Chronic Exposition for 60 Days to Low Concentrations of HgCl₂ Increased Plasma Oxidative Stress in Rats

Torres, J.G.D.¹; Martinez, C.S.; Peçanha, F.M.¹; Santos, F.W.¹; Salaices, M.²; Vassallo, D.V.³; Wiggers, G.A.¹; Folmer, V.¹

¹Postgraduate Program in Biochemistry, Federal University of Pampa (UNIPAMPA), Uruguaiana, RS, Brazil.
²Department of Pharmacology, School of Medicine, Universidad Autónoma de Madrid (UAM), Madrid, Spain.
³Department of Physiological Sciences, Federal University of Espírito Santo (UFES), Vitória, ES, Brazil.

INTRODUCTION: Mercury produces toxic effects in various organs and systems depending on the type, time and form of exposure. Among the suggested toxicity mechanisms an increase of oxidative stress has been proposed. Thus, this study investigated the effects of chronic exposure for 60 days to low concentrations of HgCl₂ on oxidative stress in rat plasma. MATERIALS AND METHODS: Two groups of 8-week-old Wistar male rats were treated for 60 days with: a) HgCl₂ (intramuscular injections – im - of mercury chloride - 1st dose 4.6µg/kg, subsequent dose 0.07 µg/kg/day, im to cover daily loss, according to the model described by Wiggers et al., 2008); b) Control (im injection with saline). We investigated plasma levels of lipid peroxidation (TBARS), non-protein thiols (NPSH) and activity of superoxide dismutase (SOD) and catalase (CAT). Results were compared by Student - t test.

RESULTS AND DISCUSSION: Chronic exposition to low-doses of mercury for 60 days increased oxidative stress depicted by high level of lipid peroxidation in plasma rats (MDA levels: Ct (N=6)- 14.9±1.2 vs HgCl₂ (N=10)- 22.5±2.6 nmol/mL – p<0.05). The treatment promoted changes in antioxidant defenses with increased levels of SH groups (Ct (N=7)-182.2±33.7 vs HgCl₂ (N=10)- 348.8±54.0 nmol/mL – p<0.05) and SOD activity (Ct (N=9)- 18.4±3.8 vs HgCl₂ (N=10)- 27.3±1.5 nmol/mL – p<0.01). The activity of catalase was not affected. These effects were observed in a similar treatment but with short exposure time and they seem to be a compensatory mechanism for the damage caused by mercury. CONCLUSIONS: These results demonstrated for the first time that exposure for 60 days to small doses of mercury, similar to found in human exposition, is able to cause oxidative stress and to increase oxidative defenses.

Keywords: Mercury, Chronic intoxication, Oxidative stress.

Financial Support: Unipampa