraglutide-treated patients completing the study, mean BW loss was 9.2% vs 3.5% on PBO. BW loss with liraglutide was independent of baseline prediabetes status and BMI.

Acknowledgement: Supported by Novo Nordisk

Fig. 1. OSA Screening and Maternal Health Outcomes

Fig. 1. Distribution of weight loss over 56 weeks in the SCALE Obesity and Prediabetes trial.
The influence of obesity and diabetes on the effectiveness of statin therapy in patients with increased cardiovascular risk.

Holecki M1, Dulawa J1, Almgren-Rachtan A2, Chudek J3
1Department of Internal Medicine and Metabolic Diseases, School of Health Science, Medical University of Silesia, Katowice, Poland;
2Department of Pharmacovigilance, Europharma Rachtan Co.Ltd. Katowice, Poland;
3Pathophysiology Unit, Department of Pathophysiology, Medical University of Silesia, Katowice, Poland

Background: Statins are used to reduce cardiovascular risk in patients with cardiovascular diseases. However, the effectiveness of therapy in many cases remains unsatisfactory. The aim of this study was to evaluate the efficacy of statin therapy in patients with elevated cardiovascular risk and the factors affecting the efficacy of treatment. Participants and methods: This study was conducted on the basis of questionnaires obtained from 8998 adult patients diagnosed with cardiovascular diseases, by cardiologists based on the patient history and physical examination of the patient and the available documentation during routine cardiological outpatient consultations.

Results: 39.4% of respondents were obese according to WHO criteria and 62.3% according to the IDF criteria of visceral obesity. 24.3% of patients had been diagnosed with type 2 diabetes. The most commonly utilized statin was atorvastatin (44.6%), followed by simvastatin (30.6%) and rosuvastatin (25.4%). Treatment was not considered fully effective in 2999 (91.8%) of patients (treated with a statin for at least 3 months) with reported recent complete lipid profile on statin therapy: LDL-cholesterol target, adjusted for cardiovascular risk, was obtained by 8.2% of study participants, most frequently on rosuvastatin therapy (18.4% of treated). Patients with very high risk of cardiovascular disease were least likely to attain target LDL cholesterol - 3.4%. The effectiveness of treatment decreased along with nutritional status (13.8% with normal weight, 9.8% of overweight and 5.2% obese) and was lower in patients with type 2 diabetes (5.4% vs. 9.4% without diabetes, p < 0.001).

Conclusions: The effectiveness of treatment of hypercholesterolemia with statins is low, not adjusting for cardiovascular risk. Obesity, and type 2 diabetes are among factors limiting the efficacy of statins treatment.

Can weight loss outcomes be improved by teaching weight maintenance skills before a weight loss intervention?

Fuller N.R.1, Sainsbury A.1, Caterson I.D.1, Denyer G.1, Fong M.1, Geroﬁ J.1, Williams K.H.1, Lau N.S.1, Markovic T.P.1
1The Boden Institute, The University of Sydney, Australia

Introduction: Previous research has shown that teaching weight maintenance skills prior to a weight loss intervention leads to better long-term weight maintenance outcomes. Within the context of a randomised, controlled trial looking at the effects of a high versus low egg diet on circulating lipid proﬁles, we sought to determine whether implementation of a weight maintenance program before a weight loss program would lead to better weight outcomes.

Methods: 140 overweight or obese participants with pre-diabetes or type 2 diabetes were randomised. Participants attended the clinic monthly for the first six months. For the first three months, participants were instructed to maintain their weight whilst making healthier food choices. For the ensuing three months (3–6 months), they were prescribed a daily energy restriction of 500 kcal per day and instructed on the specific types and quantities of foods to consume. No intervention took place during the follow-up (6–12 months).

Results: Baseline BMI of participants (mean±standard deviation (SD)) was 34.5 ± 6.2 kg/m² and body weight was 95.7 ± 19.1 kg. Only a small 1.8 ± 2.5 kg weight loss was evident during the weight loss intervention (3–6 months). However, weight loss continued after the end of the intervention, from 6–12 months, to 3.1 ± 5.8 kg. When assessing the change in weight from the initial contact with participants (month 0), the total weight loss over the 12 month study was 3.8 ± 5.8 kilograms (~4% of initial body weight). There were no significant differences in weight change between the two groups.

Conclusion: Weight loss continued from end of intervention to end of follow-up. These findings provide indirect support for the concept of teaching participants how to maintain a consistent body weight prior to weight loss interventions as typically weight regains after the end of an intervention. A longer-term follow-up > 12 months is needed in future studies.

Reference:

Preterm delivery is related to pre-pregnancy obesity in mothers with gestational diabetes

Barquiel B.1, Cos A.1, Hillman N.1, Burgos M.A.1, Pallardo L.F.1, Herranz L.1
1Diabetes and Pregnancy Unit. Obesity Unit. Department of Endocrinology. University Hospital La Paz. Madrid. Spain

Aim: To assess the association between preterm delivery, pre-pregnancy body mass index (pre-BMI), overweight and obesity in mothers with gestational diabetes (GDM).

Method: Observational retrospective study including all women with GDM and singleton pregnancies followed in our Unit (N=3,151). Women with pregestational diabetes were excluded. Associations between preterm delivery and pre-BMI, overweight, obesity, age, GDM severity defined by fasting glucose and area under the 100g-oral glucose tolerance test (OGTT) at GDM diagnosis; fasting insulinemia previous to GDM treatment, gestational age at GDM diagnosis, insulin treatment, excess gestational weight gain, urogenital infection, hydramnios and pregnancy-induced hypertensive disorder were studied. Student’s t, Mann-Whitney U and two-sided X2 tests were used in univariate analyses. Preterm delivery associated factors (P < 0.005) were introduced in a multiple logistic regression model.

Results: Preterm delivery was reported in 126 (4.0%) of GDM mothers. It was associated with pre-BMI (24.7 ± 4.6 vs. 26.0 ± 5.4 kg/m² in preterm deliveries, P = 0.014), pre-pregnancy obesity (3.1 vs. 5.4%, P = 0.036), maternal age (mean±SD: 33 ± 4 vs. 34 ± 5, P < 0.001), fasting glucose (90 ± 14 vs. 94 ± 17 mg/dl, P = 0.032) area under the 100g-OGTT (513 ± 52 vs. 522 ± 63 mg/dl-min, P = 0.048), fasting insulinemia (median(IQ range): 10 (7–13) vs. 13 (9–17) μU/ml, P = 0.009), lower gestational age at GDM diagnosis (27 ± 5 vs. 25 ± 6, P = 0.006) and pregnancy-induced hypertensive disorder (6.2% vs. 11.2%, P = 0.027). Pregnancy-induced hypertensive disorder was the main risk factor of preterm delivery in multivariate analysis (AOR 95%CI) (1.90 1.07–1.37). This risk magnitude was increased in mothers (N=336) being obese pre-pregnancy (4.38 1.24–15.49).

Conclusion: In GDM mothers, preterm delivery is related to being obese pre-pregnancy. GDM mothers with pregnancy-induced hypertensive disorders are at the highest risk of preterm delivery if they were obese pre-pregnancy.
## Efficacy and safety of liraglutide 3.0 Mg and 1.8 Mg in weight loss responders vs non-responders in overweight/obese adults with type 2 diabetes (T2d): A subgroup analysis of the SCALE diabetes trial

Mosenzon O1, Bergenstal R2, Davies M3, DeFranzo R4, Skjért T5, Noctor M6, Kushner R7

1Hadassah Hebrew University Hospital, Jerusalem, Israel, 2International Diabetes Center, Minneapolis, MN, USA, 3Diabetes Research Centre, University of Leicester, Leicester, UK, 4Texas Diabetes Institute, San Antonio, TX, USA, 5Novo Nordisk, Søborg, Denmark, 6Northwestern University, Chicago, IL, USA

SCALE Diabetes (NCT01272232) evaluates the efficacy and safety of liraglutide for weight management in overweight/obese adults with T2D. This subgroup analysis compares outcomes in responders (weight loss ≥5%) vs non-responders (WL<5%) at 56 wk. Adults (50% male, mean age 55 yr, BMI 37 kg/m2, HbA1c 7.9% and T2D duration 7.3 yr) were randomised 2:1:1 to liraglutide 3.0 mg (n=423), 1.8 mg (n=211) or placebo (PBO) (n=212) as adjuncts to diet and exercise. Change from baseline are LS means (efficacy) or observed means (safety) with LOCF. More individuals on liraglutide 3.0 mg (49.9%) and 1.8 mg (35.6%) were responders compared with PBO (13.8%), p < 0.0001. Mean WL for liraglutide 3.0 mg, 1.8 mg and placebo responders and non-responders is shown in Table. Consistent with greater WL, responders on liraglutide 3.0 mg and 1.8 mg had improved efficacy outcomes vs non-responders (Table). In responders and non-responders AEs were reported by 96 vs 92% and 96 vs 90% for liraglutide 3.0 mg and 1.8 mg respectively, and 94 vs 85% for PBO. SAE frequency was similar in responders and non-responders. Most AEs were GI and were more common in responders vs non-responders with liraglutide 3.0 mg (76 vs 55%) but not different for liraglutide 1.8 mg (58 vs 57%) and PBO (41 vs 39%). Rates (events/pt/yr) of documented symptomatic hypoglycemia (PGS≥56 mg/dL) were similar in responders vs non-responders across all groups: liraglutide 3.0 mg (0.9 vs 0.8), liraglutide 1.8 mg (0.8 vs 1.1); placebo (0.1 vs 0.3). Mean change in pulse across groups is shown in Table. In conclusion, more individuals achieved ≥5% WL with liraglutide 3.0 mg and 1.8 mg. Non-responders on liraglutide still had significant improvements in HbA1c, indicating a WL-independent effect. AE incidence was similar across subgroups.

**Acknowledgement:** Supported by Novo Nordisk

<table>
<thead>
<tr>
<th>SCALE Diabetes</th>
<th>change in efficacy endpoints from baseline at 56 weeks</th>
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</thead>
<tbody>
<tr>
<td><strong>Efficacy endpoints</strong></td>
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<tr>
<td>WC,QOL, total score</td>
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<tr>
<td>Pulse rate, b/min (SD)</td>
<td>1.4 (0.5)</td>
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</table>

Responders, subjects who achieved ≥5% weight loss. Non-responders, subjects who achieved <1% weight loss or who experienced weight gain. Efficacy endpoints are least-squares mean changes from baseline. LGF: Safety endpoints are observed means (LOCF) for pulse.

**Fig. 1.** Efficacy and safety endpoints for responders and non-responders on liraglutide 3.0 mg, liraglutide 1.8 mg and placebo in the SCALE Diabetes trial.

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## Significant increase of low magnesium (mg) serum levels in diabetic patients after weight loss induced by bariatric surgery (bs)

Brix J.M1, Kopp H.P.2, Speker C.3, Schernthaner G.H.4, Schernthaner G.5, Ludvik B.6

1Department of Medicine I, Rudolfstiftung Hospital, Vienna, Austria, 2Department of Surgery, Rudolfstiftung Hospital, Vienna, Austria, 3Department of Medicine II, Division of Angiology, Medical University of Vienna, Vienna, Austria

**Background:** Low Mg levels are associated with insulin resistance, type 2 diabetes (DM), but also vascular calcification and subsequently cardiovascular events. The aim of this study was to assess Mg levels in patients with morbid obesity (MO) before and after BS.

**Methods:** 302 patients with MO (82.1% women, mean BMI 46.2 ± 6.7 kg/m2) were investigated in a longitudinal study before and 2 years after BS and compared to 92 non-obese healthy controls (CO; mean BMI 25.6 ± 4.5 kg/m2). Serum Mg levels and cardiovascular risk factors were assessed. All patients underwent a 2-hour 75g OGTT which revealed: 60 patients with DM, 53 with impaired fasting glucose (IGT) and 189 with normal glucose tolerance (NGT).

**Results:** Patients with MO had significantly lower levels of Mg than CO (0.84 ± 0.07 mmol/l vs 0.92 ± 0.06 mmol/l, p < 0.001). After BS an increase of Mg was noted (0.85 ± 0.08 mmol/l, p = 0.014), but did not reach the levels of CO (0.92 ± 0.06 mmol/l, p < 0.001). Before BS we found a step-wise decrease of Mg levels from NGT over IGT to DM (0.80 ± 0.09 vs 0.84 ± 0.07 vs 0.85 ± 0.07, p < 0.001). The difference in Mg between DM/IGT (p = 0.009) and DM/NGT (p = 0.001) were significant. Post surgery Mg values were not different between the subgroups. Concordantly we obtained a difference between changes of Mg levels pre- to post-op between the three subgroups; overall: p < 0.001; DM (increase 7%): p < 0.001; IGT (increase 1%) = 0.858, NGT (increase 1%): p = 0.657. Multivariate regression demonstrated fasting blood glucose as the strongest predictor of Mg levels (Beta=-0.22, p < 0.001).

**Conclusion:** Patients with morbid obesity have significantly lower serum Mg levels before as well as after weight loss due to BS compared to CO. The increase in the whole group is mainly due to the 7% increase of Mg levels in the group of patients with DM.

**Tables:**

**TBP.026**

### Diabetes remission is higher in men compared to women after bariatric surgery


1Department of Medicine I, Rudolfstiftung Hospital Vienna, Vienna, Austria, 2Department of Surgery, Rudolfstiftung Hospital Vienna, Vienna, Austria, 3Department of Medicine II, Division of Angiology, Medical University of Vienna, Vienna, Austria

**Introduction:** The majority of patients undergoing bariatric surgery (BS) are women. Women and men have a different risk for gaining cardiovascular (CV) disease. It is still not clear if morbidly obese men have the same risk profile as women. Therefore we investigated gender differences regarding diabetes and weight loss in patients before and after BS.

**Methods:** We included 438 patients with MO (mean age 40 ± 12 years, 347 (84%) females, 66 males) before and 2 years after BS. In patients without diabetes a 75g OGTT was performed. Diabetes Mellitus was defined by ADA criteria. Apart from demographic and CV risk factors renal, inflammation parameters and Insulin levels were assessed. HOMA-Insulin resistance (IR) was calculated.

**Results:** Women and men did neither differ in age (40 ± 12 ± 11, p = 0.679), nor in BMI (46.5 ± 7.1 vs 46.0 ± 6.7 kg/m2, p = 0.603). But men had a slightly higher but not significant excess BMI loss compared to women (73.7 ± 23.2 vs 66.4 ± 29.8%, p = 0.064). Before BS men had significantly more often type 2 diabetes (37.7±15.8%) and equal frequency
of patients with prediabetes (19.7 vs 19.5%); Chi-Square 16.941; p < 0.001. After surgery, only 1.6% of the male and 2.6% of the female patients were still suffering diabetes and 6.3% vs 6.7% were suffering prediabetes; Chi-Square 0.079; p = 0.961. Men had a greater decrease in HOMA-IR (p = 0.013), LDL-cholesterol (p = 0.030), triglycerides (p < 0.001) and HbA1c (p = 0.002) and an increase in HDL-cholesterol (p = 0.002) than women.

Conclusion: Our data indicate that, even though there are no differences in excess BMI loss men benefit more from BS regarding

T8:PO.029

The relationship between type II diabetes risks and sociodemographic characteristics

Karaca K.E., Toprak D., Bas M., Tevfikoglu Alaceylan L.

1Health Science Faculty, Department of Nutrition and Dietetic, Acibadem University, Istanbul, Turkey 1
2Sisli Hamidiye Etfal, Training and Research Hospital, Department of Family Medicine, Istanbul, Turkey 2.
3Health Science Faculty, Department of Nutrition and Dietetic, Trakya University, Edirne, Turkey 3

Aim: The aim of this study was to determine the relationship between socio demographic characters and Type II diabetes (DM) risk in adults.

Methods: This study was performed in 4400 individuals between 18–65 years of age. The subjects were chosen by using basic random sampling method. All subjects were administered a questionnaire including questions about sociodemographic characteristics. Type II Diabetes Risk Assessment Questionnaire was used to evaluate type diabetes risk and scores were grouped as “very high (over 20 points), high (15–12 points), middle (12–14 points), slight (7–11 points), low (lower than 7 points)” Frequencies, mean values, chi-square were used; p < 0.05 was considered significant.

Results: Of 4400 participants 50.3% (n=2212) were female and 49.7% (n=2188) were male with the mean ages of 41.18 ± 14.73 and 37.38 ± 14.24 respectively. There were 2353 (53.5%) subjects in 18–39 years age group and 2047 (46.5%) subjects in 40 and over age group. A total of 67.7% were married, 29.6% were house wives, 17.7% were students, 26.0% of the participants were active smokers and 13.0% had hypertension. Women had more 10 years diabetes risk than men (p = 0.042) and their risk scores were significantly higher than men (p = 0.037). Similarly being married was significantly high risk for DM (p = 0.000). BMI was a significant risk factor (p = 0.000); as a person had higher body weight the was nearly 15 fold more for type II DM. We found 10 years DM risk scores more in active smokers group (p = 0.000). The risk scores were higher (10.3% in very high risk group) in retired people as we expect, because of the age (p = 0.000). Education level was an important risk factor for 10 years DM risk (p = 0.000). As a person had a higher education level the risk score was lower.

Conclusion: In this study it was determined that type II DM risk was increased realed with gender, marital status, age, BMI, smoking, occupation and having a chronic disease.

T8:PO.030

Combined intervention with pioglitazone and n-3 fatty acids in metformin-treated diabetic patients


1Centre, Institute for Clinical and Experimental Medicine, Prague, Czech Republic
2Department of Adipose Tissue Biology, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i., Prague, Czech Republic
3Department of Diagnostic and Interventional Radiology, Institute for Clinical and Experimental Medicine, Prague, Czech Republic
4Human Development & Health Academic Unit Faculty of Medicine University of Southampton, Southampton, United Kingdom
5Department of Mathematical Analysis and Applications of Mathematics, Faculty of Science, Palacky University in Olomouc, Czech Republic
6University of Oslo, Silentia A.S., Svelvik, Norway

Aims/Hypothesis: Marine n-3 fatty acids eicosapentaenoic (EPA) and docosahexaenoic (DHA) acids help in primary prevention of cardiovascular disease, but their impact on glucose homeostasis in type 2 diabetic (T2D) patients remains unclear. We aimed to evaluate the effect of a combination intervention using EPA+DHA and a suboptimal doses of insulin-sensitizing drug pioglitazone in obese patients with T2D already treated with metformin.

Methods: In a double-blind, placebo-controlled trial, 69 patients, 38–70 years of age (66% men) were randomly assigned to 24-week-intervention using: (i) corn oil (5 g/day; Placebo), (ii) pioglitazone (15 mg/day; Pio), (iii) EPA+DHA (2.75 g/day; Omega3), or (iv) pioglitazone and EPA+DHA (Pio+Omega3). The primary endpoints were the changes from baseline in insulin sensitivity and in triacylglycerol clearance assessed using hyperinsulinemic-isoglycemic clamp and a meal test. Secondary endpoints included changes in fasting glycemia and HbA1c, glucose and NEFA clearance and inflammatory markers.

Results: Omega3 and Pio+Omega3 increased EPA+DHA content in plasma phospholipids. Pio and Pio+Omega3 increased body weight and adiponectin levels. Both fasting glycemia and HbA1c were increased by Omega3, but unchanged by Pio+Omega3. Insulin sensitivity was improved by Pio + Omega3.

Conclusions: Besides preventing a modest negative effects of Omega-3 on glycemic control, the combination of pioglitazone and EPA+DHA can be used to increase insulin sensitivity and postprandial lipid clearance in T2D patients on stable metformin therapy.

Acknowledgement: Trial registry number: 2009-011106-42. Supported by the Ministry of Health of the Czech Republic (NT13763-4).

T8:PO.031

The evaluation of metabolic syndrome status at menopause

Akbulut G., Celebi F.

1Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara, Turkey

Metabolic syndrome (MetS) is characterized by hypertension, dyslipidemia [low level of high-density lipoprotein cholesterol (HDL-C) and elevated triglycerides (TG) levels], obesity, insulin resistance and elevated blood glucose levels. It is a risk factor for cardiovascular diseases (CVD) and type 2 diabetes mellitus. Studies have shown that about 50% of postmenopausal women are obese. The increase in body fat (BF) in postmenopausal women, especially the increase in abdominal adipose tissue, will result in the increasing risk of dyslipidemia, insulin resistance and CVD. Among women, the development of CVD shows an increase after 45–54 years of age (menopause age), appearing 10 years later than men. Besides, menopause is an important risk factor for metabolic syndrome. A number of observations suggest that estrogen deficiency after menopause is a risk
factor for CVD: the age-adjusted risk of CVD in women with premature menopause is higher than it is in pre-menopausal women. Oestrogens also increase plasma lipids and triglycerides profile in postmenopausal females. It is interesting to note that the first four risk modifiable factors are components of the MetS. To conclude, the hypoestrogenaemia of menopause would play a direct and indirect role in the biochemical and mechanic changes that contribute to the development of hypertension. The effects of menopause on serum lipids may modulate CVD risk. In conclusion, postmenopausal status seems to play an important role in the prevalence of the metabolic syndrome.

T8:PO.032
The impact of subclinical hypothyroidism in microvascular damage in patients with metabolic syndrome
Bychina E.S., Panchenkova L.A., Troshina E.A., Mazurina N.V., Platonova N.M., Komshilova K. A.
1Moscow State University of Medicine and Dentistry, Moscow, Russia, 2Endocrinology Research Center, Moscow, Russia

Background: High risk of coronary heart disease, heart failure and cardiovascular mortality is observed in metabolic syndrome (MS). Subclinical hypothyroidism (SH) is also associated with an increased risk of cardiovascular diseases. The aim of the study was to assess the impact of SH in microvascular damage in patients with MS and arterial hypertension (AH).

Methods: 87 patients were divided into 3 groups: 25 (28.7%) patients with AH, 37 (42.6%) patients with AH and MS, 25 (28.7%) patients with AH, MS and SH. 22 practically healthy people were included in the control group (CG). Microvascular function was determined in all the patients by laser Doppler flowmetry.

Results: Statistically significant reduction of the standard deviation of microcirculation (SD M) was observed in all groups in comparison with healthy individuals, patients with AH and patients with MS and SH. In the AH+MS+SH group the index of the effectiveness of laser Doppler flowmetry (IEM) was decreased in comparison with healthy controls and AH+MS patients (1.23 [0.99; 1.65] vs 1.75 [1.23; 2.24]; p < 0.05).

Conclusions: Results of microvascular function examination were similar in MS+AH and MS+AH+SH groups. Microvascular dysfunction in MS+AH+SH patients was stronger and was particularly characterized by suppression of active regulation mechanisms and severe venous and capillary congestion.

T8 – Long term outcomes

T8:PO.033
Effectiveness of a multidisciplinary weight loss programme to maintain a weight loss greater than 10% from the initial weight, after two years follow up. PROKAL Study: Results at 24 months
Moreno B.1, Bellido B.2, Sajoux I.1, Goday A.2, Saavedra D.1, Crujeiras A.B.1, Casanueva F.F.2
1Div. of Endocrinology and Nutrition, HGU Gregorio Marañon, Madrid, Spain, 2Div. of Endocrinology, CHU de Ferrol and Coruña University, El Ferrol, Spain, 3Med Dept Pronokal, Protein Supplies Sl, Barcelona, Spain, 4Div of Endocrinology, Hospital del Mar, Dep of Medicine, Universitat Autonoma de Barcelona, Barcelona, Spain, 5Molecular and Cellular Laboratory, Inst Inv Sanitarias, CHU de Santiago, 6Div of Endocrinology, Dep of Medicine, CHU de Santiago, Santiago de Compostela University

Introduction: The PronoKal Method® is a multidisciplinary weight loss method combining diet, physical activity and coaching, which not only achieves quick and safe weight loss, but also re-educates the patient in healthy lifestyle habits that help to maintain long term results.

Objective: To assess the effectiveness of the PronoKal Method® with progressive dietary guidelines vs a standard low calorie diet, in weight reduction and long-term maintenance. METHODS: A randomised, open, controlled clinical trial on weight loss with a multidisciplinary weight loss programme with progressive dietary guidelines that include a ketogenic VLCD diet based on protein preparations followed by a low calorie diet with the progressive reintroduction of natural foods and a low calorie maintenance diet (VLKD group) compared with a standard low-calorie diet. The percentage of patients achieving a weight loss greater than 5% and 10% at one year and at two years was subject to study.

Results: The percentage of patients with a weight loss greater than 5% and 10% was statistically higher throughout the study in the VLKD group compared to low-calorie group. At 12 months, almost 90% of the VLKD patients group maintained a weight loss greater than 10%, while at two years 43% of patients still maintained a loss of between 5% and 10%, and 58% of patients with a loss greater than 10% of the initial weight, compared to only 21.7% of patients in the low-calorie group (p <0.05).

Conclusions: The results of this study demonstrate that the multidisciplinary weight loss programme is effective not only for weight loss but for long-term maintenance. This achievement meant that at two years almost 60% of patients maintained a loss of more than 10% compared to their initial weight.

T8:PO.034
The long-term effectiveness of a multidisciplinary approach to weight loss compared with a low calorie diet. PROKAL Study: Results at 24 months
Moreno B.1, Bellido D.2, Sajoux I.1, Goday A.2, Saavedra D.1, Crujeiras A.B.1, Casanueva F.F.2
1Div of Endocrinol and Nut, HGU Gregorio Marañon, Madrid, Spain, 2Div of Endocrinol, CHU de Ferrol and Coruña University, El Ferrol, Spain, 3Med Dept Pronokal, Protein Supplies Sl, Barcelona, Spain, 4Div of Endocrinol, Hospital del Mar, Dep of Med, UAB, Barcelona, Spain, 5Mol and Cel Lab, Inst Inv Sanitarias, CHU de Santiago, 6Dist of Endocrinology and Nutrition, HGU Gregorio Marañon, Madrid, Spain, 7Div of Endocrinol, Dep of Med, CHU de Santiago, Santiago de Compostela University

Introduction: The PronoKal Method® is a multidisciplinary slimming which start with a ketogenic VLCD diet based on protein preparations followed by a low calorie diet with the progressive reintroduction of foods, food re-education and a low calorie maintenance diet: physical activity and emotional support (coaching).
Objective: To evaluate the effectiveness of the multidisciplinary slimming method in the short, medium and long term (2 years) for weight loss compared with a standard low calorie diet in obese patients. METHODS: A randomized (1:1), open, controlled clinical trial to assess the effectiveness of the Método PronoKal® (VLCK diet group) vs a standard low calorie diet (LC diet group) accompanied by physical activity and emotional support, in the weight reduction of obese patients. The follow-up lasted 2 years. The results between the groups was compared at 2 to 6 months, 12 months, and 24 months.

Results: Differences were found between both groups in weight reduction, which was significantly higher in the VLCK diet group throughout the study (2 months: –13.6 vs 4.8 kg; 6 months: –22.0 kg vs –6.8 kg; 12 months: –19.9 vs –7.0 kg and 24 months: –12.53 kg vs –5.2 kg; all p < 0.001). This weight loss translated into a statistically higher decrease in BMI and waist circumference (WC) in the VLCK group at one year (BMI: –7.0 vs –2.6 kg/m² and WC: –18.4 vs –7.0 cm; both p < 0.001), and also at two years (BMI: –4.3 kg/m² vs –1.9 kg/m²; and WC: –11.5 cm vs –4.1 cm; both p < 0.01). The decrease in BMI allowed the VLCK group of patients to remain outside the obese range (<30 kg/m²) for 18 months, whereas the low-calorie diet patients remained >30 kg/m² despite the weight loss.

Conclusions: The PronoKal Method® has not only proved to be more effective than a standard low calorie diet in the short, medium and long term, but, unlike the low-calorie diet, it has been able to maintain the patients free from obesity during a period of 18 months.

Abstracts

TBP.0035
Obese hypogonadal men with cardiovascular diseases (CVD) lose weight and benefit from long-term treatment with testosterone undecanoate injections (TU): Observational data from a registry study

Saad F.1, 2,3, Haider K.5, 4, 6, Haider A.1, Doros G.1, 4, 5, Traish A.1, 4
1Bayer Pharma AG, Berlin, Germany,
2Gulf Medical University, Ajman, UAE,
3Private Urology Practice, Bremerhaven, Germany,
4Boston University School of Public Health, Boston, USA,
5Boston University School of Medicine, Boston, USA

Introduction: Hypogonadism is associated with cardiometabolic. There is little information on long-term effects of testosterone therapy (TRT) in men with CVD. Material and Methods: Prospective, cumulative, observational registry study from a single urologist’s office. 347 hypogonadal men received TU for up to 87 months. A subgroup of 68 men with a previous diagnosis of coronary artery disease (CAD; n=40) and/or a history of myocardial infarction (MI; n=40) and/or stroke (n=6) were analyzed. These patients are considered high-risk patients.

Results: Mean age: 60.76 ± 4.94 years, mean observation time 72 months. 64/68 men were obese. 68 men were followed for 3 years, 59 4 years, 54 5 years, 46, and 28 7 years. Declining numbers reflect the nature of the registry but not drop-out rates. Weight (kg) decreased from 115.07 ± 13.71 to 90.79 ± 8.92. Waist circumference (cm) decreased from 112.07 ± 7.97 to 99.14 ± 6.53. BMI decreased from 37.27 ± 4.45 to 29.58 ± 3 (p < 0.0001 for all). Mean weight loss was 18.75 ± 0.71%. Fasting glucose decreased from 108.74 ± 17.08 to 96.14 ± 2.01 mg/dl, HbA1c from 7.81 ± 1.16 to 5.86 ± 0.49% (p < 0.0001 for both). Total cholesterol decreased from 204.6 ± 35.14 to 185.7 ± 7.61, LDL from 184.28 ± 37.51 to 164.24 ± 29.29, triglycerides from 308.38 ± 56.37 to 180.74 ± 6.75 mg/dl. HDL increased from 63.79 ± 17.79 to 67.14 ± 16.71 (p < 0.0001 for all). Systolic (from 167.82 ± 11.01 to 142.39 ± 9.54) and diastolic (from 102.28 ± 8.23 to 80.07 ± 7.13 mmHg) BP decreased (p < 0.0001 for both). C-reactive protein (CRP) decreased from 3.97 ± 2.43 to 0.27 ± 0.44 mg/dl. No major cardiovascular events occurred.

Conclusion: TRT in hypogonadal men with CVD was well tolerated and resulted in significant and sustained improvements of cardiometabolic risk factors.

TBP.0036
Effects of long-term treatment with testosterone undecanoate injections (TU) on excessive obesity in hypogonadal men – experience from observational registry studies

Saad F.1, 2,3, Haider A.1, 4, Yassin A.5
1Bayer Pharma AG, Berlin, Germany,
2Gulf Medical University, Ajman, UAE,
3Private Urology Practice, Bremerhaven, Germany,
4Institute for Urology and Andrology, Norderstedt, Germany

Introduction: Obesity can cause hypogonadism, and hypogonadism promotes further accumulation of fat mass in a vicious cycle. In excessively obese men (BMI ≥40 kg/m²), a 75% prevalence of hypogonadism was found. Material and Methods: Cumulative, prospective, observational registry studies of 609 men from two cohorts with total testosterone levels ≤121 nmol/L receiving TU for up to 11 years. A subgroup of 39 men with excessive obesity (BMI minimum: 40.1; maximum: 46.5 kg/m²) received uninterrupted treatment for up to 114 months. Minimum treatment duration: 42 months, maximum: 114 months.

Results: Average weight decreased from 128.7 kg to 101.5 kg, average weight loss 27.2 kg. The magnitude of weight loss depended on treatment duration: the longer the treatment, the greater the weight loss. Minimum weight loss was 18 kg in a subject who had received 42 months of treatment, maximum weight loss of 39 kg was observed in a man who had been treated for 87 months. No subject gained weight, and weight loss was progressive over time. Average waist circumference decreased from 118.0 cm to 104.9 cm by 13.1 cm. The smallest reduction of 6 cm was seen in a man who had been treated for 57 months, the greatest reduction of 25 cm was observed in a man who had been treated for 114 months.

Conclusions: Treating hypogonadism by TU in hypogonadal men with excessive obesity resulted in sustained improvements in weight and waist circumference in all subjects. The magnitude depended on treatment duration.

TBP.0037
Effects of continuous treatment up to 11 years with testosterone undecanoate injections (TU) in 115 hypogonadal men on anthropometric parameters: Real-life data from an observational registry study

Saad F.1, 2,3, Yassin A.5, 1, 2, Doros G.1, 4, 5, Traish A.1
1Bayer Pharma AG, Berlin, Germany,
2Gulf Medical University, Ajman, UAE,
3Institute for Urology and Andrology, Norderstedt, Germany,
4Boston University School of Public Health, Boston, USA,
5Boston University School of Medicine, Boston, USA

Introduction: The longest-term follow-up on testosterone replacement therapy (TRT) in the literature is 6 years. In this registry study, we assessed effects of TRT beyond this period. Material and Methods: Single-center, cumulative, prospective, registry study of 262 hypogonadal men receiving TU for up to 11 years. In 147 men, TRT had been temporarily discontinued. In 115 men reported here, TRT was continued for up to 11 years. 4 patients dropped out, 2 due to relocation, 2 were lost to follow-up. Measures were taken at every other visit. Results at the end of 10 years follow-up are reported.

Results: Mean age was 59.05 ± 9.36 years (min: 19; max: 80). Total T increased from 7.84 ± 2.34 nmol/L to trough levels (measured prior to the following injection) between 17 and 20 nmol/L, free T from 150.31 ± 65.24 to 400–500 pmol/L, and SHBG decreased from 40.12 ± 20.73 to 33.11 ± 22.14 nmol/L (p < 0.0001). Mean waist circumference decreased from 106.47 ± 8.72 to 92.33 ± 5.32 cm. The decrease was statistically significant vs baseline (p < 0.0001) and significant vs previous year for the first 7 years. The reduction of waist circumference was 11.98 ± 5.03 cm. Mean weight decreased from 97.3 ± 12.88 to 84.65 ± 7.04 kg. Mean BMI decreased from 30.81 ± 4.33 to 27.06 ± 2.49 kg/m². Decreases were statis-
Temporary withdrawal of testosterone treatment (TRT) with testosterone undecanoate injections (TU) in morbidly obese hypogonadal men – a series of case reports

Saad F.1,2, Yassin A.3
1Bayer Pharma AG, Berlin, Germany,
2Gulf Medical University, Ajman, UAE,
3Institute for Urology and Andrology, Norderstedt, Germany

Introduction: Little is known about the optimal duration of TRT in elderly hypogonadal men. We assessed anthropometric parameters and glycaemic control in 9 morbidly obese, hypogonadal men with or without withdrawal of long-term treatment with TU. Material and Methods: From a registry study of 262 hypogonadal men, 9 men with obesity grade III were analysed. All men received TU for approximately 6 years. In 6 men, TU was withdrawn for approximately 2 years before treatment was resumed. 3 men received continuous treatment for up to 10 years. Results: Patient age at baseline: 54–69 years. 2 men had type 1 diabetes mellitus (T1DM), 5 men type 2 diabetes mellitus (T2DM). Patients with T1DM or T2DM received treatment by their individual general practitioners / internists. Weight decreased in all patients while on TU by 13 to 37 kg, waist circumference 6 to 25 cm. During interruption of T therapy, all patients gained weight and waist circumference which started dropping again after resuming T treatment. In diabetics, HbA1c decreased by at least 1.1% to a maximum of 3%. After discontinuation of TU, HbA1c increased by a minimum of 1.1% and improved again after resuming TRT. At end of observation, all diabetic patients had HbA1c <7%, 5 out of 7 had an HbA1c ≤6.5%. Conclusions: In morbidly obese hypogonadal men, benefits of TRT on anthropometric parameters are partly reversed after discontinuation but recovered after resuming therapy. In diabetic men, TRT improves glycaemic control but effects seem to be largely lost when treatment is interrupted.

Dietetics, Ankara/TURKEY

Objective: Optimal glycemic control is necessary to prevent and extend the complications of diabetes. If the regulation couldn’t be maintained, homeostasis is interrupted in consequence of altered metabolic processes. Chronic dysregulation of physiological systems may lead allostatic load (AL). The aim of the present study was to investigate the association of AL biomarkers in patients with diabetes that who gained control with blood glucose regulation or not.

Methods: Total 103 patients with diabetes enrolled from the outpatient clinic of Endocrinology and Metabolism of Ondokuz Mayis University. Patients divided into two groups which are unregulated and regulated diabetics, according to HbA1c levels higher and lower than 6.5%. Twelve biomarkers were used; fasting blood glucose, blood pressure, body mass index (BMI), waist/hip circumference, total cholesterol, HDL cholesterol, HbA1c (%), body fat percentage, serum C-reactive protein (CRP), albumin, cortisol, DHEA-S levels to assess AL. Values within higher than the references were scored as 1 while those falling below the references scored as 0. AL indices ranged from 0 to 12. Results: The study was carried out on 30 male (29.1%) and 73 female (70.9). The mean ages of the patients were found 46.46 ± 5.973 years. Mean AL score among the sample having unregulated and regulated blood glucose was 5.1 ± 1.18 and 4.52 ± 1.64, respectively. The difference between groups was statistically significant (p = 0.05). Biomarkers that contribute to allostatic load score were evaluated, mean CRP levels were 6.6 ± 2.06 mg/dL, fasting blood glucose were 113.5 ± 23.45 mg/dL in the sample that having regulated blood glucose and mean CRP levels were 7.39 ± 8.71 mg/dL, fasting blood glucose were 165.04 ± 52.99 mg/dL in the sample that having unregulated blood glucose. Dietary carbohydrate percentage of energy was higher (42.1 ± 6.48%) in the unregulated group than the regulated group (42.1 ± 6.48%) but not statistically significant. The difference between total energy, fat and sodium amount of dietary intakes were different between groups (p < 0.05). Diabetes duration represents statistically significant correlation with AL (r: 0.201) and HbA1c (r: 0.489).

Conclusion: Poor glycemic control have negative effects on AL biomarkers and allostatic adaptation is impaired in uncontrolled diabetes.
A systematic review and meta-analysis on the effects of exercise training versus hypocaloric diet: Distinct effects on body weight and visceral adipose tissue

Verheggen R.J.1, Maessen M.F.1, Green D.J.2,3, Hermus A.R.4, Hopman M.T.4, Thijssen D.H.2,2
1Department of Physiology, Radboud university medical center, Radboud Institute for Health Sciences, Nijmegen, the Netherlands,
2Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, United Kingdom,
3School of Sport Science, Exercise and Health, University of Western Australia, Crawley, Western Australia, Australia,
4Department of Internal Medicine, Division of Endocrinology, Radboud university medical centre, Radboud Institute for Health Sciences, Nijmegen, the Netherlands

Introduction: Exercise training (“training”) and hypocaloric diet (“diet”) are frequently prescribed for weight loss in obesity. Whilst changes in body weight are commonly used to evaluate lifestyle interventions, visceral adiposity (VAT) is a stronger predictor for morbidity and mortality than body weight. Currently, it is not known whether training or diet has superior effects on VAT. The aim of this study is to compare the impact of training versus diet on VAT in overweight/obese humans.

Methods: Pubmed, Cochrane, Web of Science and Embase were systematically searched for eligible studies that evaluated the effects of training or diet (duration >4 weeks) on radiographic quantified VAT in overweight/obese humans.

Results: 117 Studies (n=4,815) were included. Training and diet caused VAT loss (standard mean difference (SMD): –0.47; 95%CI –0.56/-0.39 and SMD –0.63; 95%CI-0.71/-0.55, respectively, (both P < 0.0001). When comparing diet versus training, diet caused a larger weight loss (SMD 0.308; 95%CI 0.02/0.596; P = 0.04). In contrast, a trend was observed towards a larger VAT decrease in training (SMD –0.59; 95%CI –1.248/0.071; P = 0.08). Changes in weight and VAT showed a strong correlation after diet (R˛=0.737, P < 0.0001), and a modest correlation after training (R˛=0.451, P < 0.001). In the absence of weight loss (Y-axis intercept), training is related to 6.1% decrease in VAT, whilst diet showed virtually no change (1.1%).

Conclusion: Both training and diet reduce VAT. Despite a larger effect of diet on weight loss, training tends to have superior effects in reducing VAT. Finally, weight loss does not necessarily reflect changes in VAT and, therefore, examining weight loss may lead to spurious conclusions when evaluating benefits of lifestyle-interventions.

Behavioral predictors of weight regain after bariatric surgery

Calvo J.1, Exposito M.1, Cos A.J.1
1Obesity Unit. Department of Endocrinology. University Hospital La Paz. Madrid. Spain

Introduction: A significant percentage of patients undergoing bariatric surgery procedures (CB), the weight regain occurs after the first years, it is believed that behavioral influences play a modulatory role in this prob-
As a re-do procedure, BPD is safe and effective procedure in patients (52.6%) were without any anti-DM medication, in one year re-pate 24 mths post-op %EWL, %EBMIL and T2DM changes (glycaemia, IRI, metabolic outcome) failure. In 81 (32.3%) BPD was chosen for re-do. In 251 (9.02%) patients required reoperation due to procedure (weight loss/metabolic procedures were performed by our team. In total, between January 2003 and December 2012, 2781 different bar-This transcriptome analysis is one of the first studies using this study is based on a prospective follow-up of 49 severely obese ad-olese (75% girls) operated in a single French institution since 2008. Surgery was proposed only after at least one-year lifestyle intervention in a multidisciplinary program managed by a pediatric team. Post-op-erative management included several multidisciplinary visits. The mean age at surgery was 16.2 ± 0.9 years. Mean body mass index was 42.5 ± 5.9 kg/m², corresponding to a mean weight of 118.8 ± 22.3 kg. At 12 and 24 months after surgery, mean weight was 98.7 ± 21 kg and 93.6 ± 19.3 kg respectively (p < 0.001); corresponding to mean BMI 34.7 ± 6.2 and 32.3 ± 6.7 (p < 0.001) and a percentage of excess weight less (% EWL) of 41.8 ± 21.4% and 39.1 ± 24.9% (p < 0.001). The mean number of visits per patient was 9 in the first year (range 4–24) and 7 in the second year (range 3–16). During the follow up, 6 (12%) gastric bands were removed: 5 for slippage and 1 for band intolerance. Two ports repositioning were

**T8 – Bariatric and metabolic surgery**

**T8.P0.044**

Bpd as a re-do bariatric and metabolic operation

**Dolezalova K.**¹, **Fried M.**², **Sramkova P.**³, **Pichlerova D.**¹

¹OB klinika – Center for treatment of Obesity and Metabolic Disorders, Prague, Czech Republic, 
²1st Faculty of Medicine, Charles University, Prague, Czech Republic, 
³Endocrinology Institute, Prague, Czech Republic

Introduction: Biliopancreatic diversion (BPD) is considered as one of the most powerful primary operation in WL and metabolic outcomes. Multifactorial background of obesity and multi-level obesity „defend -ing“ mechanisms may potentially contribute to unsatisfactory treatment results, necessitating re-do surgery. Malabsorptive re-do operations following failed restrictive procedures may lead to the best outcomes.

Methods: Between January 2003 and December 2012, 2781 different bariatric and metabolic procedures were performed by our team. In total, 251 (9.02%) patients required reoperation due to procedure (weight loss/metabolic outcome) failure. In 81 (32.3%) BPD was chosen for re-do. In 251 (9.02%) patients required reoperation due to procedure (weight loss/metabolic outcome) failure. In 81 (32.3%) BPD was chosen for re-do. In this re-do group, 38 (46.9%) patients were T2DM. Prospectively, basic de-

Results: Mean age of 41.4 ± 9.3 years. We observed that patients with BYG lost more weight 74% versus 46.2% with GT, using as an indicator the % excess BMI lost. When evaluating the % weight loss (PP): 66% of BYG loses ≥30% and ≥30% % PP 64% GT. 56%, patients with BMI between 40 and 50 lost> 30% body weight while in cases of extreme obesity (BMI> 50), only 44% lost> 30%. With a trend to significance (0.067). Regarding physical activity, 53% stated „active“ and of them, 70% lost >30% PP. 26.5% did not do any physical activity. Regarding self-perception on the results, 86% reported feeling well and great correlated with weight loss.

Conclusion: The importance of nutritional monitoring is a mechanism to ensure the success of bariatric surgery. Adherence to a program of physical activity is a predictive factor in maintenance weight loss.

**T8.P0.045**

Novel transoral endoscopic technique to reduce stomach volume induces changes in gastrointestinal transcriptome

**van der Wielen N.**¹,², **Paulus G.F.**¹, **van Avesaat M.**³, **Mascele A.A.**², **Witkamp R.F.**³, **Meijerink J.**³, **Bouvy N. D.**²

¹TI Food and Nutrition, Wageningen, The Netherlands, 
²Division of Human Nutrition, Wageningen University, Wageningen, The Netherlands, 
³Department of Surgery, Maastricht University Medical Center, Maastricht, The Netherlands

Introduction: Bariatric surgery is a very effective intervention strategy in obesity. Recently, a novel minimally invasive technique, the Articulating Circular Endoscopic stapler has been developed, which reduces gastric volume. This procedure results in a 34.9% (IQR 17.8–46.6) median percentage of excess weight loss in the first year [1]. Here, we present the first study investigating changes in gene expression and underlying molecular pathways in stomach and duodenum tissue from humans subjected to Articulating Circular Endoscopic stapler.

Methods: Ten obese patients underwent a transoral endoscopic procedure in which several gastric plications were created to reduce the volume of the stomach. Prior to the procedure and after one year, mucosal biopsies were taken from the fundus, antrum and duodenum. Gene expression was measured using microarray analysis. Transcriptome data were cor-related to changes in gut hormone levels and weight loss.

Results: Transcriptome analysis revealed that expression of somatostatin was reduced in both the fundus and duodenum after the stomach reduction procedure, which was in line with the obtained results on plasma hormone levels (ghrelin, GLP-1 and PYY). Gene sets related to inflammation were downregulated in the fundus. In the duodenum the procedure resulted in an upregulation of gene sets related to lipid metabolism.

Conclusion: This transcriptome analysis is one of the first studies using biopsies from humans subjected to a gastric volume reduction and provides key insights into underlying mechanisms of this novel minimally invasive bariatric surgical technique.

Reference:


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The quality of follow-up is essential for success after laparoscopic adjustable gastric banding in adolescent

**Khen-Dunlop N.**¹,², **de Filippo G.P.**³, **Jais P.**², **Bougeres P.**³, **Goulet O.**²,³, **Reviron Y.**²,³, **Dabbas M.**³

¹Pediatric Surgery, AP-HP, Necker-Enfants malades Hospital, 
²Pediatric Gastro-enterology and Nutrition, AP-HP, Necker-Enfants malades Hospital, 
³Pediatric Endocrinology, AP-HP, Bicetre Hospital, 
⁴Department of biostatistics, AP-HP, Necker-Enfants malades Hospital, 
⁵Universite Paris Descartes

This study is based on a prospective follow-up of 49 severely obese ad-

olese (75% girls) operated in a single French institution since 2008. Surgery was proposed only after at least one-year lifestyle intervention in a multidisciplinary program managed by a pediatric team. Post-op-

erative management included several multidisciplinary visits. The mean age at surgery was 16.2 ± 0.9 years. Mean body mass index was 42.5 ± 5.9 kg/m², corresponding to a mean weight of 118.8 ± 22.3 kg. At 12 and 24 months after surgery, mean weight was 98.7 ± 21 kg and 93.6 ± 19.3 kg respectively (p < 0.001); corresponding to mean BMI 34.7 ± 6.2 and 32.3 ± 6.7 (p < 0.001) and a percentage of excess weight loss (% EWL) of 41.8 ± 21.4% and 39.1 ± 24.9% (p < 0.001). The mean number of visits per patient was 9 in the first year (range 4–24) and 7 in the second year (range 3–16). During the follow up, 6 (12%) gastric bands were removed: 5 for slippage and 1 for band intolerance. Two ports repositioning were
realized but none device infection was observed. There was one death, 46 months after surgery from uncontrolled aorta hemorrhage during the procedure for gastric band removing. In multivariate analysis, including the sex, age at surgery and the mean number of consultations/year, only the last criterion was found significant on weight loss. Two years after surgery, significant differences were found between patients who had 6 or less consultations/year and those with 12 consultations/year for final weight (p = 0.004) or EWL (p = 0.005). These results show that more than 50% EWL can be obtained two years after gastric banding in adolescents. But they plead for the primordial role of compliance and thus for the importance of multidisciplinary medical support.

**OBKlinika Prague, CZ**

**Pre-operative liquid low-calorie diet reduces liver fat and liver volume in morbidly obese patients undergoing roux-en-y gastric bypass**

**Bottin J.H.¹, Thomas E.L.², Fitzpatrick J.A.¹, Durighe G.¹, Balogun B.¹, Moorthy K.¹, Leeds A.R.², Bell J.D.², Frost G.S.¹**

¹Imperial College London, UK, ²University of Copenhagen, Denmark

**Introduction:** Roux-en-Y gastric bypass (RYGB) is considered the gold-standard treatment to provide sustained weight loss in morbidly obese individuals. A pre-operative diet is advised to reduce liver size and decrease risks of complications. There is no consensus on the optimal type and duration of this diet. Previous studies have shown that low-calorie diets (LCD) may be of benefit to reduce liver fat and volume (1,2,3,4)

**Aim:** To compare the effect of 3 pre-operative diets on liver fat and volume in morbidly obese patients awaiting RYGB

**Methods:** Morbidly obese volunteers (n=30, BMI:40–55kg/m²) on the waiting list for RYGB were randomly assigned to a liquid formula 810kcal/day LCD (Cambridge Weight Plan®), Northants, UK for 2 weeks (2W LCD), for 6 weeks (6W LCD), or to a 800–1000kcal/day conventional food diet (CONTROL) for 2 weeks. Liver fat and volume were measured by 1H MRS and MRI respectively using a 1.5T Phillips MR scanner.

**Results:** 23 participants completed the diet (table 1). Liver fat reduced from 8.59% (4.81–15.4%) to 4.42% (2.11–9.28%) and liver volume from 2.23L (1.99–2.50L) to 1.89L (1.66–2.15L). Liver fat and volume (log) significantly correlated at baseline (r=0.58, p=0.0001). Reductions in liver fat (-38.3 ± 19.1%) were significantly correlated (r=0.66, p=0.0001). Reductions in liver fat (-38.3 ± 6.9%) and liver volume (-15.0 ± 1.9%) were significantly correlated (r=0.66, p=0.0007). Liver fat and liver volume significantly reduced in both LCD groups compared with the control with no significant difference between the 2W and 6W groups (table 2, figure A and B)

**Conclusion:** The LCD induced significant liver fat and volume reduction by 2 weeks compared with the conventional food diet with no significant further reduction by 6 weeks.

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**References:**

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Improvement of plasma Heme Oxygenase 1 (HO1) levels in morbidly obese patients (MO) with severe obstructive sleep apnea (OSA) after bariatric surgery

Cains A.1, Tirado R.1, Madeu M.1, Perci G.2, Rebasa P.1, Luna A.1, Villaplana M.1, Couto Y.2, Rigla M.1

1Endocrinology and Nutrition Department, Hospital de Sabadell, Corporació Sanitaria Parc Taulí, UAB, Campus Excel·lència Internacional, Bellaterra, Spain, 2Pneumology Department, Hospital de Sabadell, Corporació Sanitaria Parc Taulí, UAB, Campus Excel·lència Internacional, Bellaterra, Spain.


Methods: We studied 57 MO with sever OSA. 40 women and 17 men (age 46.2 ± 10.0 years, BMI 46.8 ± 7.06 kg/m², AHl (Apnea hipoapnea index) 64.1 ± 27.6 events/hour) before and after bariatric surgery. Thirty were treated with CPAP, 24% were smokers, 67% had hypertension and 38% type 2 diabetes. Levels of HO1 were measured by ELISA (Elisa Kit bioN-ova científica, s.l.Madrid). All patients underwent overnight conventional polisomnography (CE-Records, Compumedics, Victoria, Australia). Waist circumference, % body fat by bioelectrical impedance (TANITA) and HOMA insulin resistance index were also measured. Sleeve gastrectomy or Roux-en-Y gastric bypass was performed according to the local protocol. For statistical analysis SPSS-PC-plus version 19 was used.

Results: Taking all the patients as a group, plasma HO1 levels decreased after bariatric surgery (7.43 ± 5.13 vs 6.95 ± 4.27 pg/mL, p = 0.022), however, this effect was only observed in those patients who had not been treated with CPAP (8.84 ± 6.72 vs 8.00 ± 5.69pg/mL, p = 0.021).

Conclusion: Bariatric surgery improves HO1 levels in MO with severe OSA without treatment with CPAP.

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Long-term albuminuria remission after bariatric surgery in Swedish obese subjects (SOS)

Svensson P.A.1, Peltonen M.1, le Roux C.W.2, Sjöholm K.1, Sjöström L.1, Carlsson L.M.1

1Institute of Medicine at Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden, 2National Institute of Health and Welfare, Helsinki, Finland, 3University College Dublin, Ireland

Introduction: Obesity is associated with increased risk of chronic kidney disease (CKD). Albuminuria is a predictor of progressive CKD. Bariatric surgery reduces body weight in obese subjects, but the effects on CKD is unclear. We have previously shown that bariatric surgery is associated with reduced incidence of albuminuria compared with conventional obesity treatment.

Methods: The SOS (Swedish Obese Subjects) study is a prospective, controlled intervention study including 2010 participants who underwent bariatric surgery and 2037 controls receiving conventional obesity treatment. 24-h urine collections were performed at baseline, and after 2, 10 and 15 years. Urinary albumin excretion (UAE) was calculated based on 24-h urine collection (urine albumin concentration (mg/l) × urine volume (l)/urine collection time (min)) and expressed as mg per 24 h. For the current analysis, 699 SOS study participants with microalbuminuria (defined as UAE between 30–300 mg/24 h) at baseline were included. Remission of albuminuria (defined as UAE < 30 mg/24 h) over 15 years was the main outcome measure.

Results: Microalbuminuria remission during follow-up (2, 10 and 15-years) was observed for more than 65% of the study participants undergoing bariatric surgery. The odds-ratios for remission after surgery were 5.8, 1.9 and 3.8 after 2, 10 and 15-years follow-up, respectively when compared to conventionally treated patients (all P<0.001).

Conclusion: Participants with microalbuminuria who underwent bariatric surgery had increased likelihood of remission compared with participants receiving conventional obesity treatment.
Introduction: Sleeve gastrectomy in obese patients with type 2 diabetes is effective not only in reducing weight and improving glycaemic control, but also results in significant improvement in both systolic and diastolic LV function. This may have implications for obese subjects with diabetic cardiomyopathy.

Methods:

Bone mineral density after gastric bypass surgery

Abeysekera A.1, Head A.J.1, Labib M.H.1

1Department of Clinical Biochemistry, Russells Hall Hospital, Dudley Group NHS Foundation Trust, Dudley, United Kingdom

Introduction: Reduced bone mineral density (BMD) is a recognised complication of Roux-en-Y gastric bypass (RYGB) surgery. Calcium malabsorption, secondary to vitamin D deficiency, is partially responsible and calcium/vitamin D supplementation is recommended to reduce risk of osteoporosis. However, some studies documented declines in BMD in the absence of significant changes in circulating vitamin D or PTH.

Methods: We audited BMD at 1–5 years in 66 patients (40 women and 26 men; mean age 46.5 ± 9.3 years), who underwent RYGB and who were on calcium/vitamin D supplementation. We compared serum calcium, PTH, vitamin D and % Excess Body Weight (EBW) loss between those with low and normal BMD.

Results: 25 of the 66 patients (37.9%) showed low BMD (19 osteopenia and 6 osteoporosis) either at lumbar spine or hips. Mean serum calcium and PTH concentrations were not significantly different between those with low BMD and those with normal BMD (p = 0.43 and p = 0.15, respectively). Mean %EBW loss was significantly higher in patients with low BMD (75.1 ± 14.0%) compared to those with normal BMD (61.8 ± 17.5%) (p = 0.006).

Conclusion: Our audit showed that over a third of patients who underwent RYGB developed osteopenia or osteoporosis despite being on calcium/vitamin D supplementation, suggesting that other mechanisms, such as rate of weight loss or protein intake may be important factors in contributing to low BMD following RYGB. The greater weight loss in our patients with low BMD is in keeping with studies which found an association between weight loss and bone loss. Also, diets containing 1.0–1.5 g/kg protein are recommended for optimum bone health indicating that the common practice of prescribing 60–80 g of protein after bariatric surgery is inadequate and may contribute to bone loss.

Fig. 1. Graphs showing improvements with regards to glyated haemoglobin (HbA1c) (Panel A), weight (Panel B) and global longitudinal strain (Panel C) before and after surgery for our cohort of patients.

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Abstracts

T&PO.054

The adjustable gastric banding does not reduce monocytes count 1 year after bariatric surgery

Cunha F.M.1,2, Oliveira J.1,2, Saavedra A.1,2, Costa M.M.1,2, Lau E.1,2, Magalhães D.1, Bettencourt-Silva R.1, Freitas P.1,2, Varela A.1,2, Carvalho D.1,2

1Department of Endocrinology, Diabetes and Metabolism, Hospital São João, Porto, Portugal, 2Faculty of Medicine, University of Porto, Porto, Portugal

Introduction: Monocytes (Mn) associate with atherosclerosis. Monocytosis is common in obesity. We studied the Mn count 1 year after bariatric surgery (BS) and the predictors of Mn variation. METHODS: We retrospectively studied morbidly obese patients submitted to BS: AGB (adjustable gastric banding), RYGB (Roux-en-Y gastric bypass) and SG (sleeve gastrectomy) between 2010 and 2012. Follow-up: 1 year. We excluded patients without complete white blood cells (WBC) count before or 1 year after BS. We compared WBC counts before and 1 year after BS. We evaluated the correlation between Mn and BMI, insulin resistance (HOMA2-IR), and HDL. A multivariable linear regression analysis was built to study predictors of Mn variation. RESULTS: We studied 796 patients (AGB 248, RYGB 466, SG 82). RYGB patients were younger; AGB patients had lower initial Mn count compared to RYGB and SG patients (AGB 248, RYGB 466, SG 82). RYGB patients were younger; AGB patients had lower initial Mn count compared to RYGB and SG patients. In AGB patients, there was a significant increase in Mn count after surgery 

Acknowledgement: We thank Dr. Patrícia Lourenço for all her precious help.
Effect of three types of bariatric surgery on anthropometry and glucose metabolism: Two years follow-up – pilot study

Bradnova O.1,4, Sledackova B.1, Vribkova J.1, Dolezalova K.2,3, Sramkova P.1, Vcelak J.1, Hainer V.1, Bendlova B.1, Fried M.1,3, Kunesova M.1

1Institute of Endocrinology, Prague, CZ,
2DB clinic, Prague, CZ,
3First Faculty of Medicine, Charles University, Prague, CZ.
4Anthropology and Human Genetics, Charles University, Prague, CZ.

Introduction: Bariatric surgery is the most effective tool in the treatment of obesity and related comorbidities, such as Type 2 Diabetes Mellitus, dyslipidemia, hypertension, etc. We compared effect of laparoscopic gastric banding (LAGB), laparoscopic greater curvature plication (LGCP) and biliopancreatic diversion (BPD) in morbidly obese women with Type 2 Diabetes.

Methods: 41 obese diabetic women underwent bariatric surgery: 11 LAGB (age: 58.3 ± 6.19 yrs; BMI: 44.8 ± 7.16 kg/m²), 16 LGCP (age: 51.8 ± 9.79 yrs; BMI: 41.6 ± 8.93 kg/m²), 14 BPD (age: 50.4 ± 6.19 yrs; BMI: 47.8 ± 8.02 kg/m²). All women underwent 3-hour mixed meal tolerance test before the treatment and after 2 years. Index of insulin resistance (HOMAR) and area under curves (AUC) were calculated. For statistical analyses, Mann-Whitney and ANOVA were used. In a study of preoperative BMI and co-morbid status were similar. Mean excess body weight declined by 33 ± 7.46 kg/m²; body mass index (BMI) by 4.9 ± 2.89 kg/m²; fat mass (FM; Tani-ta TBF-300) by 10.8 ± 7.2 kg/l (n=16); weight declined by 14 ± 20 (1.9; 65.2) kg; BMI by 5.1 ± 7.46 kg/m²; FM by 5.7 ± 4.5 kg BPD (n=14); weight declined by 33 ± 16 (10.4; 65.8) kg; BMI by 11.4 ± 4.78 kg/m²; FM by 26.2 ± 14.4 kg Significant decrease of fasting and stimulating parameters of glucose metabolism was found in the group of BPD (HOMAR: p < 0.0001; AUC Glucose < 0.01; AUC Insulin < 0.001; AUC C-peptide < 0.001). After LAGB, only fasting parameters decreased (Glucose: p < 0.02; Insulin: p < 0.03; C-peptide: p < 0.01; HOMAR: p < 0.04).

Conclusion: Although the study is limited by the small number of patients, we found that BPD resulted in the best long-term glucose metabolism improvement. Determination of incretin levels will be subject of further analyses.

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Polyneuropathy after bariatric surgery - case report

Oliveira J.1,4, Freitas P.1,2,3, Nadais G.1, Meireles J.1, Correia F.1,3, Carvalho D.1,4, AMTCC Group2

1Endocrinology, Diabetes and Metabolism Department of Centro Hospitalar São João, Porto, Portugal,
2Multidisciplinary Assessment of Surgical Treatment of Morbid Obesity of Centro Hospitalar de São João, Porto, Portugal,
3Neurology Department of Centro Hospitalar São João, Porto, Portugal,
4Faculty of Medicine of University of Porto, Portugal.

Introduction: The knowledge about bariatric surgery complications is increasing with the rising numbers of procedures performed. Neurological complications of nutritional deficiencies following bariatric surgery are rare with an incidence of 4.6% and may result in serious consequences. Case report: A 30-year-old woman (BMI 50.6kg/m²) underwent gastric bypass in August/2011. Two months later she began persistent vomiting and required hospitalization. After discharge she complained about progressive muscle weakness in lower and upper limbs, with significant functional impairment. She noted sensory loss in all four limbs. Neurological examination revealed: distal tetraparesis predominantly in lower limbs, glove and sock hypoaesthesia and abolished osteotendinous reflexes, with gait disability. She was admitted to the Neurology Department. Nerve conduction studies revealed severe axonal sensorimotor polyneuropathy and sural nerve biopsy showed absent myelinated fibers. Analytical study revealed: folic acid 1.9mg/dl (2.2–17.5) and vitamin D 9ng/ml (30). CBC, iron kinetics, vitamin B12, vitamin E and copper were normal. A vitamin complex was started (thiamine, folic acid and vitamin D), with progressive recovery of deficits. Currently she has autonomous gait with mild motor deficit in dorsiflexion of the left foot. It was assumed a diagnosis of carencial sensorimotor polyneuropathy due to thiamine deficiency.

Conclusion: Vitamin deficiencies following bariatric surgery can present with severe polyneuropathy, not always fully reversible. Because body reserves of thiamine are low, its deficiency may develop in the first few months after surgery. The present case highlights the need for early recognition of signs and symptoms and the importance of immediate supplementation.

Effectiveness of prolonged low calorie liquid diet in pre-operative optimisation of super super obese patients undergoing bariatric surgery

Stevens L.1, Khan O.A.1,2,3, Russell K., Walshaw L., Jennings K., Suff P.1

1North London Obesity Surgery Service, Whittington Hospital, London, UK,
2University of Copenhagen, Denmark,
3Independent Cambridge Consultant, London, UK

Introduction: Patients with super super obesity (SSO; BMI >60) undergoing bariatric surgery present major technical and physiological challenges. Techniques suggested to manage peri-operative risk include pre-op restricted-calorie diet and intra-gastric balloon. In our institution we prospectively instituted a policy of introducing a long duration, low calorie liquid diet prior to surgery. We compared this strategy with our results prior to its introduction.

Methods: A prospectively maintained database was interrogated to identify all SSO patients undergoing bariatric surgery between February 2007 and September 2013. Those having procedures prior to May 2011 did not have prolonged, specific pre-operative diet. From May 2011 however all patients were enrolled on a Cambridge Weight Plan® liquid diet – six weeks 700–920kcal/day following an initial 1500kcal/d diet for > two weeks. We compared pre-operative weight loss, peri-operative complications and long term outcome in those receiving the liquid diet versus those not.

Results: 18 SSO patients used Cambridge diet and 22 did not. Mean pre-operative BMI and co-morbid status were similar. Mean excess body weight loss from pre-diet clinic assessment to operation was slightly higher in the Cambridge diet group (15.3% vs. 10.4%, p = 0.18). Operations performed were similar with all patients having their planned procedure. Peri-operative complications were significantly more common in the non-Cambridge diet group( 6 patients versus 1, p = 0.04).

Conclusion: The Cambridge diet gives good pre-bariatric procedure weight loss in the super super obese population. This appears to contribute to better outcomes with regard to surgical complication rates as compared to patients having a non-standardised pre-operative diet. This may reflect more effective loss of intra-abdominal and hepatic adiposity, or an effect of improved metabolic and nutritional status, in patients undergoing prolonged, liquid low calorie diet.

Acknowledgement: Diet programmes were provided gratis by Cambridge Weight Plan®, Northants, UK.
Background: Custodial attitudes towards bariatric surgery in their children are under-researched; though as rates of bariatric surgery in obese adults in Western Australia increases alongside incipience of childhood obesity, we expect surgery to increasingly be considered a viable weight loss treatment.

Methods: We explored parental history and attitudes towards bariatric surgery through a questionnaire administered during a weight management clinic. Quantitative information was collected on surgery history, type, and professionals consulted regarding surgery, diet changes, physical activity, and satisfaction with surgery and outcomes; and if custodians would consider bariatric surgery for their child. Qualitative data was collected through an open-format comments section, and analysed for common themes.

Results: Families of 49 adolescents responded: 44 mothers, 4 fathers and 1 grandmother. Surgery had been performed upon 3 of the reporting custodians, 3 other immediate family members, and a further 11 family members and associates. 5 custodians were on the waiting list. Lap-band was the most common of surgery performed, and satisfaction with the outcome and experience was high. Surgeons were the most common professional consulted prior to, and following, surgery. Lifestyle changes post-surgery focused primarily on diet. Half of custodians surveyed would consider bariatric surgery for their child. This did not appear to be affected by history of surgery in the family. When comments were analysed, the main theme was that surgery would be a last resort, after diet and exercise attempts had been exhausted. Custodians reported being aware of risks and side-effects however their belief was that the risks of obesity were greater.

Conclusion: Custodial attitudes towards bariatric surgery in their child are complex and must be explored further. Preliminary findings show that custodians are making balanced decisions, with primary consideration for the welfare of their child.

Acknowledgement: The participants and the CLASP team.

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A RCT of Intragastric balloons in obese adolescents: Preliminary data

Curran J.A.1,2, Kalic R.J.1,2, Sherrington C.S.1, Ravikumara M.3, Messina D.1, Meyes C.1, Tremayne A.1, Forbes D.1,2, Davis E.A.1,2

1Department of Endocrinology, Princess Margaret Hospital for Children, Perth, Western Australia.
2School of Paediatrics and Child Health, University of Western Australia, Perth, Western Australia.
3Department of Gastroenterology, Princess Margaret Hospital for Children, Perth, Western Australia.
4Telethon Kids Institute, Centre for Child Health Research, The University of Western Australia, Australia.

Background: Intragastric balloons (balloon) are an effective, less invasive weight loss method used in adults. Their use in adolescents has not been studied. The purpose of this RCT was to determine if the balloon has a role in obesity management in adolescents receiving lifestyle modification.

Methods: A total of 30 obese adolescents with co-morbidities were randomly allocated to 2 groups: A Control group undertook a 1 year lifestyle program; a 3 month intensive phase followed by a 9 month maintenance phase. The intervention group in addition to the lifestyle program was admitted for insertion and removal of the balloon under general anaesthetic; the balloon remained in situ for 6 months. Outcomes were measured at 6 and 18 months.

Results: Baseline demographics were similar in both groups. Control group: 16 pts, 5M:11F, age 14.0 ±1.2 years, weight 106.5 ±13.8 kg, BMI zscore 2.49 ±0.18, waist circumference 116.9 ±10.2 cm, body fat % 46.3 ±6.3 (mean±SD). Intervention group: 14 pts, M7:7F, age 13.58 ±1.26 years, weight 111.4 ±22.5 kg, BMI zscore 2.58 ±0.20, body fat % 43.5 ±4.9 (mean±SD). At 6 months both the control and intervention groups had significant reductions in BMI zscore (-0.15 ±0.1 p = 0.0002 vs. -0.10 ±0.15 p = 0.018) and body fat % (-2.6 ±3.7% p = 0.017 vs. -3.1 ±3.8% p = 0.021) respectively (mean±SD). The intervention group also showed a significant reduction in weight, waist circumference and fat mass. Changes observed at 6 months were not seen at 18 months. The groups did not differ in weight loss, BMI z-score or body fat % change. No adverse events occurred during insertion or removal of the balloon, one patient required early removal of the balloon 1 month post insertion for psychological intolerance.

Conclusion: Both lifestyle and balloon and lifestyle improve BMI z-score and reduce body fat % in obese adolescents in the short term, however these changes are not maintained in the long term. The balloon appears to be safe and well tolerated in obese adolescents.

Acknowledgement: The families who have given their time freely, and the CLASP clinical service at Princess Margaret Hospital.
Interest of using continuous glucose monitoring system (CGMS) among pregnant women who underwent bariatric surgery at 24–28 gestation weeks

Derveaux A., Deruelle P., Vambergue A., Caiazzo R., Romon M., Pattou F., Pigeyre M.
1 Department of Nutrition, University Hospital in Lille, France,
2 Department of Diabetology, University Hospital in Lille, France,
3 Department of Obstetrics, University Hospital in Lille, France,
4 Department of Endocrine Surgery, University Hospital in Lille, France

Introduction: Among pregnant women, who had undergone bariatric surgery, it is difficult to evaluate glycemic status with usual care. Our objective was to describe glycemic profile at 24–28 gestation weeks by using a Continuous Glucose Monitoring System (CGMS), in this population.

Methods: 12 pregnant women (8 malabsorptive procedures, 4 restrictive procedures) were evaluated during 72 hours with a CGMS. Pre- and post-prandial glycemic profile was analyzed. As the same time, a 75g Oral Glucose Tolerance Test (OGTT) was performed for diagnosis of gestational diabetes (GDM) and its tolerance was evaluated by visual analogic scale.

Results: Maternal age was 30.3 ± 6 years and pre-pregnancy body mass index was 35.3 ± 8.8 kg/m². Mean period between surgery and pregnancy was 2.9 ± 2.5 years. Mean blood glucose level was 87.7 ± 15.8 mg/dL and 1 and 2 hours post-prandial blood glucose levels (PPG1h and PPG2h) were 114.3 ± 13.6 mg/dL and 91.3 ± 17.1 mg/dL respectively. Time to reach post-prandial peak of glucose level was 55.1 ± 17.1 min. Moreover, in our population, we observed higher glycemic variability with higher level of GPP1h and lower level of GPP2h, especially following gastric bypass, than in pregnant women without bariatric surgery (1). Four women had GDM (2 diagnosis according to abnormal glucose values in OGTT, 2 to abnormal values in CGMS). Moreover, one third of the OGTT was invalid following bypass gastric because of vomiting.

Conclusion: CGMS is useful to examine the particular glycemic profile among pregnant women who had undergone bariatric surgery, when it is difficult to diagnose a GDM with usual care, especially following gastric bypass. Also, the variability of glycemic profile can be explained by the consequences of surgery.

Reference:

Long-term prevalence of anaemia and related micronutrients deficiency after bariatric surgery

Saaavedra A., Costa M.M., Oliveira J., Cunha F., Lou E., Bettencourt-Silva R., Magalhães D., Moreira A.C., Santos A.C., Freitas P., Varela A., Queiros J., Correia F., Carvalho D., AMTCO Group
1 Department of Endocrinology, Diabetes and Metabolism, Centro Hospitalar de São João EPE, Porto, Portugal,
2 Faculty of Medicine, University of Porto, Portugal,
3 Instituto de Investigação e Inovação em Saúde, University of Porto, Portugal,
4 USF Viver mais – CES Maia/Vilalongo, Portugal,
5 Department Clinical Epidemiology, Predictive Medicine and Public Health, Faculty of Medicine, University of Porto, Portugal,
6 Multidisciplinary Evaluation for Surgical Treatment of Obesity (AMTCO) Centro Hospitalar de São João, EPE,
7 Faculty of Food and Nutrition Sciences University of Porto, Portugal

Introduction: Iron, vitamin B12 (VitB12) and folic acid (Fac) deficiency can occur after bariatric surgery (BS) and may cause anaemia. Aim: To determine the prevalence of anaemia and micronutrients deficit (iron, VitB12 and Fac) before,12, 24 and 36 months (M) after gastric banding (GB), gastric bypass (RYGB) and sleeve gastrectomy (SG).

Methods: Retrospective longitudinal study of patients submitted to BS between 01/2010–06/2013. Patients without medical records of blood cell count (BCC), iron, VitB12, Fac, supplements or blood transfusion were excluded. Anaemia was defined according WHO criteria. Deficit of micronutrients: serum iron <60µg/dL, transferrin saturation <20% or ferritin <15µg/mL; VitB12 <200pg/mL; Acr <2.2ng/mL.

Results: Sample composed by 953 patients, mean age 42.6(10.8) years, 86% women. RYGB performed in 59.8% patients, BG in 28.5% and SG in 11.6%. Prevalence of anaemia before surgery 7.7% (N=953); 12M 13.1% (N=847); 24M 17.3% (N=439); 36M 18.7% (N=251). The majority of patients with anaemia had undergone RYGB (12M: RYGB 71.2% / BG 15.3% / SG 13.5% p = 0.002; 24M: RYGB 77.6% / BG 13.2% / SG 9.2% p = <0.001; 36M: RYGB 80.9% / GB 17.0% / SG 2.1% p = <0.001). Deficiency of any micronutrient was found more frequently in RYGB group (statistical significance regarding 24 and 36M iron deficiency and VitB12). There was no association between micronutrients deficiency and weight loss. We found more supplements prescription in RYGB group. Only 1 patient required blood transfusion at 12M and 36M, respectively.

Discussion: Our results are in agreement with previously published and highlight the importance of checking BCC/micronutrients levels after BS to avoid important complications such as anaemia.

Routine closure of mesenteric defects in laparoscopic roux-en-y gastric bypass results in no internal hernia developed in 180 consecutive cases

1 Department of Gastrointestinal Surgery, First Affiliated Hospital of Jinan University, Guangzhou, China

Background: Internal hernia after LRYGB is a serious complication leading to rise in patient’s morbidity and mortality. But the closure of the mesenteric defects remains a subject of controversy. The aim of this study is to evaluate the results of routine closure of mesenteric defects in retrocolic antegastric LRYGB.

Methods: Clinical data of patients underwent LRYGB in the First Affiliated Hospital of Jinan University between January 2012 and January 2014 were reviewed. All the patients had retrocolic and antegastric anastomosis as a standard procedure with linear stapling. The jejunojejunal anastomotic mesenteric defect and Peterson’s defect were routinely closed by interrupted permanent suture. The patients were follow-up at 1, 3, 6, 12 months and annually thereafter.

Results: 180 LRYGB were performed. There were 121 males and 59 females with mean age of 33.6 years (range, 18–58), mean preoperative BMI 42.3 (range, 28.6–78.3), mean operating time 122 minutes (range, 104–139). All the patients had at least 12 months follow-up. Percentage of excess weight loss in 1, 3, 6, and 12 month after operation were 27.3 ± 8.3%, 54.2 ± 7.4%, 76.8 ± 8.7%, 79.6 ± 8.6%, respectively. No any patient (0%) developed internal hernia postoperatively. No any severe complications and death cases were observed.

Conclusions: Routine closure of mesenteric defects in LRYGB does not increase much operating time. No internal hernia was developed if the mesenteric defects are properly closed. Randomized control trial is needed to verify the long term outcomes.
Long lasting effect of gastric bypass on risk factors for atherosclerosis


1Clinic for endocrinology, diabetes and diseases of metabolism, Clinical Center of Serbia, Belgrade.
2Clinic for digestive surgery, Clinical Center of Serbia, Belgrade.
3Dietary unit, Outpatient Clinic, Clinical Center of Serbia, Belgrade.
4Emergency Center, Clinical Center of Serbia, Belgrade.

Obesity is associated with insulin resistance, affected glucose toleration, change in serum lipids, and mild systemic inflammation. Metabolic surgery improves proatherogenic metabolic parameters as well as weight reduction.

Methods: In Center for obesity, Clinical Center of Serbia, we operated 146 obese patients (90 females and 56 males). Average body mass index (BMI) was 43.4 ± 7.3 kg/m², 34.2 ± 6.8 years of age. Serum glucose level was 5.56 ± 1.3 mmol/l, total cholesterol 5.21 ± 1.3 mmol/l, HDL 1.15 ± 0.7 mmol/l, LDL 3.03 ± 0.4 mmol/l, triglycerids 2.11 ± 1.2 mmol/l, C-reactive protein 13.3 ± 9.8 mmol/l. In all patients we performed gastric bypass. Before surgery patients were on dietary regimen with 500 kcal caloric restriction per day during 4–6 months. Three weeks before surgery daily energy intake was 1000 kcal.

Results: Two years after surgery BMI was lower 29.9% (13.2 ± 0.9 kg/m², p < 0.01) than before. Serum glucose was lower 9.7% (0.5 mmol/l/12.3 mmol/l, p < 0.05). Total cholesterol decreased 9.7% (0.74 ± 0.2 mmol/l, p < 0.05), as well as LDL cholesterol which decreased 34.5 ± 0.6% (p < 0.05). The level of triglycerides was less 54.6% (1.1 ± 0.5 mmol/l, p < 0.001) than before operation. HDL cholesterol increased 21% (0.3 ± 0.2 mmol/l, p < 0.05) after two years. Creative protein was markedly decreased two years after surgery, 89% (11.3 ± 3.2 mg/l, p < 0.001).

Conclusion: Metabolic surgery, especially gastric bypass, in morbidly obese patients has long-lasting beneficial effect on lipid profile, blood glucose, and systemic inflammation and due to this action, lowering risk for atherosclerosis, diabetes type 2 and obesity related metabolic diseases.

TB.PO.065

Weight loss after 3 types of bariatric surgery - 3 years of follow-up

Saevedra A., Costa M.M., Oliveira J., Cunha F., Lau E., Bettencourt-Silva R., Magalhães D., Moreira A.C., Santos A.C., Freitas P., Varela A., Queirós J., Correia J., Carvalho D., AMTCO Group

1Department of Endocrinology, Diabetes and Metabolism, Centro Hospitalar de São João EPE, Porto, Portugal,
2Faculty of Medicine, University of Porto, Portugal,
3Instituto de Investigación e Innovación em Saúde, University of Porto, Portugal,
4USF Viver mais – ACESS Maiia/Valongo, Portugal,
5Department Clinical Epidemiology, Predictive Medicine and Public Health, Faculty of Medicine, University of Porto, Portugal,
6Multidisciplinary Evaluation for Surgical Treatment of Obesity (AMTCO) Centro Hospitalar de São João EPE,
7Faculty of Food and Nutrition Sciences University of Porto, Portugal

Introduction: Different bariatric surgery (BS) techniques are currently available (restrictive, malabsorptive, mixed procedures). Aim: To compare the effect on weight, body mass index (BMI) and percentage of alterable weight loss (AWL) over 3 years after 3 BS techniques - gastric band (GB), gastric bypass (RYGB) and sleeve gastroectomy (SG).

Methods: Prospective longitudinal study of patients who had undergone BS between 01/2010-06/2011. Variables analyzed at 12, 24 and 36 months: Weight (W), Weight Change (WC), BMI, BMI variation; %AWL available (restrictive, malabsorptive, mixed procedures). Aim: To compare the effect on weight, body mass index (BMI) and percentage of alterable weight loss (AWL) over 3 years after 3 BS techniques - gastric band (GB), gastric bypass (RYGB) and sleeve gastroectomy (SG).

Results: Sample composed by 215 patients, mean age 43.2(10.1) years, 71% women. 54.9% of patients placed GB (W 109.2 (15.6) kg; BMI 43.2 kg/m²); 25.1% placed RYGB (W 126.6 (19.5) kg; BMI 46.9 kg/m²) and 20% of patients placed SG (W 108.2 (20.0) kg; BMI 42.1 kg/m²).

%AWL was calculated 146 obese patients (90 females and 56 males). Average body mass index (BMI) was 43.4 ± 7.3 kg/m², 34.2 ± 6.8 years of age. Serum glucose level was 5.56 ± 1.3 mmol/l, total cholesterol 5.21 ± 1.3 mmol/l, HDL 1.15 ± 0.7 mmol/l, LDL 3.03 ± 0.4 mmol/l, triglycerides 2.11 ± 1.2 mmol/l, C-reactive protein 13.3 ± 9.8 mmol/l. In all patients we performed gastric bypass. Before surgery patients were on dietary regimen with 500 kcal caloric restriction per day during 4–6 months. Three weeks before surgery daily energy intake was 1000 kcal.

Results: Two years after surgery BMI was lower 29.9% (13.2 ± 0.9 kg/m², p < 0.01) than before. Serum glucose was lower 9.7% (0.5 mmol/l/12.3 mmol/l, p < 0.05). Total cholesterol decreased 9.7% (0.74 ± 0.2 mmol/l, p < 0.05), as well as LDL cholesterol which decreased 34.5 ± 0.6% (p < 0.05). The level of triglycerides was less 54.6% (1.1 ± 0.5 mmol/l, p < 0.001) than before operation. HDL cholesterol increased 21% (0.3 ± 0.2 mmol/l, p < 0.05) after two years. Creative protein was markedly decreased two years after surgery, 89% (11.3 ± 3.2 mg/l, p < 0.001).

Conclusion: Metabolic surgery, especially gastric bypass, in morbidly obese patients has long-lasting beneficial effect on lipid profile, blood glucose, and systemic inflammation and due to this action, lowering risk for atherosclerosis, diabetes type 2 and obesity related metabolic diseases.
Background: The aim of this study is to investigate the surgical techniques and clinical outcomes of precise laparoscopic Roux-en-Y gastric bypass (PLRYGB) in treatment of Asian super obesity with BMI≥50.

Methods: Clinical data was collected and analyzed in consecutive patients underwent PLRYGB in the First Affiliated Hospital of Jinan University between March 2011 and March 2014. 30 patients in super obesity group with BMI≥50, and 30 patients in ordinary obesity group with BMI<50 as a control. Patients were followed up for 12–36 months.

Results: No any conversion to open operations or deaths. Preoperative BMI were: 75.3 ± 5.3 kg/m² and 58.3 ± 4.7 kg/m², respectively (P < 0.05). With compare, baseline, the BMI decreased gradually and reach the peak one year after the operation in both groups: 27.2 ± 3.3 kg/m² and 36.7 ± 4.8 kg/m², respectively (P < 0.01). %EWL and preoperative BMI were in a linear negative correlation (P < 0.05). %EWL in 12 and 24 months of the two groups were: 75.3 ± 14.0%, 63.6 ± 9.4%; 80.1 ± 12.3%, 71.4 ± 12.5%, respectively (P < 0.05). The %EWL in super obesity group was lower than that in the ordinary obesity group (P < 0.05). Co-morbidities including fatty liver, hypertension, T2DM, hyperuricemia, sleep apnea and hyperlipidemia were cured or relieved after one year of operation. Mild postoperative complications were observed in the two groups, including 9 cases of hair loss and 3 cases of dumping syndrome. Occurrence of loose skin after surgery is higher in super obesity group (6 cases, 20%) than that in ordinary obesity group (2 cases, 6%), P < 0.05.

Conclusions: PLRYGB is safe and feasible as a single stage operation for Asian super obese patients. The %EWL in ordinary obesity group is higher than that in super obesity group after one year of operation. Preoperative weight loss may be favorable in overall weight loss outcomes. Occurrence of loose skin after surgery is higher in super obesity group.

Results: Follow-up was completed in 245 patients, of which 13.1% were men and 86.9% were women, with a median age of 43.0 years (interquartile range (IQR) from 35.00 to 53.00), median weight 113.05kg (IQR 103.78–127.00), and median BMI 43.5940kg/m² (IQR 40.1463–46.6769). Median baseline vitD were 12.0ng/mL (IQR 8.0–17.0). A larger percentage of patients had prior vitD deficiency (80.8%) than at 12 months after surgery (42.9%), having found an average increase of vitD at 12 months of 9.19 ± 11.006ng/mL (p < 0.001). The variation of vitD was statistically significant in all groups (p = 0.004), with a median of 10.0ng/mL in the AGB (IQR 2.0–15.0), 7.0ng/mL in GB (IQR 0.0–15.0), and 13.0ng/mL in SG (IQR 6.5–20.0). The weight loss at 12 months was statistically significant (p < 0.001), with a median loss of −17.800kg for AGB (IQR −9.975−(-17.800)); −38.000kg for GB [IQR −31.800−(-44.900)]; −28.150kg for SG [IQR −21.600−(-41.650)]. There was no correlation between the vitD and EIMCP.

Conclusions: VitD deficiency was confirmed in our study population. We verified a significant increase in vitD with weight loss and over the 12 months follow-up. However, there was no correlation between the vitD and EIMCP.

Results: Acute weight loss following omega-loop-gastric bypass surgery impairs liver transaminases and cholestatic parameters in diabetic and non-diabetic patients

Introduction: 50–75% of obese and diabetic patients exhibit non-alcoholic fatty liver disease, which is associated with elevated liver enzymes. We hypothesized that increased flux of toxic lipids mobilized from adipose tissue to the liver during acute weight loss might be a risk factor for liver impairment within the first months after bariatric surgery.

Methods: Within our cohort study we evaluated liver enzymes (AST, ALT), De Ritis Ratio (DRR) and cholestatic parameters (CP) (AP, bilirubin) pre-, 3- and 12 months postoperative (T0-T12) in non- (N) and diabetic (D) patients with omega-loop gastric bypass.

Results: N [n=28; 68%; 41 ± 15 (mean±SD) years] and D [n=22; 68%; 54 ± 10 years] obese patients showed a significant weight loss (WL) of 37.4 ± 6.6% in N vs. 33.7 ± 7.9% in D at T12, (N vs. D n.s.). Acute WL was greater for N [22.7 ± 5.6% vs. D 18.4 ± 3.9%, p = 0.02], and AST dropped significant in N [23(16–41)U/L, median(min-max) to 27(19–58)U/L, p = 0.01] at T3. At T0 D had significant higher DRR than N [1.2 ± 0.9 vs. 0.8 ± 0.2, p = 0.01]. This difference appears also at T3 [N 0.9 ± 0.2 vs. D 1.1 ± 0.5, p = 0.01], whereby it dropped in D and rose in N. In the whole cohort we found an increase in CP [AP: 87(55–115)U/L to 93(65–136)U/L, p = 0.01; N vs. D n.s.; biliurbin: 0.6(0.3–1.0)mg/dl to 0.8(0.5–1.5)mg/dl, p = 0.00; N vs. D n.s.]. At T12 all parameters returned to preoperative values, except for AST in N [T0 to T12, N:5(11–30)U/L vs. D:1(43–25)U/L, p = 0.01].

Conclusion: Acute weight loss results in rise of transaminases, DRR, and CP in N, probably due to increased free fatty acid flux, as they exhibited greater weight loss with a potential risk for acute liver decompensation for patients at elevated risk (eg higher fibrosis score) at T0.
The effect of omega-loop versus roux-en-y gastric bypass on weight loss and liver cholestatic parameters

Kruschitz R.1, Luger M.2,3, Melanie W., Kienbacher C., Trauner M.1, Schindler K.1, Langer E.4, Prager G.5, Ludvik B.6
1Division of Endocrinology and Metabolism, Department of Internal Medicine III, Medical University of Vienna, Austria,
2Special Institute for Preventive Cardiology and Nutrition – SIPCAN save your life, Salzburg, Austria,
3Division of Gastroenterology and Hepatology, Department of Internal Medicine III, Medical University of Vienna, Austria,
4Division of General Surgery, Department of Surgery, Medical University of Vienna, Austria

Introduction: There is evidence that Omega-Loop Gastric Bypass (OLGB) demonstrates promising results for weight loss (WL). However, it’s impact on liver enzymes compared to Roux-en-Y Gastric Bypass (RYGB) has not yet been determined.

Methods: We evaluated liver enzymes (AST, ALT), cholestatic parameters (CP, GGT, AP, bilirubin) and NAFLD fibrosis score (NFS) 1 pre-, 3, 6 and 12 months postoperative (T0-T12).

Results: Non-diabetics who underwent either RYGB [n=25±9, BMI: 45.6±1.4 (meant±SD); age: 44.3±10.2] or OLGB [n=25±8, BMI: 43.5±3.3; age: 43.5±13.2] were analysed. OLGB showed a greater WL compared to RYGB [T3: RYGB 15.7±4.3 vs. OLGB 23.3±5.5%, p=0.001; T6: 23.8±6.0 vs. 33.5±6.6%; p<0.001; T12: 29.7±9.2 vs. 37.0±6.5%; p<0.001]. ALT dropped in RYGB (T0-T12:p=0.04), while rising in OLGB (p<0.05) over the observation period [T0: 33±21 vs. 32±15U/L; n.s.; T12:25±8 vs. 37±16U/L; p<0.01]. Compared to T0 RYGB vs. OLGB showed a significant higher AST at T6, this difference disappeared at T12 [T0: 28±12 vs. 26±9U/L; n.s.; T6: 25±7 vs. 34±16; p=0.04]. GGT increased in RYGB from T0-T6 [T0: 43±57U/L vs. T6: 19±11U/L; p<0.05], while it remained stable in OLGB [T0: 33±15 vs. T6:63±32U/L; n.s.]. NFS initially showed higher proportion of NAFLD in RYGB vs. OLGB [T0 vs.12%] this proportion changed at T12 [13 vs. 24%]. In the whole cohort a maximal rise in CP was found at T3 in RYGB and OLGB [AP; T0:8±24 vs. 84±21U/L; n.s.; T3:107±21 vs. 96±21 (n.s.); bilirubin: T0:0.5±0.1 vs. 0.6±0.2mg/dl; p=0.02; T3:0.7±0.3 vs. 0.9±0.3mg/dl; n.s.]; Increased AP (T0-T12; p=0.01) and bilirubin (T0-T12; p<0.01) remained high until T12.

Conclusion: OLGB vs. RYGB results in greater WL but deterioration of liver parameters in the first year after surgery.

Reference:

Effect of two preoperative low-energy diets on liver fat content in bariatric patients: A randomized trial

Schuetz T.1, Peter V.2, Garnov N.3,4, Schaudinn A.3,4, Linder N.1, Busse H.1,5,6,7,8,9, Shahg E.1,8,9, Potetz D.2,9, Dietrich A.1,2,3,4
1IBF Adiposity Diseases, Leipzig University Medical Center, Leipzig, Germany,
2Department of Diagnostic and Interventional Radiology, Leipzig University Hospital, Leipzig, Germany,
3Klinik Dr. Rinecker, Munich, Germany,
4Coordination Centre for Clinical Trials, Leipzig University Hospital, Leipzig, Germany,
5Clinic of Visceral, Transplantation, Thoracic and Vascular Surgery, Section of Bariatric Surgery, Leipzig University Hospital, Leipzig, Germany

Introduction: It is known that a preoperative low-energy diet (LED) can effectively reduce liver fat content (LFC). In a prospective, randomized intervention study, we compared two LED products (high protein plus low carbohydrate vs. high carbohydrate) concerning their effects on LFC.

Methods: 89 patients scheduled for bariatric surgery were randomised to receive LED1 (75 g protein, 28 g fat, 80 g carbohydrates) or LED2 (58 g protein, 19 g fat, 111 g carbohydrates) and 200 g of vegetables daily for two weeks. Pre- and post-interventionally, LFC was measured by a ded-
Subclinical hypothyroidism in a population of obese patients

Costa M.M.1,2, Belo S.1,2, Saavedra A.1,2, Oliveira J.1,2, Cunha F.1,2, Lau E.1,2, Magalhaes D.1, Silva R.1, Freitas P.1,2, Varela A.1,2, Queiroz J.1, Correia F.1, Carvalho D.1,2
1Department of Endocrinology, Centro Hospitalar Sao Joao, Porto, Portugal, 2Faculty of Medicine, Porto University, Portugal

Introduction: The incidence of subclinical hypothyroidism (SH) varies from 4 to 10% depending upon the gender, age and population studied. Increased levels of TSH are observed in obese patients and previous studies have demonstrated that with increasing TSH there is an increase in BMI.

Obesity: SH prevalence and comparison of weight loss among patients with SH and euthyroid patients (ET) in a population of obese undergoing bariatric surgery.

Methods: Retrospective study of patients who underwent bariatric surgery between January 2010 and June 2013. We included patients with preoperative determination of TSH and FT4 and excluded patients with thyroid disease, patients on therapy (levothyroxine or antithyroid synthesis) and those without information on these two factors.

Results: 820 patients were analyzed, 86.7% (n=711) were female, with mean age of 42.6 (10.7) years, baseline BMI 44.3 (5.6) kg/m². Of these, 760 were ET and 44 had SH. The prevalence of SH baseline was 5.4%. The mean baseline TSH was higher in SH (5.24 (1.58) vs ET 1.88 (0.80) μIU/mL; p < 0.001); no difference in the levels of FT4 (SH 1.04 (0.15) vs ET 1.07 (0.15) ng/dL; p = 0.176). No differences were found with statistical significance between the ET and SH in initial BMI (ET 44.3 (5.7) vs SH 45.2 (5.8) kg/m²; p = 0.292), in weight loss (ET 32.3 (15.4) kg vs SH 32.6 (15.2) kg; p = 0.927) and BMI at 12 months (ET 31.9 (5.5) vs SH 32.7 (56) kg/m²; p = 0.351).

Conclusion: The prevalence of SH was similar in this population with the proportion of SH reported in previous studies. In this sample, TSH was not a determinant of the decrease in weight after surgery.

Nutritional factors affecting weight loss at three months after laparoscopic sleeve gastrectomy

Gherasim A.1,2, Arhide L.1,2, Padureanu S.5,1, Ungureanu C.1, Gavrili R.5,1, Mihalache L.1
1,2Grigore T. Popa* University of Medicine and Pharmacy, Iasi, Romania

Background and aim: Laparoscopic sleeve gastrectomy (LSG) is a newer bariatric surgical procedure with promising results and fewer long-term complications. The factors influencing weight loss after LSG are not entirely understood. The aim of this study was to investigate how the preoperative nutritional status of the patients undergoing LSG influence weight loss at three months after surgery.

Material and methods: We included in this study all patients who underwent LSG during 2013–2014 in our center. We calculated body mass index (BMI) before surgery and % excess weight loss (%EWL) at 3 months after surgery. We assessed the following seric markers before, and 3 months after surgery: total proteins, albumin, calcium, magnesium, potassium, vitamin D, PTH, folic acid, C reactive protein.

Results: We evaluated 30 patients (22 women). Average age was 41 ± 11.9 years, and average BMI before surgery was 44.1 ± 8.3 kg/m² (min. 34.5 kg/m², max. 63.8 kg/m²). Before surgery, the most common nutritional deficiency was in vitamin D: average value was 14.9 ± 9.4 ng/dl (95%CI: 10.5–19.5 ng/dl), but 36.8% of patients had values of ≤10 ng/dl. % EWL deficiency was in vitamin D: average value was 14.9 ± 6.9 kgm²; p = 0.034)

Conclusion: Given that older age, greater weight and a poorer preoperative nutritional status hinder weight loss after LSG, we suggest that this procedure should be discussed with patients earlier, to increase its benefits.
alternative to biliopancreatic diversion – duodenal switch - SADIS (single anastomosis duodenosleeve with sleeve gastrectomy).

Material and methods: After obtaining agreement from ethical committee we started to perform this operation in our two centers in the frame of prospective study. The indication for surgery was failed sleeve resection and weight regain. Four patients were operated on from may to september 2014. Two of them were diabetics, two had hypertension, in one dyslipidemia was under medical treatment.

Results: significant weight loss was recorded in all patients, antidiabetic treatment and antihypertensive drugs was removed and all patients express satisfaction with the operation. Improvement in glycaemic control was observed, as well. No surgical complication was recorded.

Conclusion: It is impossible to create any firm conclusion from this pilot report. More patients and longer follow up are necessary to confirm very optimistic report of Torres and co.

T8:PO.076

No evidence of impaired oral hormone substitution after gastric bypass surgery in patients with morbid hypothalamic obesity and hypopituitarism secondary to craniopharyngioma

Wolf P.1, Winhofer Y.1, Smajis S.1, Krischitz R.1, Schindler K.1, Gessl A.1, Vila G.1, Raber W.1, Langer F.1, Prager G.1, Livvik B.1, Luger A.1, Krebs M.1

1Medical University of Vienna, Department of Internal Medicine III, Division of Endocrinology and Metabolism,
2Medical University of Vienna, Department of Surgery,
3Rudolfstiftung, Department of Internal Medicine I, Division of Endocrinology, Diabetology and Nephrology

Background: Craniopharyngiomas (CP) are benign brain tumors presenting in childhood treated by tumor resection together with radiotherapy. In about half of the cured patients hypothalamic damage leading to eating disorders and obesity as well as to hypopituitarism, necessitating consequent hormone substitution therapy, is observed. Bariatric surgery is an efficient treatment strategy for morbid obesity. However, so far it is unknown, whether oral hormone substitution is hampered by impaired intestinal absorption, leading to severe hypopituitarism or adrenal insufficiency.

Methods: 4 CP-patients with hypopituitarism and morbid obesity treated by gastric bypass surgery were included in this retrospective analysis. Dosage of hormone substitution, hormonal blood concentrations, adverse effects of impaired drug absorption and anthropometric characteristics were investigated pre and 3 to 12 months post operatively.

Results: In all CP-patients (3w/m1; BMI basal 49 ±7kg/m2) gastric bypass resulted in distinct weight loss (-35 ±27kg). In follow-up examinations mean concentration of fT4 increased (FT4 basal 0.9 ± 0.31ng/dl vs FT4 FollowUp 1.28 ± 0.29ng/dl). No patient developed any signs of adrenal insufficiency postoperatively. Mean daily dosage of oral thyroid hormone substitution (levothyroxine basal 156 ±44µg/d vs levothyroxine FollowUp 150 ± 30µg/d) and hydrocortisone (hydrocortisone basal 29 ± 12mg/d vs hydrocortisone FollowUp 26 ± 2mg/d) was unchanged. Mean insulin-like-growth-factor-1 concentration decreased after weight loss (IGF-1 basal 217 ± 93ng/ml vs IGF-1 FollowUp 111 ± 66ng/ml), whereas daily growth-hormone substitution was slightly increased (somatotropin basal 0.9 ± 0.5mg/d vs somatotropin FollowUp 1.0 ± 0.4mg/d).

Discussion: Our results in n=4 CP patients suffering from hypopituitarism indicate that oral hormone substitution is not impaired following gastric bypass operation, probably making it a safe and considerable treatment strategy in patients suffering from hypothalamic obesity.

T8:PO.077

The Discrepancy Between Patient Expectations and Achievable Body Weight Loss Ratios in Patients Undergoing Bariatric Surgery

Murt A.1, Ozkan A.H.M.1, Yalaza Kahraman A.1, Yunuk V.1

1Istanbul University Cerrahpasa Medical Faculty, Department of Endocrinology and Metabolism,
2Istanbul University Cerrahpasa Medical Faculty, Department of Internal Medicine

Background: We had the observation that patients scheduled for bariatric surgery had unrealistically high weight loss expectations, probably due to lack of delivery of proper information by healthcare providers. In this study, we have formally tabulated the expectations of patients from bariatric surgery and compared this information with the reported outcomes of the procedure.

Methods: Patient Expectations from Bariatric Surgery Questionnaire was applied to 42 patients followed at Metabolism Clinic of Cerrahpasa Medical Faculty and were referred to the bariatric surgery clinic. The questionnaire was applied within a week prior to the surgery. Weight loss expectations percentage for each patient was calculated by dividing the expectation stated by a patient to his/her absolute excess weight. Additionally, factors that motivate patients were questioned.

Results: 42 patients (8 male, 34 female, preoperative mean BMI: 48.82 ±8.99kg/m2) attended to the survey. Laparoscopic sleeve gastrectomy was planned for 40 patients and en-Y gastric bypass was planned for 2 patients. Average weight loss expectation was 97 ±18% (range: 46–141%). There was no significant correlation between body weights or BMIs and weight loss expectations. We have also asked the main motivating factor that lead the patients to seek for bariatric surgery. Most of the patients believed that bariatric surgery would cure their related morbidities completely (diabetes, hypertension etc) by losing their excess weight, as well as having a better physical comfort.

Conclusion: A recent meta-analysis on the follow-up of patients after bariatric surgery has shown that patients lose their 61% of excess body weight by a bariatric surgery procedure. Our study indicated that our patients have developed unrealistic goals and expectations from bariatric surgery procedures. This discrepancy may be a reason for disappointments after the procedures and loss of motivation to follow their post-op Methabolism Clinic visits

T8 – Multidisciplinary treatment

T8:PO.078

Common misconceptions about dieting and nutrition by the obese patients of our diet program.

Poon P.1

1Dr. Poon’s Metabolic Diet Clinic, Thornhill, Ontario, Canada

We counsel patients who are obese and are suffering from Metabolic Syndrome. Our diet plan does not require the patient to count calories. It is mainly a low-sugar, low-starch, low-saturated fat and low-sodium diet. The patients are encouraged to eat until they are full and they are allowed to eat at any time of the day. The diet is high in lean protein, omega-3 and omega-6 fatty acids, and vegetables with high fiber content. Here is a list of statements from patients that are commonly heard in our clinic: I have to drink milk and eat cheese everyday because I have osteoporosis I cannot eat meat because I have high cholesterol I have to eat sugar because I heard that my brain needs sugar to function I have to eat some sugar and starch because I am a type 2 diabetic I have to eat my rice and bread everyday because it is in my culture I am eating fruits because fruit contain natural sugar I do not drink diet soda because I was told that I can gain weight even if it contains zero calories I do not eat after 7 PMI was told breakfast is the most important meal of the day I was told to eat more often to lose weightI am an emotional eater I have to eat my birthday cake on
my birthday I am on a fat free diet I gain all this weight because I cannot exercise All these misconceptions might hinder the patient's weight loss progression. This presentation will provide an opportunity to discuss the validity of these statements

Conclusion: Long-term therapy of obesity with sibutramine is effective and safe subject to the indications and contraindications for its prescription.

TB:PO.081
Risk of overweight and obesity in adults with the genetic disorder sickle cell disease: Are all types created equal?

Hill L.K.1, O’Garo K.N.2, Binks M.2, Wood M.2, Feliu M.2, Barker C.S.1, Keys A.1, Kaufman K.1, Kahathuduwa C.1, Dorfman C.2, Putlin D.2, Applegate K.2, Robinson E.1, Edwards C.L.1

1Duke University Medical Center, Durham, NC, USA, 2Texas Tech University, Lubbock, TX, USA.

Introduction: Historically, patients with the genetic disorder Sickle Cell Disease (SCD) were considered at risk for underweight, malnutrition, and premature death. Thus, little attention was placed on dietary management, exercise, sleep hygiene or stress management as these patients were not considered at risk for overweight and obesity. Our recently published data however, suggests that patients with SCD live longer; with over half of our sample at risk for overweight and obesity! The current study used baseline data collected via survey methodology, and evaluated the association of SCD subtype with obesity risk.

Methods: Data from N = 242 (46% female) adult (M = 33.37 ± 12.68 years) SCD clinic attendees taking part in an ongoing IRB-approved longitudinal study at a Southeastern United States medical center was examined. A 700-item psychosocial/medical survey was completed, height and weight were measured and BMI calculated (kg/m²). Subjects were classified according to SCD subtype.

Results: Using ANCOVA with Bonferroni correction for multiple comparisons; we considered SCD type/BMI associations with covariates age, gender and education. We found that BMI was greater (i.e. in the overweight to obese range) among individuals possessing the SB+ and SC subtypes (p<0.001) compared to individuals with SS type whose BMIs were lower and more consistent with traditional conceptualizations of SCD.


TB:PO.082
Impact of multidisciplinary preparation to bariatric surgery on health behaviors

Ledoux S.1, Breuil M.C.1, Delapierre M.1, Larger I.2, Sami O.1, Coupaye M.1

1Service des Explorations Fonctionnelles-Centre de l’obésité (CINFO), Hôpital Louis Mourier, Faculté Paris Diderot, 92700 Colombes, France.

Introduction: International guidelines emphasize the need for multidisciplinary preparation before bariatric surgery to improve safety and effectiveness, but its impact has been little studied. Our aim was to explore the impact of this preparation on dietary habits, physical activity, weight loss and quality of life before surgery.

Methods: We prospectively recorded in 78 candidates for bariatric surgery (age:43 ± 12 yr; M/F:15/63; weight:122 ± 17 kg; IMC:44 ± 5 kg/m²), anthropometric parameters, food intake, physical activity (Beache questionnaire) and quality of life (SF36) at the beginning and the end of the preoperative preparation (7 ± 2 months).
Results: Reported caloric intake decreased from 2143 ± 640 to 1906 ± 564 kcal/24h (p < 0.001) during the preparation and snacking from 68 to 13% of the subjects. Physical activity increased (p < 0.05) and quality of life improved (p < 0.01), but mean weight change was zero (±5 kg). The mean number of preoperative consultations proposed (with nutritionist, dietician, psychologist and sports coach) was 7 ± 2 and was as greater as patients gained weight during the preparation (R =0.2992, p < 0.01). However, the number of consultations was positively correlated with the decrease of reported caloric intake (R=0.2885, p < 0.05). Furthermore, weight loss before surgery was positively related to postsurgical weight loss (recorded at 6 ± 1 months in 59 subjects), whereas preoperative dietary changes were not.

Conclusion: Despite increase of dietary knowledge (reflected by improved diet report) during preoperative preparation, candidates for bariatric surgery have difficulty to actually change their eating behavior (reflected by weight change) before surgery. However, only weight change seems to impact the success of bariatric surgery.

TB:PO.084
Two years obesity intervention program in children and adolescents: The importance of age at enrollment
Linde S.E.1, Albusms J.2, Danielsen Y.1, Langeland E.1, Norgren S.1, Julíusson P.B.2
1Department of Internal Medicine, Haukeland University Hospital, Bergen, Norway,
2Centre for Clinical Research and University, Haukeland University Hospital, Bergen, Norway,
3Department of Clinical Psychology, University of Bergen, Bergen, Norway,
4Faculty of Health and Social Sciences, Bergen University College, Bergen, Norway,
5Department of Women’s and Children’s Health, Karolinska Institutet, Stockholm, Sweden,
6Department of Pediatrics, Haukeland University Hospital, Bergen, Norway

Aim: To evaluate pre-post changes following a two-year outpatient hospital based intervention program with monthly sessions for childhood obesity.

Methods: Data on body mass index (BMI) during intervention, two years prior start and two years after treatment termination, was collected from 34 children and adolescents with obesity (age range 5.5 – 15.1 years, 17 girls). Paired t-tests and multivariate linear regression models were used for analysis. Blood samples were taken at start an end of treatment.

Results: In children under 12 years of age (n=18), a significant reduction of BMI SDS was observed (-0.35, p = 0.003) with a non-significant increase in BMI SDS (0.23, p = 0.061) in children over 12 years (n=16). Two years after end of intervention, 55% of the children (n=29) showed stabilization or further reduction (>-0.25) in BMI SDS while increase of 0.25 BMI SDS or more occurred in 45%. Significant reduction was found in blood lipids.

Conclusion: The intervention was found beneficial in younger children, underlining the importance of early intervention. However, post-treatment increase in BMI SDS of more than 0.25 SDS in almost half of the treated children indicates a need for longer follow-up or treatment content that better enhance long term maintenance of positive lifestyle changes.

TB:PO.085
The effect of long-term interdisciplinary therapy on bone metabolism and adipokines in obese adults
Nascimento M.A.1,2, Yi L.C.3, Ferreira C.L.1, Sanches R.B.1,2, Poli V.E.1,2, Fidalgo J.P.1,2, Moraes A.S.1,2,3, Cresciani P.1,2, Andrade-Silva S.G.1,2, Clemente J.C.1,2, Caranti D.A.1
1Post Graduate Program of Interdisciplinary Health Sciences, Federal University of São Paulo – UNIFESP - Santos, Brazil,
2Obesity Study Group (GEO), Federal University of São Paulo – UNIFESP - Santos, Brazil,
3Multimagem Clinical.

Introduction: Obesity has been associated with increased bone mineral density (BMD). However, it is suggested that pro-inflammatory adipokines from adipose tissue can increase resorption activity and decrease bone formation and that anti-inflammatory adipokines can increase bone mass. This study aimed to assess the effects of long-term Interdisciplinary Therapy (IT) on pro- and anti-inflammatory adipokines and bone metabolism in obese adults and to check the role of bone metabolism in adipokines of this population.

Methods: Nineteen adult obese women were submitted to a 32 week IT. The IT consisted of intervention with physical exercise, physiotherapy and nutritional and psychological support. The body composition, total BMI, total bone mineral content (BMC), TNI-α and IL-6 (pro-inflammatory adipokines) and adiponectin (anti-inflammatory adipokine) blood concentrations were evaluated before and after the therapy. The paired Student t-test and Wilcoxon test were used to assess the data. Also, the correlation between delta variations (Δ) was performed by using the Pearson correlation coefficients.
Changes in body mass index (BMI) standard deviation score (SDS) during one-year outpatient obesity intervention program in children and adolescents

Soreide H.1, Danielsen Y.S.2, Linde S.F.3, Haaland O.4, Morken M.H.5, Júlíusson P.B.6

1Institute of Clinical Science, University of Bergen, Bergen, Norway,
2Department of Clinical Psychology, University of Bergen, Bergen, Norway,
3Department of Internal Medicine, Haukeland University Hospital, Bergen, Norway,
4Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway

Introduction: Efficient treatment-strategies are needed for overweight and obese children. The aim of the present study was to evaluate an obesity intervention program for severe childhood obesity in Bergen, Norway.

One-year changes in BMI SDS were analyzed.

Methods: Ninety-three obese children and adolescents (35 boys) with a mean age of 11.8 years (range 5.5–17.9) and mean (SD) BMI SDS 3.07 (0.49) were included, completing one year of the intervention. The treatment was an interdisciplinary family-based lifestyle intervention for children with severe obesity, combining both a hospital outpatient clinic and the primary health care. The treatment targeted diet, physical activity and sedentary behaviour. The participants were scheduled to undergo physical examinations every six months by a paediatrician at hospital and monthly weighing sessions by a nurse in the primary health care. BMI was standardized using Norwegian growth charts.

Results: Mean (SD) BMI SDS was unchanged in the group as a whole, with a baseline value of 3.07 (0.49) and 3.07 (0.63) after one year of treatment (p = 0.830). A significant reduction in mean BMI SDS was however seen in boys (-0.13, p = 0.001) and for children below 12 years of age (-0.12, p = 0.003). For children entering the intervention at age 12 years and older, the mean BMI SDS was in contrast significantly increased (+0.09, p = 0.023). A multiple linear regression analysis showed that changes in BMI SDS were significantly dependent on both gender (p < 0.001) and age (p < 0.001).

Conclusion: Better response in the prepubertal age range underlines the importance of early interventions. Further studies are needed to find good treatment solutions for the adolescents.
Interdisciplinary therapy effects on anthropometrics, VO2max and quality of life in obese adult women.

Andrade-Silva S.G.1,2, Sanches R.B.1,2, Fidalgo J.P.1,2, Araujo G.S.1,2, Cerrone L.A.1,2, Moraes A.S.2,4, Rebello R.A.1,2, Poli V.S.1,2, Bresciani P.L.1,2, Nascimento M.A.1,2, Yi L.C.1, Caranti D.A.1,2,4

1Post Graduate Program of Interdisciplinary Health Sciences, Federal University of São Paulo/UNIFESP - Brazil.,
2Obesity Study Group (GEO) - Federal University of São Paulo/UNIFESP - Brazil.,
3Department of Biosciences, Federal University of São Paulo/UNIFESP - Brazil.,
4Post Graduate Program of Nutrition - Federal University of São Paulo/UNIFESP - Brazil.

Introduction: Obesity is cited as an aggravating factor of physical functioning, such as general health perception and vitality as well as psychological and social well-being. It was associated with poor body image, depression, stigmatisation, discrimination, diminished social interactions, and lower socioeconomic status, affecting the quality of life.

Methods: 22 adult obese women were enrolled at presential therapy consisting of physical exercise sessions three times a week and nutritional, psychological and physiotherapy intervention once a week at the Federal University of São Paulo – Brazil. Maximal oxygen uptake (Fitmate®) and body composition (Lunar Prodigy DEXA) and quality of life (WHOQOL-brief) were recorded before and after 32 weeks of intervention.

Results: Showed in figure 1

Conclusion: These findings showed an important increase in all domains of Quality of Life promoted by interdisciplinary therapy. An improvement in VO2max and decreased in fat mass are a potential triggers that corroborate these improvements.

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Final</th>
<th>p</th>
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<tbody>
<tr>
<td>Body Mass (kg)</td>
<td>93.2±12.1</td>
<td>87.4±12.0</td>
</tr>
<tr>
<td>BMI</td>
<td>33.7±2.6</td>
<td>31.5±2.5</td>
</tr>
<tr>
<td>Waist Circumference (cm)</td>
<td>105.7±6.3</td>
<td>99.7±6.9</td>
</tr>
<tr>
<td>Hip Circumference (cm)</td>
<td>117.8±7.0</td>
<td>112.7±6.7</td>
</tr>
<tr>
<td>Neck Circumference (cm)</td>
<td>37.9±3.0</td>
<td>37.6±3.8</td>
</tr>
<tr>
<td>VO2max (L/min)</td>
<td>2.0±0.4</td>
<td>2.3±0.4</td>
</tr>
<tr>
<td>Total Tissue Mass (kg)</td>
<td>87.5±10.9</td>
<td>85.6±10.8</td>
</tr>
<tr>
<td>Fat Tissue Mass (kg)</td>
<td>40.5±7.7</td>
<td>36.6±7.7</td>
</tr>
<tr>
<td>Lean Tissue Mass (kg)</td>
<td>46.9±8.9</td>
<td>49.9±9.0</td>
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<tr>
<td>Quality of Life (GQI)</td>
<td>5.6±2.5</td>
<td>14.7±1.7</td>
</tr>
<tr>
<td>Physical Domain (GQI)</td>
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<td>Psychological Domain (GQI)</td>
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<td>Social Relationship (GQI)</td>
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<td>Environment Domain (GQI)</td>
<td>12.3±2.6</td>
<td>13.7±4.4</td>
</tr>
</tbody>
</table>

Fig. 1. Anthropometrics, VO2max and Quality of Life after Interdisciplinary Therapy

Abstracts
Positive preliminary evaluation of the results in a newly established childhood obesity clinic including children who drop out of follow-up

Larsdottir A.E.1, Olaafsddottir A.S.2,3, Brynjolfssdottir B.4, Bjornsdottir O.E.5, Bjarnason R.6,7, Helgason T.8

1University of Iceland, Faculty of Medicine, Reykjavik, Iceland, 2Children’s Medical Centre, Landspitali University Hospital, Reykjavik, Iceland, 3University of Iceland, School of Education, Reykjavik, Iceland

Introduction: In 2011 a small multidisciplinary team was formed at Landspitali University hospital to treat obese children by improving their lifestyle (the Health School, 6 specialities, less than 2 positions in total). It has reached 10% of all obese children in Iceland in 4 years. As in other obesity treatments, a high proportion of families do not return to scheduled visits. The aim of this study was to investigate the reasons for drop-out and estimate the effect of the treatment on body weight.

Methods: The children were treated individually or in groups, based on cognitive behavioural family treatment. All children seen at the Health School from 1:1:2011 to 15:3:2013 were included in this study. Parents were contacted by phone and invited to a visit, with the child. Weight, height and waist circumference were measured, and the parents asked to answer a survey with questions about motivation, achievement and lifestyle.

Results: 173 children were included. Last contact with the Health School was over a year ago in 66%, median follow-up time was 27 months. In total 88% (n=153) were reached and measurements were obtained from 51% (n=89). Reduction in BMI Standard Deviation Score (BMI-SDS) was seen in 66% (n=59). The overall change in BMI-SDS was –0.24 (responders only –0.59). The questionnaire was answered by 76% (n=132). The most frequent reasons for drop-out were not knowing of the follow-up (31%) and lack of interest (23%). The majority (94%) was satisfied with the service offered and would recommend the Health School.

Conclusion: A small dedicated team can have a lasting effect on obese children and even a large portion of children who drop out of treatment lose weight in the long term. The main reasons for continuing treatment are lack of motivation and time.

References:

Family-based behavioral treatment of obesity - the fabo-study

Danielsen Y.S.1,2, Skjøkådeåegard H.F.2, Kolko R.P.3, Wilfey D.E.3, Julisson PB.1,2

1Department of Clinical Psychology, University of Bergen, Bergen, Norway, 2Section for Eating Disorders, Haukeland University Hospital, Bergen, Norway, 3Obesity Outpatient Clinic, Haukeland University Hospital, Bergen, Norway, 4Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center, Pittsburgh, PA, USA.

Introduction: The purpose of the FABO study is to evaluate the effect of family-based behavioral weight loss treatment (FBBT) compared with the effect of today’s standard treatment given to children and adolescents suffering from obesity at the Obesity Outpatient Clinic (OOC), Haukeland University Hospital. FBBT has been demonstrated to be the most effective treatment option for youth with obesity. Such treatment has not previously been incorporated into an obesity clinic in Norway.

Methods: The FABO study is a randomized controlled trial, in which families (N=120) will be recruited among children and adolescents between ages 8–16 years referred to the OCC by their general practitioner. Criteria for admission to the clinic are an (IOTF) isoBMI of ≥ 35, or isoBMI ≥ 30 with obesity related co-morbidity. Families are randomized to receive FABO treatment immediately or following standard treatment (wait list control condition). The FABO treatment consists of 17 weekly manualized sessions with subsequent follow-up every three month for two years. Outcome variables include the following: Anthropometry: BMI, waist-circumference and body composition (measured with BIO-impedance and DXA scan). Physiological measures: blood samples, blood pressure. Activity level/inactivity and sleep pattern (measured with accelerometer). Psychological measures: Questionnaires (DEBQ, YEDQ-Q, CBCL, CDI, SPPC) and food records (4-day diet record).

Results: Details of the FABO treatment and study will be presented along with the preliminary analysis. Are the children and partners of obese women treated by RYGB, with great weight loss after RYGB, more physically active 9 months after surgery? Are children and partners of obese women, with great weight loss after RYGB, affected in terms of BMI? Methods: RYGB was conducted in 5 specialized clinics. Height, weight and physical activity (PA) were measured objectively 3 months before and 9 months after RYGB. PA was measured by tri-axial Actigraph GT3X+ accelerometers during 1 week. PA was categorized by time spent in moderate or vigorous PA (MVPA), low PA (LPA), and sedentary behavior (SB). Approximately 60 women, 35 spouses, and 75 children (7–14 years of age) were included in most analyses. Linear regression models for repeated measurements were used to evaluate changes in own, partners’ and children’s BMI and PA, between the two time points.

References:
Rasmussen E.1, Berglind D.2, Willmer M.3, Näslund E.1, Ghaderi A.3
1Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden, 2Department of Clinical Sciences, Danderyd Hospital, Stockholm, Sweden, 3Department of Clinical Neroscience, Karolinska Institutet, Stockholm, Sweden

Influences of gastric bypass surgery on their own, partners’ and children’s weight and physical activity

Rasmussen E.1, Berglind D.2, Willmer M.3, Näslund E.1, Ghaderi A.3
1Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden, 2Department of Clinical Sciences, Danderyd Hospital, Stockholm, Sweden, 3Department of Clinical Neroscience, Karolinska Institutet, Stockholm, Sweden

Roux-en-Y gastric bypass (RYGB) surgery results in great weight loss in most women, but less is known about the influences on their own, partners’ and children’s physical activity, and influences on children’s and partners BMI. Research questions: (i) Are obese women, treated by RYGB gastric bypass, who lose a large amount of weight, more physically active 9 months after surgery? (ii) Are the children and partners of obese women treated by RYGB, with great weight loss after RYGB, more physically active 9 months after surgery? (iii) Are children and partners of obese women, with great weight loss after RYGB, affected in terms of BMI?

Methods: RYGB was conducted in 5 specialized clinics. Height, weight and physical activity (PA) were measured objectively 3 months before and 9 months after RYGB. PA was measured by tri-axial Actigraph GT3X+ accelerometers during 1 week. PA was categorized by time spent in moderate or vigorous PA (MVPA), low PA (LPA), and sedentary behavior (SB). Approximately 60 women, 35 spouses, and 75 children (7–14 years of age) were included in most analyses. Linear regression models for repeated measurements were used to evaluate changes in own, partners’ and children’s BMI and PA, between the two time points.

Results: The women lost on average 11.7 BMI units (33.2 kg) between the two data collection time points. Their partners lost on average 0.9 BMI units (2.5 kg) over the 9 months period. Among the children the prevalence of overweight and obesity went from 57.0% to 48.6%, reflecting a relative risk of 0.87 (95% CI 0.73; 1.00, p = 0.048). For obesity only, the prevalence went from 18.2% to 15.9%, giving a relative risk of 0.87 (95% CI 0.62, 1.24, p = 0.447). We found no significant differences in MVPA, MVPA, LPA or SB from 3 months before to nine months after surgery in women, despite substantial weight loss. 44% of partners and 39% of children decreased time spent on MVPA, and increased time spent in SB, between pre- and post-surgery.
Phentermine/topiramate/ephedrine with coffee shows to weight management in obesity for 4 weeks, especially those with high VAT and hyperglycemia

Lee K.R.1, Ko K.D.2, Whang I.C.2, Kim K.K.2, Suh H.2
1bariatric unit, Department of Family Medicine, Dong-incheon Hospital, Gachon University, Incheon, Korea,
2Department of Family Medicine, Gil Medical Center, Gachon University, Incheon, Korea

Although caffeine/ephedrine (thermogenic) and Qsymia (anorectic) were approved, they are not available in Korea. It is crucial for anti-obesity medication that thermogenic as well as appetite suppression would be included. Therefore we investigated the effect of weight loss using by phentermine/topiramate/ephedrine over a cup of coffee in obesity. In addition which fatness markers; metabolic variables further would be assessed to relate with its outcome. 50 obese subjects (female: 76%, 29.79 kg/m²) were investigated to study the clinical efficacy of phentermine7.5mg/topiramate50mg/ephedrine20mg with a sip of coffee for weight management for 4 weeks. All of them were examined their energy intake, and given behavioral counseling. Weight, height, body fat (bioelectric impedance (BIA)), and visceral adipose tissue (VAT) were measured at initial visit. Fasting plasma glucose (FPG), insulin, free fatty acid, lipid profiles were obtained. The regimens were taken once a day, and body fat was assessed through BIA at 4 week visit. Pearson coefficient, paired t-tests and ANOVA analysis were performed. FPG, visceral adipose tissue showed the significant association with medication after adjusted for age. Therefore the weight, body fat were compared according to 4 groups based on FPG, VAT. All subjects lost 6.83 kg**, 1.82% for 4 weeks respectively. While the weight loss showed best in high VAT/FPG group, fat loss did in low VAT/FPG group. (*: P < 0.05, **: P < 0.01) In conclusion, phentermine/topiramate/ephedrine with coffee demonstrates to promote the significant weight loss, especially tends to show weight loss in obese subjects with high VAT and hyperglycemia for 4 weeks. Well controlled clinical trial would be considered in the future.

Clinical efficacy of weight and body fat using by hutermin (phentermine)/topiramate/aperin to Korean overweight subjects for 4 weeks

Lee K.R.1, Ko K.D.2, Whang I.C.2, Kim K.K.2, Suh H.2
1bariatric clinic, Family Medicine, Dong-Incheon Gil Hospital, Gachon University,
2Family Medicine, Gil Medical Center, Gachon University

In order to explore the effect of weight loss by combined medication of Qsymia and Retigen, we investigated the effect of weight and body fat using by hutermin 15mg (phentermine; Huons, Korea), aperin (Huons, Korea; ephedrine 25 mg, caffeine 25 mg, acetaminophen 200 mg) and topiramate 50mg for 4 weeks. 46 subjects (female 87%, BMI 28.3 kg/m²) were enrolled to study the clinical efficacy of weight loss using by hutermin/topiramate/aperin. Weight, height, and body fat (bioelectric impedance (BIA), DXA, CT) were measured at initial visit. In addition, body fat and weight were assessed through BIA at 4 week visit. Pearson coefficient, pair t-test were performed for statistics. The probability less than 0.05 was considered as significant at two sided. As visceral (VAT) and subcutaneous adipose tissues (SAT) were significantly related with medication use, weight and body fat were compared for 4 weeks according to 4 groups based on adipose tissue. 5.35 kg** (71.67 +/- 1.92 to 66.32 +/- 1.73), 2.69%* (33.47 +/- 1.07 to 33.47 +/- 1.07) were decreased in all of participants for 4 weeks (*: P < 0.05, **: P < 0.01) Among 4 groups, weight change in high VAT/SAT group was highest; in contrast the change of body fat in
low VAT/SAT group was. Noted were minor adverse events such as hot flushing, palpitation, and insomnia. In conclusion, hutermin/topiramate/aperin showed the significant reduction in weight and fat for overweight subjects for 4 weeks. Interestingly, body fat decreased most in lower SAT/VAT group. It implies that hutermin/topiramate/aperin may affect SAT as well as VAT. Further controlled cohort trial would be needed to explore the relationship between adipose tissue and the regimen in the future.

**T&PO.097**

*Should the dosage of phentermine is adjusted for lower BMI patients?*


1. 365MC Obesity Clinic, Seoul, South Korea
2. Department of Liposuction, Seoul 365MC Hospital, Seoul, South Korea
3. Department of Bariatric surgery, Seoul 365MC Hospital, Seoul, South Korea
4. 365MC Obesity Clinic, Busan, South Korea

**Introduction:** Phentermine is recommended for subjects whose BMI are 30kg/m² or greater and 27kg/m² or greater having weight-related comorbidity. But in South Korea, the cutoff point of BMI for obesity is lower than that in Western countries, so in many cases, phentermine is being prescribed for the patients who have lower BMI than the recommendation. The aim of this study is to know whether to adjust the dosage of phentermine considering the lower BMI state.

**Methods:** The patients who participated in the treatment were divided into the two groups, BMI 25kg/m² or greater (high BMI group: n=37) and less than 25kg/m² (low BMI group: n=39). They all received phentermine-HCl 37.5mg per day with life style modification for 4 weeks. They were checked BMI, body weight, body fat weight before and at the end of the treatment. And to check the adverse reactions, at every visit, twice a week, they were asked about the discomfort with the medication. Result: The mean of weight loss was 3.79 ± 1.72kg (5.0 ± 2.0% of initial weight) in hight BMI group and 3.36 ± 1.85kg (5.37 ± 2.9% of initial weight) in low BMI group. There were no significant differences in the change of body weight, BMI, body fat and the incidence of adverse reactions between both groups.

**Conclusion:** Phentermine was well tolerated and made the favorable results in weight control for lower BMI patients like for obese patients. It is considered that it doesn't need to adjust the dosage of the agent even for the lower BMI patients.
Early phase of metformin action in dietary-obese mice: Lack of involvement of amp-activated protein kinase and possible interaction with n-3 fatty acids

Kucharikova P1, Horakova O1, Rossmeisl M1, Kopecky J1
1Department of Adipose Tissue, Institute of Physiology Academy of Sciences of the Czech Republic v.v.i, Prague, Czech Republic.

Introduction: We have shown previously that n-3 fatty acids (omega-3) prevent both hepatic steatosis and insulin resistance in obese mice depending on AMPK. Metformin lowers glycaemia presumably via suppression of mitochondrial complex I activity leading to AMPK activation; however, AMPK-independent effects were also observed. We investigated whether pretreatment with omega-3 could enhance acute metformin action, and whether AMPK is involved.

Methods: Adult C57Bl/6 mice were fed a high-fat diet (HFD) for 6 weeks, and then either HFD or HFD with 15% lipids replaced by omega-3 (HFD-F) for 2 weeks. At the end, mice were given metformin (400 mg/kg) or saline and then underwent oral glucose tolerance test (OGTT) or were killed to collect liver samples. Similar experiment with a lower dose of metformin (60 mg/kg) was performed with mice lacking α2 AMPK subunit (AMPKα2-KO).

Results: During OGTT, metformin, but not saline, lowered glycaemia as well as an area under the glycaemic curve (AUC). In salin-treated mice, AUC was lower in HFD-F fed group (p < 0.05). Omega-3 also tended to augment effect of metformin, but the difference was not statistically significant. We observed no change in AMPK activity in liver, and no difference between control and AMPKα2-KO mice in response to omega-3 or metformin during OGTT.

Conclusions: The absence of changes in AMPK activity in liver as well as no difference in response of AMPKα2-KO mice collectively suggest that AMPK is not essential for the acute hypoglycaemic effect of metformin. Moreover, there was a trend for an additive effect of omega-3 and metformin on glucose metabolism, which deserves further characterization.

Characteristics of anti-obesity medication prescribers prior to the approval of new pharmacotherapy in the US

Schmidt S.L1, Horn D.B.2, Bryman D.1, Westman E.C.3, Hendricks E.I.4
1American Society of Bariatric Physicians,
2University of Texas Health Science Center Houston,
3Center for Weight Management Sacramento,
4Duke Lifestyle Medicine,
5Midwestern University

Introduction: A survey of obesity medicine specialists was conducted before the recent approval of several new anti-obesity medications (AOMs) in 2012 and 2014. A subset of physicians reported that they “frequently” prescribed phentermine (P) for weight loss. The aim of this analysis is to characterize the prescribing practices of these physicians, as they may be prescription strategies already described in this study.

Methods: An Internet survey was sent to obesity medicine physicians inquiring about their practice and prescribing habits.

Results: 307 respondents reported frequently prescribing P to treat obesity. They treated 1235 ± 2212 patients per year per physician, compared to 339 ± 472 patients for doctors who rarely prescribe P (n=18). 40% of these doctors practice only obesity medicine. Less than 5% were in a surgical setting and over 75% were in private practice. 13% prescribe P for 12 weeks or less, while 53% prescribe P long term for chronic disease management. Only 30% require patients to take drug holidays. 47% are located in the southern US. Liraglutide was prescribed by 9% of these physicians; bupropion: 35%; naltrexone: 5%; topiramate: 36%; orlistat: 14%; exenatide: 14%; metformin: 38%; diethylpropion: 51%; phendimetrazine: 50%; zonisamide: 4%. With regard to combination therapy, 32% were prescribing phentermine/topiramate; 44% prescribe phentermine + metformin and 5% prescribed bupropion/naltrexone. The most common nutrition strategy was a low carbohydrate diet.

Conclusion: Physicians who frequently prescribe P treat a large number of patients for obesity. In 2012, these physicians had limited options in medications and prescribed some medications off-label to help in obesity treatment. Recommended next steps will be to assess changes in AOM prescribing that may occur with the recent US approval of many of the prescription strategies already described in this study.

The impact of roux-en-y gastric bypass on neuroendocrine regulation of energy balance and their possible implications on appetite/satiety

Netto B.M1, Bettini S.C.1, Clemente A.P.1, Masquio D.C.1, Farias G1, Boritza K1, Silva L.G1, Von der Heyde M. E2, Earthenman C. P3, Démasi A.R1
1Universidade Federal de Sao Paulo – Escola Paulista de Medicina - UNIFESP - EPM - Brazil,
2Universidade Federal do Paraná - UFPR - Brazil,
3Hospital das Clinicas - UFPR - Brazil,
4University of Minnesota - USA

Introduction: The body weight varies depending on the prevailing direction of environmental pressures, however; physiological factors could intervene in the control of body weight. The aim of the present study was to assess the impact of Roux-en-Y gastric bypass (RYGB) on hormones and peptides involved in the control of energy balance and their possible implications on appetite/satiety.

Methods: The sample was composed of 41 extremely obese (39 women and two men) who underwent Roux-en-Y gastric bypass (RYGB). Anthropometric and biochemical markers were collected prior to surgery and 6 months post-RYGB.

Results: The BMI decreased from 44.62 ± 6.32 kg/m² to 31.66 ± 5.66 kg/m² (p < 0.001) at the 6th month. Percentage of excess weight lost was 63.50 ± 24.99%. Levels of the glucose decreased significantly 6 months after gastric bypass (p < 0.001). Also, at the 6th month after the surgery, the PYY values were significantly higher than the baseline period (p < 0.001). The multiple linear regression analysis revealed that α-MSH levels and BMI were together dependent predictors of changes in PYY concentrations.

Conclusions: The RYGB surgery seems to be related to neural mechanisms, which possibly by an adaptive response are involved in mediating post-surgery changes in PYY secretion. This finding could explain the good results of surgery in mediate the control of energy intake, modulates feeding behavior and contribute to improvements in glycemic and the appetite/satiety control.

Acknowledgement: FAPESP (2013/04136-4; 2013/19046-0; 002804928-41), CNPq (150177/2014-3; 300654/2013-8) and CAPES.

T8 – Medico-Surgical approaches
**T8 – Ethics and guidelines**

**TB:PO.101**

**Bariatric surgery in adolescents: Is there a consensus in treatment algorithms**

Fried M.1,2

1 Ob klinika – Center for treatment of Obesity and Metabolic Disorders, Prague, Czech Republic,

2 11th Faculty of Medicine, Charles University, Prague, Czech Republic

**Introduction:** Childhood obesity shows increasing prevalence becoming serious health, social, and economic problem. There’s variation in obesity prevalence among different age and sex groups, and geographical regions. It is widely accepted that bariatric surgery is the most effective treatment for morbidly obese adults, reducing mortality, improving/resolving co-morbidities, decreasing health-care utilization and costs, however there’s a lack of robust data about the role of bariatric surgery and standardized approach in surgery for obesity in adolescents.

**Methods:** Review of the most frequently adopted algorithms for surgical treatment of obese adolescents was carried out and generally accepted common grounds as well as the most frequent differences are highlighted.

**Results:** The commonly accepted criteria for childhood bariatric treatment are: BMI > 40 (99.5th percentile for the respective age) and at least one co-morbidity; BMI > 50 with less serious comorbidities; Failure of nonsurgical treatments with at least 6-12 months of weight-reducing attempts in a specialized center; Patient shows skeletal and developmental maturity / attains 95% of adult height based on estimates from bone age. Is able to commit a comprehensive medical and psychological evaluation before and after surgery. Is willing to participate in a postoperative multidisciplinary treatment program;

**Conclusion:** More evidence and algorithm for bariatric surgery in adolescents is needed to evaluate outcomes, including influence on physical growth and QoL, international registry and definition of specialized childhood MDT centers is necessary.

**T8 – Emerging treatments**

**TB:PO.102**

**Low-level laser therapy (LLLT) associate with aerobic plus resistance training to improve inflammatory biomarkers in obese adults.**

Campos R.S.1, Dámaso A.R.1, Masquio D.C.1, Aquino Jr A.E.1, Sene-Fiorese M.1, Duarte F.O.1, Tock L.1, Parizotto N.2,3, Bagnato V.2, S.1

1 Pos-Graduate Program of Nutrition - Federal University of São Paulo – Paulista Medicine School- UNIFESP-EPM - São Paulo - Brazil,

2 Optics Group from Institute of Physics of São Carlos (IFSC – USP) - São Carlos - SP - Brazil,

3 Department of Physical Therapy - Federal University of São Carlos - UFSCar - São Paulo - Brazil,

**Weight Science - Obesity Management - São Paulo - Brazil

Introduction: Recently investigations suggest the benefits of Low-Level Laser (light) therapy (LLLT) in noninvasive treatment of cellulite, improvement of body countering and control of lipid profile. However, the underlying key mechanism for such potential effects associated to aerobic plus resistance training to reduce body fat and inflammatory process, related do obesity in women still unclear.

**Methods:** For this study, it was involved 40 obese women with age of 20–40 years. Inclusion criteria were primary obesity, body mass index greater than 30 kg/m² and less than 40 kg/m². The voluntaries were allocated in two different groups: Phototherapy group and SHAM group. The interventions consisted on physical exercise training and application of phototherapy (830nm), immediately after the physical exercise, with special designed device. Pro/anti-inflammatory adipokines were measured.

**Results:** It was showed that LLLT associated to physical exercise is more effective than physical exercise alone to increase adiponectinemia the most potent anti-inflammatory adipokine. Also it was showed reduced values of neck circumference (cm), insulin concentration (µU/ml) and interleukin-6 (pg/ml) in LLLT group.

**Conclusion:** physical exercise training and Low-Level Laser (light) therapy promote improvement in inflammatory framework and body composition, suggest the phototherapy can be an important tool in the treatment of obesity, being this results applicable in the clinical practice.

**Acknowledgement:** FAPESP (2013/04136-4; 2013/19046-0; 002804928-41), CNPq (150177/2014-3; 300654/2013-8) and CAPES.

**TB:PO.103**

**Energy cost of lower body vibration across varying frequencies in young men and women**

Fares E.1,2, Miles-Chan J.L.1, Chamie C.1, Montani J.P.1, Schutz Y.1, Dullio A.G.1

1 Department of Medicine, University of Fribourg, Fribourg, Switzerland

**Introduction:** There is increasing recognition about the importance of enhancing energy expenditure (EE) for weight control through increases in low-intensity physical activities compatible with daily life (2–4 METS; i.e. 2–4 times the resting EE). Whole-body vibration increases EE modestly and could present both a useful adjuvant for obesity management and a tool for metabolic phenotyping. However, it is not clear whether a “dose-response” relationship exists between vibration frequency and EE. The aim of this study was to investigate the relationship between lower body vibration (LBV) frequency and EE.

**Methods:** EE was measured by indirect calorimetry in 8 healthy young adults (4 men, 4 women), first at rest while sitting in a comfortable seat and then standing without vibration, and subsequently during 5 cycles of intermittent LBV (30s vibration and 30s rest per cycle) at 3 frequencies of 30, 40 and 50 Hz (validated by accelerometry) separated by 5 min rest while sitting; LBV was standardized with the subject standing with both knees slightly bent to the extent that body vibration occurred only below the waistline.

**Results:** LBV increased EE relative to resting levels (+55% vs sitting, p < 0.001; +37% vs standing, p < 0.001). No differences in EE were observed across vibration frequencies, including in a subgroup (n=4) which repeated the protocol on 3 separate days. Intra-individual coefficient of variation in EE during sitting, standing without vibration and during LBV was 2.2, 7.7, and 10%, respectively.

**Conclusion:** No relationship could be demonstrated between EE and LBV frequency in the range of 30–50Hz, raising the possibility that within this range, the impact of increased vibration on skeletal muscle tension is buffered by tendon elasticity.

**TB:PO.104**

**Combination prolonged-release naltrexone/bupropion therapy resulted in clinically meaningful improvements in weight and quality of life (qol) - integrated analysis of four phase 3 trials**

Holseth A.E.1, Burns C.M.1, Walsh B.1, Klassen P.1, Kolatkin R.L.2

1 Orexigen Therapeutics, La Jolla, CA USA,

2 Quality of Life Consulting, Durham, NC USA

**Introduction:** Comprehensive treatment for obesity ideally will improve physical, psychological, and social aspects of health in addition to facilitating weight loss.

**Methods:** This integrated analysis of 4 Phase 3, 56-week trials of naltrexone/bupropion 32/360 mg prolonged-release (NRB) vs placebo (PBO) investigated changes in weight and weight-related QOL using the Impact of
TB.P.O.105

Prolonged-release naltrexone/bupropion improves glucose control in individuals with prediabetes

Halseth A.E.1, Walsh B.1, Gilder K.1, Hollander R.1
1Orexigen Therapeutics, La Jolla, CA USA, 2Baylor Medical Center, Dallas, TX USA

Introduction: Combination therapy with prolonged-release naltrexone/bupropion 32 mg/360 mg (NB) reduces body weight in subjects with and without type 2 diabetes mellitus (T2DM), and improves glycemic control in subjects with T2DM. Given the well-established relationship between weight loss and prevention of T2DM, we examined the effects of NB in overweight/obese subjects without T2DM but with impaired fasting glucose (FG) in 3 Phase 3 clinical trials.

Methods: Subjects with impaired FG (≥5.56 mmol/L at screening and baseline) who completed 56 weeks of treatment in conjunction with lifestyle modification were assessed (NB n=176, placebo [PBO] n=108; 76% female, mean age 51 years, mean BMI 37 kg/m², mean weight 103 kg). Weight and FG were analyzed as LS means, insulin and HOMA-IR as geometric LS means; differences were evaluated by ANCOVA with treatment, study, and baseline values as covariates.

Results: At week 56, weight change was significantly greater with NB (-9% vs PBO (-5%; p < 0.001 vs. NB). At baseline, FG was 6.17 mmol/L for NB and 6.08 mmol/L for PBO. At 56 weeks, FG was reduced by 0.59 mmol/L with NB vs 0.38 mmol/L with PBO (p = 0.013 vs NB). Fasting insulin was similar at baseline (NB: 15.5 μU/mL; PBO: 15.3 μU/mL) and was significantly reduced with NB (30%) vs PBO (13%) at week 56 (p = 0.002 vs NB). HOMA-IR was 4.2 (NB) and 4.1 (PBO) at baseline; greater improvement was observed with NB (-37%) vs PBO (-19%; p = 0.001 vs NB). Weight loss was correlated with reductions in FG (r=0.38), insulin (r=0.49), and HOMA-IR (r=0.50; all p < 0.001, no difference between NB and PBO).

Conclusion: Greater weight loss with NB was associated with significantly greater improvement in FG, insulin, and HOMA-IR vs PBO. Such weight loss may delay the progression to T2DM.

TB.P.O.106

Antiobesity activities of aminoprocalcitonin in high-fat-diet-induced obese mice

Maldonado R.1, Minano F.J.1,2, Tavares E.1
1Clinical and Experimental Pharmacology Research Unit, Valme University Hospital, Seville, Spain, 2Department of Pharmacology, Pediatrics and Radiology, Faculty of Medicine University of Seville, Seville, Spain

Background: Obesity is associated with insulin resistance and a state of abnormal inflammatory response. Recently aminoprocalcitonin (NPCT), a neuroendocrine peptide produced in the brain and peripheral tissues, has been shown to play an important neuroimmune role in inflammation. NPCT acts as a catabolic mediator in neuroendocrine and metabolic mechanisms that regulate energy homeostasis. NPCT may be a candidate for participation in the cross-talk between inflammatory and metabolic signals.

Objective: This study investigated the effects of chronic subcutaneous infusion of NPCT on obesity and its associated factors in high-fat-diet-induced obese (HF) mice.

Methods: Male C57BL/6 mice were randomly assigned to one of four groups: low-fat-diet (LF)-vehicle, LF-NPCT, HF-vehicle and HF-NPCT. NPCT was administered via subcutaneous osmopumps. After 4 week of treatment, obesity-associated factors, including food/caloric intake, body weight, plasma concentrations of insulin, glucose (insulin-resistance), and circulating markers of inflammation were measured.

Results: A 4-week infusion of NPCT significantly decreased the food/caloric intake body weight and plasma levels of proinflammatory cytokines (TNF-a, IL-6, and/or IL-1β) in HF fed mice. The anti-inflammatory effects of NPCT were associated with improved glucostatic status in the treated animals, evidenced by improved glucose tolerance.

Conclusions: These findings identify a potential novel application for NPCT as an anti-obesity and anti-inflammatory agent.

Acknowledgement: This work was supported by grants from Instituto de Salud Carlos III (FIS2012/01074), Consejería de Salud, Junta de Andalucía (DPI08012/2011 and PI0293/2010).
energy delivery 50 Joules. The body composition was measured with bio-impedance InBody®.

**Results:** Described in table above.

**Conclusion:** LLLT when associated with concurrent (mixed) exercise potentiated the exercise effects decreasing neck and waist circumference, visceral fat and platelets, all of these factors included in the cardiovascular risk in obese woman. These results suggest the LLLT as new therapeutic tool to control the cardiovascular risk in obese people.

**Table 1. Body mass, visceral fat and platelets.**

<table>
<thead>
<tr>
<th></th>
<th>Body mass (kg)</th>
<th>Visceral fat (cm²)</th>
<th>Platelets*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>86.4±0.10</td>
<td>137.8±0.10</td>
<td>157±0.4</td>
</tr>
<tr>
<td>Sham</td>
<td>87.9±0.10</td>
<td>138.3±0.10</td>
<td>159±0.6</td>
</tr>
</tbody>
</table>

*initial versus end; ** Sham versus Phototherapy

**Table 2. Waist and neck circumference.**

<table>
<thead>
<tr>
<th></th>
<th>Waist circumference</th>
<th>Neck circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>101.8±0.10</td>
<td>39.9±0.10</td>
</tr>
<tr>
<td>Sham</td>
<td>102.0±0.10</td>
<td>40.0±0.10</td>
</tr>
</tbody>
</table>

*initial versus end; ** Sham versus Phototherapy

**T8:PO.109**

**An integrated analysis of weight loss with combination prolonged-release naltrexone/bupropion therapy by BMI classification**

**Walsh B.1, Aponian C.2, Burns C.M.1, Taylor K.1**

1Orexigen Therapeutics, Inc., La Jolla, CA, USA, 2Boston University School of Medicine, Boston, MA, USA

**Introduction:** Naltrexone prolonged-release (PR) / bupropion PR (NB [32/360 mg]) significantly reduced body weight vs placebo (PBO) in the four Phase 3 trials of overweight/obese patients (BMI 27–45 kg/m²). This integrated analysis examined weight loss in these trials when stratified by baseline BMI (obesity class): Class-I (30.0–34.9 kg/m²), Class-II (35.0–39.9 kg/m²), Class-III (≥40 kg/m²).

**Methods:** Treatment group differences (LS mean=SE) in the modified ITT-LOCF (≥1 post-baseline weight on study drug) were evaluated by ANCOVA with treatment, study, and baseline values as covariates.

**Results:** Baseline characteristics were similar between treatment arms (NB n=2043; PBO n=1319): 81% female; 79% Caucasian; mean age 46 years; mean BMI 36 kg/m²; obesity Class-I 37%, Class-II 36%, Class-III 25%. Completion rate was 66% (NB) and 59% (PBO). At Week 56, significantly greater weight loss was observed with NB (7.0 ± 0.2% vs PBO (-2.3 ± 0.2%; p < 0.001), and a more patients attained ≥5% weight loss with NB (odds ratio vs PBO: 4.1; p < 0.001). NB patients experienced favorable shifts in BMI class from baseline (NB vs PBO: improved = 45% vs 20%, no change = 53% vs 74%, worsened = 2% vs 6%; p < 0.001), and a non-obese BMI was achieved in 17% of Class-I NB subjects (vs 6% PBO) and 3% of Class-II NB subjects (vs 1% PBO). Weight loss with NB was similar across the 3 obesity classes (-4.0% to -5.0% PBO-corrected, all p < 0.001), as was achievement of ≥5% weight loss (odds ratio vs PBO: 3.5 to 4.3; all p < 0.001). The safety/tolerability profile of NB was consistent with its components; the most common AEs were nausea (32%), constipation (19%), headache (18%), and vomiting (11%).

**Conclusion:** The clinically significant weight loss associated with NB was consistent across a wide BMI range.

**T8:PO.110**

**Vitamin d supplementation promotes weight loss and waist circumference reduction in overweight/obese adults with hypovitaminosis d**

**Vigna L.1, Latoni C.1, Sommaruga D.1, Tirelli A.S.1, Riboldi L.1**

1Dept of Preventive Medicine, Fondazione IRCCS Ca’ Granda Ospedale Maggiore Polyclinico, Milano, Servizio dietetico direzione sanitaria di presidio, Fondazione IRCCS Ca’ Granda Ospedale Maggiore Polyclinico, Milano, Laboratorio analisi cliniche e microbiologia, Fondazione IRCCS Ca’ Granda Ospedale Maggiore Polyclinico, Milano

Hypovitaminosis D is associated with adiposity and higher risk of developing obesity-related complications. Intervention studies with cholecalciferol provided inconsistent results. The objective was to evaluate whether restoration of optimal vitamin D status promotes weight loss and improves metabolic serum biomarkers. Four-hundred overweight or obese patients with vitamin D insufficiency were recruited from 2011 to 2013. Participants received a balanced moderately-low-calorie diet and were assigned to 3 groups: 1) no treatment; 2) cholecalciferol 25.000 UI / month; 3) cholecalciferol 100.000 UI / month. At baseline (T0) and after 6 months (T1) we determined: anthropometric measures, BMI, waist circumference, body composition, plasma 25-hydroxyvitamin (OH)D, fasting glucose, fasting insulin, and glycated hemoglobin. Differences were investigated using repeated measures ANOVA regardless of patient adherence to treatment (intention-to-treat analysis). Six-month supplementation with 25.000 and 100.000 IU increased serum 25(OH), but only 100.000 allowed achievement of optimal vitamin D status (p < 0.001) (Fig. 1). A significantly greater weight decrease was observed in the 25.000 and
Obesity Facts 2015;8(suppl 1):1–247

Abstracts

**Randomized, double-blind, placebo-controlled, 4-week proof of concept trial of beloranib, a novel treatment for patients with Prader-Willi syndrome**

*Kim D.D.‡, Malloy J.L.‡, Chen A.‡, Taylor K.‡, Hughes T.E.‡*

‡Zafgen, Inc. Boston MA USA

Patients with Prader-Willi syndrome (PWS) fail to regulate metabolism and hunger, resulting in preoccupation with food and extreme drive to eat that leads to severe obesity. Beloranib is a MetAP2 inhibitor that reduces hunger and restores balance to the production/utilization of fat; prior studies have shown ~11% body weight (BW) loss and ~50% reduction in hunger over 12 wks in exogenous obesity. This was a randomized, double-blind, placebo-controlled study in 17 adults with PWS. Patients were randomized to receive blinded twice weekly SC doses of 1.2 mg (n=5), 1.8 mg (n=6) of beloranib, or placebo (n=6) for 4 weeks. All patients were offered 50% increase in daily calorie allowance throughout the trial. All 17 patients (11 females, age 33.5yr, BMI 31.4kg/m², BW 72.0kg) completed the trial. After 4 wks, patients on placebo had an average (±SEM) increase of 3.6% ± 2.4% total body fat vs. a reduction in total body fat of 0.9% ± 1.1% and 4.5% ± 2.0% in the 1.2 mg and 1.8 mg beloranib groups, respectively (p < 0.05 for both doses). Biomarkers associated with cardiovascular disease risk (lipids, hs-CRP) and adipose tissue function (adiponectin) were also improved in both beloranib groups. Food-related problem behaviors, as measured by Hyperphagia Questionnaire, improved by 1.8% (1.2mg), 52.4% (1.8mg), vs. worsening by 40.5% with PBO (p = 0.025 vs. 1.8 mg). Beloranib was well-tolerated with no severe/serious adverse events and no clinically significant changes in laboratory values or ECG/vital signs observed. This study demonstrated proof-of-concept safety and effectiveness of beloranib on body composition, food related problem behaviors, and cardiovascular risk markers in PWS. Phase 3 trial assessing safety and efficacy of beloranib in patients with PWS has been initiated.
T8 – Diagnostics

T8:PO.113
Influence on helicobacter pylori eradication of laparoscopic gastric plication
Tokocin M.1, Varonagolu T.1, Koy Y.1, Tolga D.2, Arici S.1, Solmaz A.1, Tokocin O.1,2, Celebi F.1, Tetikkurt U.S.1, Kutanis R.1
1Department of General Surgery, Bagcilar Training and Research Hospital, Istanbul, Turkey,
2Department of Patology, Bagcilar Training and Research Hospital, Istanbul, Turkey.

Introduction: Among the surgical procedures for the treatment of morbid obesity, laparoscopic gastric plication has known as a bariatric technic with little or no studies regarding operative findings and patient follow-up. Aim of this study is to evaluate the incidence of Helicobacter pylori (HP) infection on the preoperative and post operative outcomes of patients undergoing laparoscopic gastric plication.

Methods: A retrospective study was done on the gastric pathology specimens of randomly selected asymptomatic 100 patients of 407 who underwent laparoscopic gastric plication from 2010 to 2013. All the specimens were analysed by the same pathologist and histological grading was based on the Sydney classification.

Results: 76 of the 100 patients are HP positive while 24 were negative. There is no significant difference between two groups in term of BMI, sex and weight. Although no differences were found at the preoperative and postoperative gastrosopies of these patients according to the activity, atrophy, intestinal metaplasia and the positivity of HP, we observed difference at the aspect of inflammation (p = 0.012).

Conclusions: While HP were not treated via laparoscopic gastric plication, we detected the positive influence on the inflammation of patients operated by laparoscopic gastric plication.

Acknowledgement: The authors declare that there is no Acknowledgement regarding the publication of this paper.

T8:PO.114
Spise: Single point insulin sensitivity estimator – a novel parameter to evaluate insulin sensitivity in obese adolescents
Paulimichl K.1, Anderwald C.H.2,3, Binder S.1, Eidherr A.1, Labmayr V.1, Widhalm K.1, Weghuber D.1
1University hospital of pediatrics salzburg, beta-judo consortium, obesity research unit, salk / paracelsus medical university, Salzburg, Austria,
2Department of endocrinology and metabolism, general hospital vienna, Medical University Vienna, Austria,
3Department of Pediatrics, General Hospital Vienna, Medical University Vienna, Austria.

Introduction: Insulin resistance is a key feature of obesity-associated metabolic comorbidities. Clinical assessment of insulin sensitivity (IS) currently uses indices calculated from plasma glucose and insulin values (fasting as well as during oral glucose tolerance test). These indices correlate insufficiently with the IS assessed by the glucose-clamp method. The goal of the current study is to contrive and validate a new and simple index for IS which does not necessitate the prevenation evaluation of insulin-levels.

Methods: This study was carried out by the Beta-JUDO consortium (Beta-Cell Function in Juvenile Diabetes and Obesity) and included 21 morbidly obese patients (age 14.5 ± 1.8 years, 29% female, WHO-ISO-BMI 41.6 ± 12.7 kg/m²). They underwent both a standardized oral glucose tolerance test and an isoglycemic glucose-clamp from which IS indices were derived. The SPISE is calculated by mathematical modeling and includes BMI (kg/m²), serum triglycerides (mg/dL) and serum-HDL-cholesterol (mg/dL). The detailed description of the SPISE is complex and at present in preparation for publication.

Results: Matsuda ISI comp, HOMA-IR respectively QUICKI correlate with the M-value from glucose-clamps with r = 0.51, 0.52 and 0.51 (each with a p-value of <0.05) in this study population. In comparison, the SPISE shows an r-value of 0.59 (p-value <0.01) when correlated with the M-value.

Conclusion: As an innovative index the SPISE enables an improved estimation of peripheral insulin sensitivity derived from a single fasting sample without the need to determine insulin.

T8:PO.115
Comparison of correlation between prostate volume and obesity
Huh J.1,2, Park J.1, Kong M.3,4, Kim H.2,3,5
1Department of Urology, Jeju National University Hospital,
2Department of Family Medicine, Jeju National University Hospital,
3School of Medicine, Jeju National University in Jeju, Korea.

Introduction: Benign prostatic hyperplasia(BPH) is a common condition in males more than 40 years old, and the incidence of BPH has shown a tendency to increase with age. Obesity is state of excessive accumulation of fat in the body and leads to changes in the body’s metabolism and endocrine function, so progression of BPH occurs in obesity status according to many articles. The purpose of this study is to compare the efficacy of obesity indices which correlate with prostate volume.

Methods: The study was carried out in 285 males, who visited health promotion center in Jeju National University Hospital and underwent transrectal ultrasonography and abdominal fat computed tomography from April, 2010 to June, 2013. Anthropometric parameters were measured directly and blood samples were obtained in a fasting state more than 8 hours in the morning. Then, we analyzed the correlation between obesity indices and prostate volume.

Results: After adjusting by age, prostate volume was positively correlated with BMI(r=0.227, P < 0.001), waist circumference(WC)(r=0.151, P = 0.011), visceral fat area(VFA)(r=0.157, P = 0.008). However prostate volume was not correlated with subcutaneous fat area(SFA) and visceral to subcutaneous ratio(VSR). WHR had the largest area under the curve(AUC) for the identification of prostate volume more than 30ml(AUC=0.595, P = 0.017). Then the VFA and BMI were in order.

Conclusion: Prostate volume was positively correlated with BMI, WC, WHR and VFA in the obesity indices and WHR had the largest AUC and then, VFA and BMI were in order.

T8:PO.116
BMI, in itself, is not sufficient parameter for evaluation of nutritional state of professional soldiers in the armed forces of the czech republic
Fajfrová J.1, Pavlik V.1, Vacková M.1, Blažek O.1
1Department of Military Internal Medicine and Military Hygiene, Faculty of Military Health Science University of Defence Hradec Králové, Hradec Králové, Czech Republic.

Introduction: In the Armed Forces of the Czech Republic there has been introduced a system evaluating the health capability of active-duty service, regulation No 103/2005 Sb. One of the evaluation criteria is also the nutritional state assessed only by BMI values. Aim of our study was to determine real nutritional state of soldiers.

Methods: Nutritional state assessment was focus on body composition measured by bioimpedance analysis supplemented with waist circumference, skinfold thickness, mid-arm circumference and hand grip strength test.
Results: For now we enrolled 404 male soldiers and 50 female soldiers with mean age 32.0 ± 7.4 years and 28.6 ± 8.6 years, respectively. BMI was 25.8 ± 3.5 kg/m² vs. 23.5 ± 3.5 kg/m². Overweight was found in 31.2% vs. 20%, obesity in 10.2% vs. 6%. Percentage of body fat in range of overweight was found in 11.4% vs. 32%, and in range of obesity was found in 6.2% vs. 20%. Waist circumference ≥ 94 cm for men and ≥ 80 cm for women was found in 10.2% and 6% and waist circumference ≥ 102 cm for men and ≥ 88 cm for women was found in 5.7% and 6%.

Conclusion: First results of our work indicate that the BMI criterion, in itself, is not sufficient, especially for evaluating overweight and it is necessary to extend the current assessment algorithm with other parameters, that means waist circumference and percentage of total body fat. These parameters are able to complete the BMI values and better identify individuals with the risk of development of obesity and associated complications. Nowadays we prepare amendment of regulation about evaluating the health capability of active-duty service.

T8:PO.117 Phenotypic characterization further anthropometric measures in morbid obesity Cos Blanco A.1, Calvo I.2, Cardenas J.J.1, Pelegrina B.1, Roldan M.C.1, Vazquez C.1, Pallardo L.F.1
1Obesity Unit. Department of Endocrinology. University Hospital La Paz, Madrid, Spain, 2Department of Endocrinology. Jimenez Diaz Foundation. Madrid. Spain

Introduction: Body composition, fat distribution, presence and extension of co-morbidities, weight history, functional status and degree of compulsivity are among others, phenotypic traits that allow us a more accurate assessment of health risk of obese people. AIM: Characterize and categorize obese patients according to their clinical and functional status.

Method: Data is collected from 81 patients with severe obesity. Weight, height, waist circumference, biochemical parameters and blood pressure are registered. Also recorded are hepatic, renal and osteoarticular diseases, sleep-apnoea syndrome and/or gastro-oesophageal reflux, if present. The degree of functional capability is assessed and patients are categorized according to criteria of hypertriglyceridemic waist (HW), Garvey’s Cardiometabolic Disease Staging System (CMDS) and Edmonton Staging System (ESS).

Results: 67% women. Average age 47±10y, 18% below 30y. Average BMI of 47±5 kg/m², 26% of patients have BMI >50 kg/m². Average waist circumference of 132±14cm, 22% of women and 10% of men have a high HW index. 55% of the patients have hypertension, 33% diabetes, 34% show sleep-apnoea syndrome and 25% gastro-oesophageal reflux. Most patients (62%) live sedentarily. Applying ESS, nine patients (11%) are in the highest risk range and 70% are in the high-risk range. Using CMDS 51% show high risk and 22% medium risk. No correlation was found between BMI and CMDS/ESS.

Conclusion: A diagnostic approach using clinical staging systems provides us with information on presence or extension of co-morbidities which can guide the decision making process. A proper characterization of obese people could help determining and establishing better criteria to prioritize therapeutics interventions in this group of patients.

T8:PO.118 COMPARISON OF TWO DIFFERENT BIA INSTRUMENTS Sekeli E.1, Lugner M.1, Kruschitz R.1, Krai M.1, Langer F.1, Krebs M.1, Prager G.2, Ludvik B.1, Schindler R.1
1Department of Internal Medicine III, Medical University of Vienna, Vienna, Austria, 2Department of Surgery, Medical University of Vienna, Vienna, Austria

Introduction: Bioelectrical impedance analysis is a simple and non-invasive method to assess the effectiveness of weight reduction interventions, to identify the patient’s health risk and to formulate individual dietary and exercise recommendations. A standardized BIA measurement is needed to allow accurate monitoring of changes in the body composition. In this study two BIA instruments were compared to determine agreement.

Methods: 88 postoperative bariatric surgical patients, 69 women and 19 men. (BMI: 31.58 ± 6.6 kg/m², age: 42.3 ± 12.1 years) underwent BIA measurement with the BIA Corpus RX 4000 (BIAC), lying in supine position, and with the Seca mBCA 515®, standing barefoot, as recommended by the manufacturer. Body composition was calculated with Gray et al.2 prediction equation. Bland Altman method was used to determine agreement.

Results: Comparison of Seca® and BIAC resulted in an observed difference in resistance (+71.8 ± 25.2Ω, p = 0.002), reactance (-1.3 ± 4.0Ω, p = 0.002) and phase angle (-0.85 ± 0.3°, p = 0.001). Limits of agreement between Seca® and BIAC were 121.17/22.3Ω for resistance, 6.6/9.3Ω for reactance and -0.3°/-1.5° for phase angle. A significant (p < 0.001) difference remained after calculation of FFM (kg) (-3.1 ± 1.6 kg, p < 0.001), FM (kg) (3.1 ± 1.6 kg, p < 0.001) and FM% (3.5 ± 1.7%, p < 0.001), resulting in lower FFM and higher FM values determined with Seca®.

Conclusion: Changing BIA instruments while monitoring body composition over time needs consideration of potential differences in the measurement.

References:

T8:PO.119 Cardiometabolic risk factors and inflammation in adipose tissue are increased in obese subjects classified as metabolically healthy Gómez-Ambrosi J.1,2, Catalán V.1,2, Rodríguez A.1, Andrade P.1, Ramírez B.2,3, Ibáñez P.2, Vila N.1,2, Romero S.2, Margall M.A.1,2, Gil M.1,2,4, Moncada R.A.1,2, Valentí V.1,2,6, Silva C.3,4, Salvador J.2,4, Frühbeck G.2,4,7
1Metabolic Research Laboratory, Clínica Universidad de Navarra, Pamplona, Spain, 2Department of Endocrinology and Nutrition, Clínica Universidad de Navarra, Pamplona, Spain, 3Department of Biostatistics, Clínica Universidad de Navarra, Pamplona, Spain, 4Department of Biobiochemistry, Clínica Universidad de Navarra, Pamplona, Spain, 5Department of Anesthesiology, Clínica Universidad de Navarra, Pamplona, Spain, 6Department of Surgery, Clínica Universidad de Navarra, Pamplona, Spain, 7Obesity and Adipobiology Group, Instituto de Investigación Sanitaria de Navarra, Pamplona, Spain

Introduction: It has been suggested that individuals with the condition known as metabolically healthy obesity (MHO) may not have the same increased risk for the development of metabolic abnormalities as their non-metabolically healthy counterparts. However, the validity of this concept has recently been challenged since it may not translate into lower morbidity and mortality. The aim of the present study was to compare the cardiometabolic/inflammatory profile and the prevalence of impaired glucose tolerance (IGT) and type 2 diabetes (T2D) in patients categorized as MHO or metabolically abnormal obesity (MAO).

Methods: We performed a cross-sectional analysis to compare the cardiometabolic/inflammatory profile of 222 MHO and 222 MAO patients (62% women) matched by age, including 255 lean subjects as reference (cohort 1). In a second cohort, we analysed the adipokine profile and the expression of genes involved in inflammation and extracellular matrix remodelling in visceral adipose tissue (VAT, n=82) and liver (n=55).

Results: The cardiometabolic and inflammatory profiles (C-reactive protein, fibrinogen, uric acid, leukocyte count and hepatic enzymes) were similarly increased in MHO and MAO in both cohorts. Moreover, above 30% of patients classified as MHO according to fasting plasma glucose exhibited IGT or T2D. The profile of classic (leptin, adiponectin, resistin) as

Abstracts

Obesity Facts 2015;8(suppl 1):1–247
well as novel (SAA and MMP9) adipokines was almost identical in MHO and MAO groups in cohort 2. Expression of genes involved in inflammation and tissue remodelling in VAT and liver showed a similar alteration pattern in MHO and MAO individuals.

**Conclusion:** The present study provides evidence for the existence of a comparable adverse cardiometabolic profile in MHO and MAO patients.

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**TB:PO.120**

**Relationship of serum tsh with body mass measures in healthy adults**

_Solanki A1, Jindal S2, Bansal S3_

1. Resident, Department of Medicine, Peoples College of Medical Sciences, Bhopal(M.P), INDIA.
2. MD DM Endocrinology, Professor, Department of Medicine, Peoples College of Medical Sciences, Bhopal(M.P), INDIA.
3. Associate Professor, Department of Medicine, Peoples College of Medical Sciences, Bhopal(M.P), INDIA.

**Introduction:** The problem of obesity is multi-faceted and requires the understanding of different areas to effectively address and reverse the current trends. The present study aims to look at the association between thyroid-stimulating hormone and body mass measures.

**Methods:** 742 subjects, healthy, self-reported, euthyroid staff of Peoples University aged 18–60 years were screened and those with TSH between 0.3 mU/L – 10 mU/L were taken for the purpose of analysis. TSH was estimated by 3rd generation chemiluminescence assay. Pearson’s correlation coefficient was calculated.

**Results:** We derived a significant positive correlation between TSH and Body Mass Index (P < 0.001), TSH and Weight (P = 0.0016), TSH and Waist Circumference (P = 0.0007), TSH and Hip Circumference (P = 0.0017).

**Conclusion:** In our study, we derived a significant positive correlation between TSH and BMI in euthyroid adults. The studies so far about the relationship of weight and thyroid functions have shown significant and positive correlation [1] as well as no correlation [2]. There is a need to look at serum TSH levels of an individual in light of his/her weight as obese/overweight people tend to have higher serum TSH. Further, the inverse derivation of the available data can open new avenues for treatment of obesity presuming thyroid hormones have significant impact on adiposity.

**References**


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**TB:PO.121**

**The influence of glucose homeostasis on body weight loss**

_Branco T1, Baião D1, Lopes P1, Martins S1_

1. Instituto Prof. Teresa Branco

**Introduction:** The primary objective of the present study was to evaluate the influence of the glucose homeostasis, evaluated by HOMA, on body weight loss promoted by a 6-month weight loss program, based on a multidisciplinary approach, with personalized interventions and lifestyle group sessions.

**Methods:** The sample comprised 94 adults (40.8 ± 10.1yr; 30.7 ± 5.5kg/m²). Body weight was assessed at baseline and at the end of the 6-months loss program with an electronic scale (SECA, Hamburg, Germany). The 6-month weight loss program was composed by lifestyle weight loss group...
Abstracts

sessions and all the participants were followed by a multidisciplinary team comprising a physician, a nutritionist, a psychologist and an exercise physiologist. Glucose homeostasis was evaluated by HOMA test (baseline insulin (μU/ml) x baseline glucose (mg/dl) / 405) at baseline. Multiple regression analysis was performed to assess the multivariate relationships between glucose homeostasis and body weight loss.

Results: At 6-month, participants lost, on average, 6.4kg ± 6.2kg (p < .001) of initial body weight (range: −6.7kg – 26.4 kg loss), with no differences between genders (p > 0.05). Glucose homeostasis was not associated with body weight loss (p > 0.05). No correlation was found between baseline glucose homeostasis and body weight loss at 6-month (p > 0.05).

Conclusions: This analysis suggested that glucose homeostasis does not influence body weight loss in adults that follow a 6-month weight loss commercial program, that included nutritional and physiologic sessions and physical activity recommendations.

T8 – Geriatric obesity, treatment

T8:PO.122
The implications of sarcopenia and sarcopenia obesity on lung function in healthy elderly
Kim H.1,2, Moon J.1, Kong M.1,2, Huh J.1,2
1Department of Family Medicine, Jeju National University Hospital, 2Department of Urology, Jeju National University Hospital, 3School of Medicine, Jeju National University in Jeju, Korea

Introduction: Previous studies have demonstrated a positive association between obesity and decreased lung function. In this study, we evaluated the impact of sarcopenia and sarcopenic obesity on pulmonary impairment in healthy elderly.

Methods: This study included 2490 subjects aged over ‘0’ (16 men and 1322 women) that participated in the Korean National Health and Nutrition Examination Survey (KNHANES) from 2008 to 2011. We excluded individuals who had chronic diseases such as chronic liver disease, chronic kidney disease. We also excluded individuals who had FEV1/FVC<0.7 and chronic obstructive lung disease, bronchial asthma, tuberculosis. Appendicular skeletal muscle mass (ASM) divided by weight (ASM/Wt, %) was estimated by dual X-ray absorptiometry (DXA). Sarcopenia was defined as 2 standard deviations below the gender specific mean for young healthy adults. Obesity was defined as waist circumference greater than 90cm in men and 85cm in women.

Results: According to the above definition, our cut off value for sarcopenia in men and women was 27.85% and 21.35%, respectively. The prevalence of sarcopenia in individuals aged over 60 was 10.0%. Significant positive correlations were found for ASM/Wt with forced vital capacity (FVC) (R2 0.428, P < 0.001) and forced expiratory volume in 1 second (FEV1) (R2 0.342, P < 0.001). Lung function in the sarcopenic obesity group appeared to be decreased compared to the normal group after adjusting for age, smoking status, alcohol consumption and exercise by multiple logistic regression.

Conclusions: In conclusion, sarcopenia and sarcopenic obesity were closely associated with decreased lung function in healthy Korean elderly.

T8 – Complications

T8:PO.123
Waist Circumference Correlates with Disease Severity in Acute Pancreatitis
Štimac D.1, Franjić N.1, Poropat G.1, Mikolasević I.1, Klobučar Majanović S.1
1Division of Gastroenterology, Department of Internal Medicine, University Hospital Rijeka, School of Medicine Rijeka, 2Division of Endocrinology, Diabetology and Metabolic Diseases, University Hospital Rijeka, School of Medicine Rijeka

Background/aims: Obesity is a well-known factor contributing to the etiology of acute pancreatitis (AP). In order to clarify its role in the pathogenesis and progression of the disease, several studies were conducted with different outcomes. Since the number of performed studies is limited, we decided to check the conclusions and present our own results.

Method: In this retrospective study, medical histories of 156 patients diagnosed with AP during the years 2008 and 2009 were analyzed. Of the 156 patients, 81 were men and 75 women, mean age 64.2 ± 14.5 years, average APACHE II score 8.58 ± 4.07. Body-mass index (BMI), waist circumference (WC), hip circumference and waist-hip ratio were retrieved and their correlation with local, systemic complications and death outcomes were compared using receiver operating characteristic (ROC) curves.

Results: Among the researched parameters only WC correlated with local, systemic complications and death outcomes. According to ROC curves, the cut-off value of 96 cm had 94.6% sensitivity and 40.3% specificity value in predicting systemic complications (p = 0.0018). The cut-off value of 103 cm had 68% sensitivity and 59.4% specificity value in predicting local complications (p = 0.0048), while the cut-off value of 100 cm predicted mortality with 80% sensitivity and 42.5% specificity value (p = 0.0031). Among other parameters, only waist-hip ratio – local complications ROC curve reached statistical significance; for cut-off value of 0.96 sensitivity was 80% and specificity 42.5% (p = 0.0101).

Conclusion: although obesity is a definite risk factor for AP, the exact measure which should be used to quantify the level of risk still eludes us. Statistical analysis has shown that in our case BMI was a poor parameter and WC had a better correlation in predicting complications, including death, in patients with AP. However, low specificity is the problem which will impede WC from gaining a more pronounced role in everyday practice.

T8 – Alternative treatments

T8:PO.124
Effects of Traditional Chinese acupuncture for treatment of obesity: A systematic review
Lenon G.B.1, Li K.X.1, Yang Y.W.1, Xue C.C.1
1Traditional & Complementary Medicine Research Program, Health Innovations Research Institute; School of Health Sciences, RMIT University, Bundoora Campus, Victoria 3083, Australia;

Background: Traditional Chinese acupuncture has become popular for obesity throughout the world but there is a lack of evidence of its efficacy and safety. The aim of this study is evaluate the safety and therapeutic benefits of traditional acupuncture treatment in management of obesity in randomized controlled trials (RCT).

Methods: The review was conducted according to Cochrane Handbook for Systematic Reviews 5.1.0 and searched in 22 electronic databases and hand search for all RCT quasi-RCT without language restrictions. Key words were acupuncture, obesity, overweight, randomized clinical trial and their synonyms. The risk of bias of included studies was assessed. The differences in effect size between traditional acupuncture and control: placebo, no treatment and dietary therapy/exercise groups were analysed.
Evaluation of the efficacy and safety of Redusure (IQP-AK-102), a proprietary combination for weight reduction

Riede L.¹, Grube B.², Bongartz U.¹, Lim YM.³

¹analyse & realize, GmbH, Weißenseer Weg 111, 10369 Berlin, Germany
²Practice for General Medicine, Kurfürstendamm 157/158, 10709 Berlin, Germany,
³InQpharm Europe Ltd, Invasion House, Wilbury Way Hitchin, Hertfordshire, SG4 0TY, United Kingdom

Introduction: IQP-AK-102 is a novel combination of three soluble fibres. Due to its unique physicochemical properties, satiety sensation in the upper gut is enhanced through gastric distension and delayed gastric emptying, which subsequently reduces food intake.²

Methods: 119 overweight and obese subjects participated in this randomized, double-blind, placebo-controlled trial. Subjects took either 2 capsules of IQP-AK-102 or placebo twice daily and were counseled to maintain a 20% calorie-deficit diet (energy contributions: 50% carbohydrates, 30% fat, and 20% protein) and moderate physical activity for 12 weeks.

Results: 111 subjects were included in the final analysis. Body weight and body fat mass were similar in both groups at baseline. After 12 weeks, subjects on IQP-AK-102 experienced a statistically significant greater reduction in mean body weight compared to placebo group (3.53 ± 2.28 kg versus 0.14 ± 1.84 kg, p < 0.001). IQP-AK-102 group had higher body fat mass decrease (2.51 ± 3.16 kg versus 0.05 ± 1.95 kg, p < 0.001). Statistically significant reduction in waist and hip circumference was also observed after 12 weeks. No serious product-related adverse events were reported.

Conclusion: The results indicate that IQP-AK-102 is an effective intervention for body weight reduction with a good safety profile.

References
T8:PO.128

Obesity clinic for teenagers - a successful spin off project, bicycling around the country

Danielson T., Sigurardottir G., Arnason E., Bjarnason R.1,2, Helgason T.2

1Hjolakraftur.com, bicycle training for adolescents,
2University of Iceland, Faculty of Medicine, Reykjavík, Iceland

Introduction: Many projects and teams treating obesity in older children have faced the challenge of keeping their subjects motivated for physical activity. In this project we describe a novel approach that reached a number of children and led to a personal victory for many of them.

Methods: When children come to the Health School, the obesity team of the National childrens hospital, our aim is to find out what activity is most likely to motivate them. Teens were referred to a physiotherapist and a fanatic cycling enthusiast, forming groups for regular biking exercises. Standardized questionnaires were asked before and after the season.

Results: The adherence was very good, and a large proportion kept on cycling that summer, challenging themselves. The questionnaires revealed that the self-esteem and belief in own ability was significantly better. Valdi was crazy enough to drop the idea that if the teens would be willing to work hard, he would do everything in his power to take them to the biggest bike race in Iceland. In accordance with the power of the children the challenge was taken on to compete in the annual WOW-Cyclothon, a biking relay-race around Iceland (1332 km). A team of 6 children, 2 parents and 2 trainers completed the race. The goal was set and reached on finishing last, but at the same time to have every team-member win him/herself, to win the media attention and the fundraiser for the National Hospital. This won the group a flight ticket and a biking tour in Lyon, France, in September 2014. The aim for 2015 is to have at least 3 teams from Hjólakraftur.

Conclusion: This is an example of a successful spin off project which was made possible by the newly formed obesity clinic, enthusiastic trainers and good will towards obesity treatment in the society.

T8:PO.129

Effects of α-lipoic acid and eicosapentaenoic acid on inflammation and cardiovascular risk markers in overweight/obese women following an energy-restricted diet

Huerta A.E., Martínez J.A., Moreno-Aliaga M.J.1,2,3

1Department of Nutrition, Food Science and Physiology, University of Navarra, Pamplona, Spain,
2CIBER Fisiopatología de la Obesidad y Nutrición (CIBERobn), Instituto de Salud Carlos III, Madrid, Spain,
3Centre for Nutrition Research, University of Navarra, Pamplona, Spain.

There is strong evidence that the pro-inflammatory state accompanied by the enlargement of the adipose tissue plays an important role in the appearance of related obesity metabolic comorbidities. The aim of this trial was to evaluate the additional effects to body weight loss on some inflammatory markers of dietary supplementation with α-lipoic acid and eicosapentaenoic acid (EPA) separately or in combination in healthy overweight/obese women following a hypocaloric diet.

Methods: Seventy-seven Caucasian healthy overweight/obese sedentary women (38.7 ± 7.2 years old) were assigned to one of the four experimental groups: Control, EPA (1.3 g/d), α-lipoic acid (0.3 g/d), and EPA+α-lipoic acid (1.3 g/d+0.3 g/d). All groups followed a 10 weeks intervention with a personalized hypocaloric diet. At beginning and at the end, inflammatory markers were measured in plasma using the appropriate ELISA kits.

Results: The treatment with α-lipoic acid, significantly (P < 0.05) reduced circulating levels of C-reactive protein (CRP) and Asymmetric dimethylarginine (ADMA) while prevented (P < 0.01) the fall of apelin levels observed during weight loss. Additionally, the α-lipoic acid reduced leukocyte count, even adjusting by weight loss and initial level (P < 0.01). The changes in leukocyte count were significantly and positive correlated with changes in CRP and waist circumference (P < 0.01).

Conclusions: The dietary supplementation with α-lipoic acid appears to improve some inflammatory and cardiovascular risk markers, suggesting additional positive effects of this antioxidant in combination to hypocaloric diet in obesity-related metabolic disorders.

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Obesity Facts publishes articles covering all aspects of obesity, in particular epidemiology, etiology and pathogenesis, treatment, and the prevention of adiposity. As obesity is related to many disease processes, the journal is also dedicated to all topics pertaining to comorbidity and covers psychological and sociocultural aspects as well as influences of nutrition and exercise on body weight. The editors carefully select papers to present only the most recent findings in clinical practice and research. All professionals concerned with obesity issues will find this journal a most valuable update to keep them abreast of the latest scientific developments.

Special sections comprising a variety of subspecialties reinforce the journal’s value as an exhaustive record of recent progress for all internists, gastroenterologists, endocrinologists, pediatricians, dieticians, nutritionists, bariatric surgeons, psychologists and psychiatrists, occupational health practitioners, sports medicine specialists, ecotrophologists, sociologists, and biologists as well as prevention and public health researchers. In addition, Obesity Facts serves as an ideal information tool for the members of the pharmaceutical and food industry as well as those active in nutritional research and medicine.

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Obesity Facts 2015;8(suppl 1):249–264

Author Index

Aasheim E.T., T8:OS2.6
Abbott J., T4:PO.035
Abe M.A., T1:PO.011
Abeysekera A., T3:PO.028, T8:PO.053
Abild C.B., T4:PO.001
Abou Samra M., T3:PO.041
Acar Tek N., T8:PO.040, T7:PO.056
Acosta JR., T2:PO.053
Adabi P., T7:PO.029, T5:OS2.6, T6/T7:OS3.6
Adamo M., T1:PO.039
Adamsen A.J., T7:PO.023
Adan R., T3:PO.082
Adelfang M., T2:PO.063, T1:PO.008
Agarwal-Barojas S., T3:PO.018
Aguiar-Martical H., T3:PO.018
Aguirre L., T2:PO.001
Ahlin S., T8:OS3.3
Ahmadian A., T2:RS1.4
Ahmedna M., T3:PO.047
Ahrens W., T3:PO.085, T5:OS2.4
Aigner E., T8:PO.019
Aires L., T3:PO.117
Akbulut G., T3:PO.039, T8:PO.031
Aki C., T3:PO.003
Al Mehmadi Y., T8:PO.039
Al-Emadi M., T2:PO.077
Al-Ijjar M.I., T2:PO.077
Al-Kuwar M.G., T3:PO.047
Al-Mugbel M., T5:PO.007
Al-Sayraf M., T2:PO.077
Al-Sowaidi S., T2:PO.077
Albaduljader K.A., T3:PO.086
Alamri Z., T8:OS2.1
Alfaraj G., T3:PO.129
Albargh A.S., T3:PO.076
Albergnsson S.A., T3:PO.033
Albertsson-Wikland K., T5:OS1.3
Aldhooon Hainerova L., T1:PO.017, T5:RS2.1, T7:PO.046
Aldini G., T3:PO.126
Alemany M., T1:PO.008, T2:PO.059, T2:PO.063
Alexandre V., T1:PO.013
Ali A., T3:PO.080
Alimehmeti I., T7:PO.069
Alliger M., T3:PO.021
Allorge D., T2:PO.018
Almeida H., T3:PO.047
Almogren-Rachtan A., T8:PO.023
Alnæma J.M., T3:PO.047
Alrowailly M.A., T5:PO.038
Álvarez-Bueno C., T7:PO.008, T7:PO.009, T7:PO.010
Amann-Gassner U., T5:OS1.4
Amati P., T2:SC2.1
Amil M., T2:PO.073
Amnell P., T3:PO.050
Amri Z., T1/T2:OS2.1
Amtco A., T4:PO.002, T4:PO.003
Amtco Gr., T8:PO.007, T8:PO.056
Anderson D., T4:PO.034
Andersson D., T2:PO.053
Andersson D.P., T2:RS1.4, T8:OS2.3, T8:OS3.2
Andersson S., T4:PO.011, T5:RS1.4
Andersson-Assarsson J.C., T2:PO.062
Anderwald Ch., T8:PO.114
Andrada P., T8:PO.119
Andrade S., T2:PO.073
Andrade-Silva S.G., T7:PO.032, T8:PO.085, T8:PO.087, T8:PO.089
André S., T2:PO.017
Andreeva V.A., T7:PO.078
Anisgani L., T8:CS1.1
Antel J., T3:PO.082
Antequera D., T1:PO.016
Antoni R., T3:PO.023
Antunes H.M., T3:PO.077
Antunes E.R., T6:PO.004
Anveden A., T8:OS3.3
Aotani D., T1:PO.011
Aouadi M., T2:PL
Aparicio-Llopis E., T4:PO.018
Apovian C., T8:PO.109
Applegate K., T8:PO.081
Aquino Júnior A.E., T2:PO.015, T8:PO.102
Araujo A., T7:PO.022
Araujo G.S., T8:PO.089, T7:PO.032
Araujo J., T7:PO.004, T7:RS2.4
Ahrne L., T8:PO.073
Arias-Palencia N., T7:PO.010
Ariki S., T8:PO.113
Antci G., T3:PO.016, T3:PO.106
Armaganidis A., T8:PO.091
Arnason E., T8:PO.128
Arner E., T2:RS1.4, T8:OS2.3
Aren A., T2:RS1.4, T8:OS2.3, T8:OS3.2, T2:PO.028, T2:PO.053
Armgrimson S.A., T3:OS1.5, T7:PO.065
Arnoni y., T3:PO.089
Aron-Visnewskey J., T1/T2:OS2.4, T3:OS2.2, T2:PO.013
Aronne L.J., T8:OS1.3
Arsonon A.S., T5:OS1.3
Arós F., T3:OS2.1
Arrueoain A., T2:PO.018
Arrueoain A., T2:PO.003, T2:PO.066
Arrinarian S., T1:PO.008, T2:PO.063
Artelego-De Mora V., T7:PO.088
Arvidsson L., T7:PO.049
Asenso E.M., T3:PO.083
Ashby H.L., T3:PO.028
Ashwell M., T7:PO.052
Aslie LM., T5:RS1.3
Aslan S., T5:PO.040
Atmous J., T8:PO.084
Astier J., T2:PO.003
Atkinson R.L., T1:PO.017, T8:PO.046
Austel A., T3:PO.112
Aveyard P., T3:PO.048
Axiotidou E., T3:PO.073, T4:PO.016, T4:PO.026
Azay-Shah A., T5:PO.027
Ayah B., T3:PO.015
Ayoub J., T3:PO.041
Bak-Christensen N., T3:PO.007, T7:PO.079
Ba M., T3:PO.114
Babak O.Y., T1:PO.047
Babuska V., T2:PO.026
Bacardi-Gascón M., T3:PO.017, T5:PO.010, T3:PO.008, T3:PO.035
Bäckdahl J., T8:OS2.3, T8:OS3.2, T2:PO.053
Bakerman O., T8:OS3.1
Badr A.S., T7:PO.055
Bae K.H., T2:PO.029
Baer N., T6/T7:OS1.1
Bagnato V.S., T8:PO.102, T8:PO.107
Baião D., T8:PO.121
Bajec D.D., T8:PO.064
Bakacs M., T6:RS1.3
Baker M.K., T3:PO.130
Bakhmassi A., T2:PO.077
Bala C.G., T3:PO.038
Balaguer T., T1/T2:OS2.1
Balaz M., T1/T2:OS3.1
Balofski F., T6:PO.007
Baldrich-Mora M., T3:PO.010
Balk B., T2:PO.018
Balogun B., T1:PO.040, T8:PO.049
Bambrac C., T7:PO.014
Banerjea M.A., T3:PO.080
Bansal S., T8:PO.120
Barber A., T1:PO.012
Bardova K., T1:RS2.3, T1:PO.005, T3:PO.099, T5:PO.024, T8:PO.030
Barker C.S., T8:PO.081
Barkhordarian N., T7:PO.041
Barros U., T8:PO.009
Barnes A., T8:PO.002
Barnett T.A., T6/T7:OS2.3
Barone I., T3:OS3.1
Barquet B., T8:PO.025
Barkquisina V., T1/T2:OS2.1
Barragán R., T3:PO.083
Barreiro T.V., T3:PO.131
Barros H., T7:RS2.4, T7:PO.004
Bas M., T3:PO.016, T3:PO.107, T8:PO.029, T3:PO.106
Bashah M., T2:PO.077
Bashan N., T2:PO.010, T2:PO.014
Basic-Markovic N., T4:PO.023
Basora J., T3:OS2.1
Bassil M., T3:PO.041
Batterham R.L., T1:PO.039
Baumert J., T6/T7:OS2.5
Baumgartner-Parzer S., T1/T2:OS1.3, T5:PO.005
Baur L.A., T5:OS1.6, T5:RS1.3
Bauters D., T2:PO.008

Author Index

Obes Facts 2015;8(suppl 1):249–264

261
Walker L., T3:PO.035, T3:PO.125
Walker M., T8:PO.068
Wall P., T4:PO.033
Walsh A.M., T3:PO.046
Walsh B., T8:PO.104, T8:PO.105, T8:PO.108, T8:PO.109
Walsh M., T3:PO.120
Walshaw L., T8:PO.057
Wang C., T8:PO.063, T8:PO.066
Wang H.J., T3:OS.5.3
Wang J., T1:PO.035
Wasse L.K., T3:PO.116
Watanabe M., T3:PO.025
Weatherford J.S., T8:PO.021
Weatherford R.D., T8:PO.021
Webber L., WHO.4, T6/T7:OS3.5, T7:PO.045, T7:PO.059, T7:PO.060
Weeghuber D., T8:PO.019, T8:PO.114
Wehkalampi K., T4:PO.011
Weiss R., T3:PO.089
Wen L., T5:RS1.3
Wendel-Vos G.C., T3:RS1.4
Wensveen F.M., T2:PO.016
Wessner B., T7:PO.041
West J., T5:PO.002
Westeterp K., T3:PO.072
Westman E.C., T8:PO.099
Whang I.C., T8:PO.095, T8:PO.096
White M., T7:PO.023
White R., T2:PO.057
Whybrow S., T3:OS3.5
Więcek A., T2:PO.049
Widikhm K., T7:PO.041, T8:PO.114
Widlund Y., T2:RS1.4
Wiegand D., T4:PO.020
Wiemers N., T6:PO.008
Wiggers J., T3:PO.123
Wilding J.P., T4:PO.022, T8:PO.022
Wilfey D.E., T8:PO.093
Wilkins L.R., T7:PO.039
Williams K.H., T8:PO.024
Williams L.T., T8:WS1.3
Willmer M., T8:PO.094
Wilson C., T4:PO.019
Windle J., T3:PO.046
Winhofer Y., T8:PO.076
Winkler T.W., T3:PO.082
Wintner J., T6/T7:OS1.6
Witkamp R.F., T1:PO.041, T8:PO.045
Wohlfahrt P., T7:PO.068
Wolden M.L., T4:PO.022, T4:PO.024
Wolf P., T8:PO.076
Wolfenden L., T3:PO.123
Wolke D., T4:PO.011
Wong W.W., T8:PO.052
Wood M., T8:PO.081
Woodwiss A.J., T2:PO.004
Woodward E., T7:PO.019
Wouters K., T8:PO.086
Wright J., T5:OS1.1, T5:PO.002
Wrezinska M., T7:PO.053
WTCCCT3:PO.082
Wu X., T3:PO.057
Wulfsohn R., T3:PO.019
Wynn E., T1:PO.013
Wyskida K., T4:PO.017
Xhavara E., T7:PO.069
Xherahu E., T7:PO.069
Xie M., T8:PO.052
Xu F., T1:PO.001
Xu X., T3:PO.057
Xue C.C., T8:PO.124
Xue H., T3:OS2.4, T3:PO.004, T3:PO.007, T3:PO.115
Yahalom R., T8:PO.071
Yalaza Kahraman A., T8:PO.077
Yamaguchi F., T3:PO.134
Yamamoto T., T3:PO.091
Yamamoto Y., T1:PO.011
Yamazaki T., T6:PO.002
Yan S., T1:PO.018, T7:PO.057, T7:PO.058
Yang J., T8:PO.063, T8:PO.066
Yang L., T7:PO.058, T7:PO.057
Yang M., T3:OS2.4, T3:PO.004, T3:PO.007, T3:PO.115
Yang W., T8:PO.063, T8:PO.066
Yang Y.W., T8:PO.124
Yap S.Y., T3:PO.002
Yaroch A., T7:PO.076
Yassin A., T8:PO.036, T8:PO.037, T8:PO.038, T8:PO.039
Yassibas E., T3:PO.030
Yearwood L., T3:PO.080
Yeh H.L., T6:PO.001
Yengo L., T2:PO.018
Yi G., T3:PO.057
Yi L.C., T8:PO.085, T8:PO.089
Yilmaz H., T3:PO.009, T3:PO.111
Yin T.W., T3:PO.136
Yoo H., T4:PO.032
Yoo J., T4:PO.032
Yooun D., T2:PO.055
Yoshimura M., T3:PO.110
You B.H., T2:PO.078
Youn D., T5:OS2.3
Yu S., T4:PO.032
Yumuk V., T8:PO.077
Yurt M., T3:PO.027
Yusof K., T7:PO.035
Zabierski P., T1:PO.022
Zafropoulos V., T5:PO.025, T5:PO.026, T7:PO.036
Zak A., T1:PO.033
Zalba G., T7:PO.051
Zalla B., T7:PO.066
Zambon S., T6/T7:OS2.4
Zamboni M., T1:PO.010, T2:PO.023
Zammit G., T8:OS1.3
Zampelas A., T3:PO.014
Zamrazilova H., T1:PO.017, T2:PO.036, T2:PO.082, T7:PO.046
Zavadorovskaya V.D., T2:PO.069
Zdziennicka A., T1:PO.022, T2:PO.071
Zeggini E., T3:PO.082
Zelić M., T2:PO.016
Zeman M., T1:PO.033
Zetterberg H., T3:OS2.3
Zeyda M., T2:PO.009
Zhang N., T3:PO.057
Zhang S., T7:PO.075
Zhang T., T5:PO.007
Zhao M., T1:PO.011
Zhao P., T3:PO.131
Zheng J., T7:PO.062, T4:PO.028
Zhou X., T8:PO.063, T8:PO.066
Zidek V., T1:PO.014, T2:PO.002, T2:PO.040
Zielinski E., T1/T2:OS1.3
Zins M., T6/T7:OS2.6
Zipfel S., T3:PO.049, T3:PO.082
Zmrlza H., T7:PO.006
Zoega H., T4:PO.027
Zohar Y., T3:PO.025
Zoico E., T1:PO.010, T2:PO.023
Zoric S., T8:PO.064
Zouhar P., T1/T2:OS1.2, T1:RS2.3, T1:PO.003, T2:PO.030
Zsoldsos F., T8:PO.019