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In recent years there is great evidence that oxygen free radicals play an important role in the pathophysiology of many neuropsychiatric disorders. In schizophrenia, antioxidant status could be altered as a consequence of both the evolution of the disease and the neuroleptic treatment. In the present study we investigated the activities of erythrocyte superoxide dismutase (SOD) and whole blood glutathione peroxidase (GPx) in 70 schizophrenic patients and 43 healthy volunteers, age and sex matched. We have observed significantly higher values of SOD activity (1486.45 ± 262.59 U/g Hb vs 1393.92 ± 250.73 U/gHb, $p < 0.05$) but normal values of GPx activity (38.86 ± 9.59 U/g Hb vs 44.24 ± 11.53 U/g Hb, $p > 0.05$) in the schizophrenia group compared with the control group. These results suggest an adaptative response to the increased superoxide radicals production.

P-027

Adaptation to oxidative stress in the chronic effects of cocaine and amphetamine

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Repeated abuse of the stimulant drugs cocaine and amphetamine is associated with extraneuronal dopamine accumulation in specific brain areas. Dopamine oxidative metabolism generates reactive oxygen species, namely H_2O_2. In this work we studied the involvement of oxidative stress in the chronic effects of cocaine and amphetamine in PC12 cells (a dopaminergic neuronal model), as compared to chronic H_2O_2 exposure. Long-term cocaine treatment largely, but not completely, protected the cells against a H_2O_2 challenge, whilst a decrement in intracellular ATP was observed. Complete H_2O_2 resistance of cells chronically exposed to H_2O_2 appears to involve changes in the activity of glutathione peroxidase (GPx), glutathione reductase (GRed) and superoxide dismutase (SOD), whereas chronic cocaine increased GPx activity only, possibly explaining the incomplete resistance to acute H_2O_2. PC12 cells chronically exposed to amphetamine initially exhibited changes in GPx, GRed and SOD activities that returned to control levels after 4 weeks of exposure. This biphasic effect may be explained by dopamine depletion evoked by amphetamine, and may explain the lower level of resistance to acute H_2O_2 of cells chronically exposed to amphetamine, in comparison with cells chronically exposed to cocaine. ATP/ADP levels decreased upon 2 weeks of exposure to the drugs and H_2O_2 and returned to control levels upon 3 weeks of exposure. Together, these results indicate that cellular adaptations of PC12 cells to cocaine and amphetamine are associated with changes in the activity of antioxidant enzymes, suggesting the involvement of oxidative stress in the chronic effects of these drugs of abuse.

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P-028

Identification of free radical oxidation products of 1-palmitoyl-2-lineloyl-phosphatidylethanolamine by LC MS/MS

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Lipid peroxidation—which encompasses oxidative degradation of phospholipids—occurs in cell membranes, resulting in alterations of the membrane's properties, such as fluidity and permeability. This process has attracted much attention due to the increasing evidence of its involvement in the pathogenesis of numerous illnesses, such as diabetes and cancer as well as age-related diseases, such as Parkinson's and Alzheimer's. In order to mimic the *in vivo* oxidation of membrane phospholipids, the Fenton reaction was carried out in 1-palmitoyl-2-lineloyl-phosphatidylethanolamine (PLPE) vesicles. The oxidation products formed were separated by reverse phase liquid chromatography coupled to a mass spectrometer using an acetonitrile gradient and characterized by tandem mass spectrometry (LC-MS/MS). The peroxidation products identified included species resulting from the insertion of oxygen atoms in the *sn-2* chain (long chain) and were, predominately, keto, hydroperoxide, hydroxy and poly-hydroxy derivatives, with high relative abundance of the keto derivatives. Products resulting from the shortening of the *sn-2* chain due to the cleavage of oxygen-centred radicals (short-chain) were also identified and comprised, mostly, aldehydes, hydroxy-aldehydes and dicarboxylic acids. Moreover, it was observed that, in PLPE, certain positions in the unsaturated chain are more susceptible to undergo radical oxidation, namely C-9 and C-12.

P-029

Glutathione reductase can be associated with high blood pressure in obesity

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The erythrocyte glutathione reductase (GR) is a cytoplasm enzyme which leads to the glutathione recycling protecting cells from oxidative stress. The objective was to study the relationship of erythrocyte GR activity with hypertension (HBP) of obesity (OB). A sample of 261 women from 25–79 years old ($M \pm SD = 49.37 \pm 12.76$), 85 with systolic HBP and 21 with diastolic HBP, 96 being obese (BMI > 30) were studied. The GR activity (μmol/min/grHb) was determined by spectrophotometer and BMI (Kg/m^2) and blood pressure by standardized methods. Statistical evaluation as done by Student *t*-test. The GR activity was lower in HBP when compared with normotensive (NT) (systolic HTA $= 46.05 \pm 18.18$ and NT $= 58.12 \pm 20.03$), $p < 0.001$. Although greater in OB (59.21 ± 20.09) vs non-obese (NOB) (51.86 ± 20.44), $p = 0.006$, GR activity was lower in HBP OB (OB 54.31 ± 22.91 vs NOB 44.32 ± 14.37, $p = 0.01$) than in NT OB (OB 63.49 ± 16.02 vs NOB 54.84 ± 21.16, $p = 0.006$). In conclusion, the GR activity could be implied in hypertension, due to failure of its oxidative stress defensive capacity in obese and non-obese women.

P-030

Erythrocyte glutathion reductase is a possible marker of cardiovascular age-related risk

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The erythrocyte glutathione reductase (GR) is an enzyme which leads to the glutathione recycling, protecting cell from oxidative stress being a marker of body riboflavin status. Pulse pressure reflects vasculature healthiness. The objective was to study the correlation of GR with age and cholesterol levels and its activity in hypertensive (HBP) and normotensive (NT) patients. A sample of 261 women from 25–79 years old ($M \pm SD = 49.37 \pm 12.76$), 85 with systolic HBP and 21 with diastolic HBP, was studied. The GR activity (μmol/min/grHb) was determined by spectrophotometry; blood pressure and serum lipids (International System U), by standardized methods. Statistical evaluation was done by Student *t*-test, ANOVA and Pearson correlation. GR was lower in HBP when compared with NT (49.09 ± 19.47 vs 57.47 ± 20.09, respectively) ($p = 0.002$), being different according to HBP JNC 7 class (NT $= 58.54 \pm 18.98$; pre-HBP $= 58.26 \pm 20.81$; HBP grade 1 $= 46.82 \pm 18.25$; HBP grade 2 $= 41.41 \pm 16.89$) ($p < 0.001$). GR was inversely correlated with age ($r = -0.782$, $p < 0.001$), pulse pressure ($r = -0.486$, $p < 0.001$) also with cholesterol total and LDL-c both in NT ($r = -0.305$, $p < 001$; $r = -0.311$, $p < 0.001$) and HBP ($r = -0.443$, $p < 0.001$; $r = -0.318$, $p = 0.002$). In conclusion, GR low activity can contribute to cardiovascular risk, being lower with ageing leading to vascular lesions supported by the association of GR and hypertension grade, pulse pressure and plasma cholesterol parameters. These results may support the oxidative/inflammatory involvement associated to HBP, as well as a possible deficit of riboflavin with age, justifying its inclusion as a food supplement.