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Toxic effects of Cr(VI) in liver after administration in the drinking water to Wistar rats

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Chromium is a lustrous, brittle, hard metal. The main human activities that increase Cr(VI) concentrations are chemical, leather and textile manufacturing, electro painting, and is used to manufacture magnetic tape, and often used as pigments for photography. These applications will mainly increase concentrations of chromium in water. Through coal combustion chromium will also end up in air and through waste disposal chromium will end up in soils. Cr(VI) is a danger to human health. Cr(VI) compounds can be toxic if orally ingested or inhaled. Apoptosis is a selective process for deletion of cells in various biological systems. This event is tightly regulated with processes playing essential roles in the homeostasis of renewable tissues. Diverse groups of molecules are involved in the apoptosis pathway. One set of mediators implicated in apoptosis belong to the asparate-specific cysteinyl proteases or caspases. Caspase-8 is supposed to be the top of the death-mediated apoptosis pathway, whereas caspase-3 belongs to the "effector" proteases in the apoptosis cascade. The aim of this study was to evaluate the effects of Cr(VI) on the liver. Expression of caspases 3 and 8 in liver rats was analyzed by the reverse transcriptase-polymerase chain reaction (RT-PCR).

Ten male Wistar rats aged 4 months were divided in two groups. One group was the group control, the other one was submitted of Cr(VI) in the drinking water in a concentration of 20 mg/ml. Food and water were at libitum. After 8 weeks, the animals were euthanized. Liver was collected, weighed and divided in two, half was fixed by immersion in 10% buffered formalin and embedded in paraffin, the other half for total RNA extraction by RT-PCR.

The results demonstrated that technique RT-PCR is sensitive enough to detect caspases 3 and 8 mRNAs and that caspase 3 and 8 participate in the apoptotic process induced by Cr(VI) in rats.

We could observe that Cr(VI) induced liver toxic effects because there is an increase of the expression of the mRNA of caspase 3 and 8.

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P14-33

Toxic effects on Wistar rat kidney of lead administrated in water

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Lead occurs as expected in the environment. Nevertheless, most lead concentrations that are found in the ecosystem are a result of human performance. Lead is used in building construction, lead-acid batteries, bullets and shot, and is part of solder, pewter, and fusible alloys, in car engines, such as fuel combustion, industrial processes and solid waste combustion. Lead can end up in water and soils through corrosion of leaded pipelines in a water transporting system and through corrosion of leaded paints. It cannot be broken down, it can only be converted to other forms. These will experience health effects from lead poisoning, lead is a particularly dangerous chemical, as it can accumulate in individual organisms. Apoptosis is an important cellular response that is induced by different stimuli among them lead chronic intoxication. The cell death process is irreparable following the activation of cytoplasmic cysteine proteases (caspases). The caspases are responsible for the degradation of cellular structural and repair proteins. The aim of this study was to evaluate the effects of lead chronic intoxication on rat Wistar kidney.

Ten male Wistar rats aged 4 months were divided in two groups. One group was the group control, the other one was submitted of Pb(II) in the drinking water in a concentration of 20 mg/ml. Food and water were at libitum. After 4 weeks, the animals were euthanized. Kidney was collected, weighed and divided a sample was fixed by immersion in 10% buffered formalin and embedded in paraffin and the other half for total RNA extraction.

The results demonstrated that technique RT-PCR is sensitive enough to detect caspases 3 and 8 mRNAs and

that caspase 3 and 8 participate in the apoptotic process induced by Pb(II) in rats. Histological results demonstrate a discrete fibrosis and necrosis.

We could observe that Pb(II) is toxic to kidney because there is an increase in the expression of the mRNA of caspase 3 and 8.

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P14-34

Determinants of blood lead levels in children and adults living in a former mining area in Brazil

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The Ribeira river valley is located in the far south of the state of São Paulo and the east side of the state of Parana, Brazil. During the last 50 years, it had been under the influence of the full activity of a huge lead refinery and mining along the riverside. The plant completely stopped all kind of industrial activities at the end of 1995, and part of the worker population and their families still remain living nearby in small communities. The objective of the study was to assess the determinants of blood lead levels in those mining areas, where residual environmental contamination from the past industrial activity still remains. Blood samples of 295 children aged 7–14 years and 350 adults aged between 17 and 70 years old, were collected. A standardized questionnaire was applied, aiming to get information on food consumption habits, leisure activities, current and former occupation (adults), current and former occupation of parents (children), current and former dwelling place and conditions, and other issues. The blood lead concentrations were determined by graphite furnace atomic absorption spectrophotometry with Zeeman background correction (model SIMAA 6000, Perkin-Elmer). The samples were diluted 1:10 with 1% Triton X-100 in 0.1% nitric acid, and a mixture of ammonium dihydrogen phosphate and magnesium nitrate was used as chemical modifier. Logistic regression models were used to correlate some independent variables to blood lead levels and to assess the specific effect of each adjusted variable by the others. The dependent variable was blood lead level, categorized as 14 μg/dl or greater and lesser for adults and 10 μg/dl or greater and lesser for children. For adults, the following variables showed significant association with high blood lead levels: residential area close to lead refinery [odds ratio (OR) = 7.27 (95% confidence interval (CI) = 2.61–20.24)], former dwelling at the refinery village [OR = 5.43 (95% CI = 1.89–15.60)], male gender [OR = 18.35 (95% CI = 5.41–62.35)], smoking habits [OR = 4.24 (95% CI = 1.44–12.49)], and consumption of fruits from home backyard [OR = 3.63 (95% CI = 1.32–9.98)]. For children, the variables were: residential area close to the lead refinery [OR = 10.38 (95% CI = 4.86–23.25)], former father's occupational lead exposure [OR = 4.07 (95% CI = 1.82–9.24)], and male gender [OR = 2.60 (95% CI = 1.24–5.62)].

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P15 Toxicology *in vitro*

P15-01

Protective effect of vitamin C towards *N*-nitrosamine-induced DNA damage in the single-cell gel electrophoresis (SCGE)/HepG2 assay

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The aim of this study was to investigate the protective effect of vitamin C towards *N*-nitrosamine-induced DNA damage in the single-cell gel electrophoresis (SCGE)/HepG2 assay. To determinate the role of oxidative DNA damage in *N*-nitrosamines genotoxicity, we employed formamidopyrimidine DNA glycosylase (Fpg). None of the vitamin C concentrations tested (1–10 μM) in presence or absence of Fpg enzyme caused DNA damage per se. Combined treatment of HepG2 cells with vitamin C and *N*-nitrosodimethylamine (NDMA), *N*-nitrosopyrrolidine (NPYR), *N*-nitrosodibutylamine (NDBA) or *N*-nitrosopiperidine (NPIP) reduced the genotoxic effects of the *N*-nitrosamines in a dose-dependent manner. The protective effect of vitamin C was higher towards NPYR-induced oxidative DNA damage than against NDMA, NDBA and NPIP. Vitamin C (10 μM) reduced the NPYR-induced oxidative DNA damage in 73–81% in absence or presence of Fpg enzyme, respectively.

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