


Editorial

Nutritional Modulation of Dietary Sugars as a Strategy to Improve Insulin Resistance and Energy Balance in Diabetes

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Lifestyle changes and less healthy behaviours include dietary changes toward increased consumption of Westernised diets and processed food. This is associated with the increasing prevalence of overweight in young adults and risk of obesity and associated pathologies later in life. The World Health Organization (WHO) established guidelines for free sugar intake in adults and children to be below 5–10% of total daily energy. However, recent studies support that it may actually be 15–20% in adults [1]. According to the National Portuguese Food and Physical Activity Survey report, the average national consumption of simple sugars (mono- and di-saccharides) is 90 g/day, contributing to an average of 19.8% for the total energy value and 17.3% in adults [2].

The consumption of added sugars contributes to an increased energy density in diet, leading to a positive energy balance, larger waist circumference, and weight gain, increasing the risk of obesity and type 2 diabetes [3,4]. Moreover, given the strong association between whole-body and abdominal fat mass with type 2 diabetes, cardiovascular diseases, and cancers, the guidelines of the World Health Organization (WHO) recommend 15–30% of total daily energy intake to be from fats and less than 10% intake of saturated fats. Fat accumulation and body mass index (BMI) were shown to be directly proportional to the excessive intake of energy in relation to expenditure, especially from foods rich in fats [5,6].

Sugars may be divided into two distinct groups: those naturally present and those added to foods. Natural or intrinsic sugars are naturally present in foods, such as fruit sugar (fructose), vegetables, honey, and sugars from dairy products (galactose and lactose). Added sugars are a large group of mono- and di-saccharides added to foods during processing, preparation, or at the table, with the objective of sweetening and increasing food palatability and shelf life, improving the texture, inhibiting the growth of microorganisms in high concentrations, provide functional structures, or increase accessibility. They are mostly found in sugary drinks, pastry products, cookies, fruit juices, energy drinks, nectars, fruit juices from concentrate, white bread, and breakfast cereals.

The impact of dietary sugars on the pathophysiological mechanisms of type 2 diabetes and its complications is not entirely understood. This Special Issue explores the association between the excessive consumption of dietary sugars, their sources and types, as well as their different impact on several features of type 2 diabetes aetiology and several physiological and pathophysiological processes and mechanisms of disease. In the articles published by Fernandes et al., Monteiro-Alfredo & Matafome, Garcia et al., and Mendes & Barra et al., the consumption and impact of dietary sugars on the gastrointestinal system is discussed. Fernandes et al. discuss the dietary sources of naturally occurring and added sugars, while Mendes & Barra et al. describe the role of different diets and dietary regimens in preventing post-prandial sugar increase and hyperinsulinemia. Moreover, Monteiro-Alfredo &



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Matafome and Garcia et al. explore the intestinal metabolism of dietary sugars, including the formation and absorption of advanced glycation end products and their impact on the gut microbiota. Regarding the impact of dietary sugars on other metabolic processes, Malta et al. describe the long-term alterations in beta-cell function caused by an increased and sustained consumption of sugars. Such consequences may include modifications of the mitochondrial function, generation of oxidative stress, and modulation of inflammatory pathways. These topics are covered by the reviews published by Diniz et al. and Barbosa & Carvalho. The impact of excessive and chronic sugar consumption may also arise from impaired energy balance and the development of addictive behaviors. The impact of sugars in the modulation of hypothalamic pathways is discussed by Capucho & Conde. Additionally, regarding the development of prevention strategies to avoid the negative impact of dietary sugars, Pedrosa et al. describe the role of exercise in reducing blood markers of glucose dysmetabolism. Importantly, the review published by Ferreira-Junior et al. demonstrates the importance of preventing excessive sugar consumption in critical phases of development since it may have long-term consequences.

Overall, this Special Issue covers an important topic with relevance not only from a scientific point-of-view but also from nutritional, policy, and industrial perspectives. We are currently subjected to increasing obesogenic pressures, with sugars being hidden in many foods, creating the perfect environment for the slow but consistent progression of metabolic dysfunction. This Special Issue aims to uncover the mechanisms involved and increase awareness of this escalating health problem.

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