Correlation between trace elements in blood and urine and human reproductive indicators

F. Moreira, A.C. Mancebo, F. Baptista, R. Gomes, M.D.C. Souza

1 Fundação Oswaldo Cruz, Brazil, 2 Clinica G&O Barra, Brazil

The great concern with exposure to metals and their effects on human health has been expressed in research related to occupational health. However, few studies have been developed to correlate such exposure and reproductive health. It is well known that a long term exposure to metals such as lead (Pb) and cadmium (Cd) is correlated to adverse effects in the reproduction of many mammalian species. Thus the development of studies with fertile and infertile population is mandatory. The aim of this work was to investigate the correlation between metal levels and fertility in the general population using blood, urine, follicular fluid (FF) and seminal liquid (SL). The concentrations of those metals in biological fluids from 25 infertile couples under IVF were determined by electrothermal atomic absorption spectrometry. Results presented are preliminary since only 16 individuals were involved and categorized by gender. Among men, medians were Pb-B = 3.8 µg dL\(^{-1}\), Cd-B = 1.05 µg L\(^{-1}\) and Cd-U = 0.28 µg L\(^{-1}\), while the results found for Pb-SL and Cd-SL were 0.78 µg L\(^{-1}\) and 0.10 µg L\(^{-1}\), respectively. In this category, just the relationship between Cd-S and Cd-U showed a mild correlation (Spearman’s coefficient = 0.647) statistically significant (90%, \(p = 0.08\)). Regarding to women, the medians were Pb-B = 3.2 µg dL\(^{-1}\), Cd-B = 1.05 µg L\(^{-1}\) and Cd-U = 0.28 µg L\(^{-1}\), while the results found for Pb and Cd in FF were 1.25 µg L\(^{-1}\) and 0.76 µg L\(^{-1}\), respectively. There was only a mild to strong correlation (\(r = 0.745\)) with statistical significance (95%, \(p = 0.05\)), between Pb-FF and Cd-FF. As men group showed an inverse correlation (\(r = -0.240\)) with no statistical significance (\(p = 0.568\)) for Pb-SL and Cd-SL, it may be that the statistically significant correlation for Pb-FF and Cd-FF is a characteristic of the gender. Nevertheless the results were not conclusive since the sample size was still small.

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Ascorbate prevents pro-oxidant effects of vanadium pentoxide on wild-type Saccharomyces cerevisiae UE-ME3

S. Gonçalves, R. Ferreira, I. Alves-Pereira

1 Dep de Química, Escola de Ciências e Tecnologia, Universidade de Évora, Portugal, 2 Dep de Química, Escola de Ciências e Tecnologia, Universidade de Évora, Instituto de Ciências Agrárias e Ambientais, Centro de Tecnologia Animal (ICIAM-CTA), Universidade de Évora, Portugal

Vanadium pentoxide, \(\text{V}_2\text{O}_5\) behaves as an amphoteric oxide and a powerful oxidizing agent which may be an oxidative stress inducer. The vanadium (\(V^{5+}\)) is generally reduced by living cells to vanadium (\(V^{4+}\)), less toxic, using enzymes which mobilize the reducing equivalents of NADPH, or non-enzymatically using ascorbate. Nevertheless, species generated by vanadium (\(V^{4+}\)) from \(\text{H}_2\text{O}_2\) and lipid peroxidation, via Fenton reaction can have a significant role in the metabolism of vanadium and induce cell damage in physiological conditions. Although vanadium is an element with ubiquitous environmental distribution, combustion of fossil fuels represents an important source of vanadium in the environment. Biological studies to evaluate the influence of vanadium on living organisms has shown that is mutagenic and genotoxic. Having in account that toxicity mechanisms of vanadium on eukaryotic cells are not entirely clear, the main objectives of this work was to evaluate the synergistic effects of 0.025 mM ascorbate vs 2 mM \(\text{V}_2\text{O}_5\) on cell survival, alkaline phosphatase (ALP), catalases A and T (CAT A, T) and glutathione reductase (GR) activities of Saccharomyces cerevisiae UE-ME3. Cells at mid-exponential phase were inoculated in YEPD medium with 2% (w/v) glucose and incubated during 72 h in a water bath with orbital stirring, at 28 °C, in the absence or in presence of 2 mM \(\text{V}_2\text{O}_5\), or 0.025 mM ascorbate plus 2 mM \(\text{V}_2\text{O}_5\). Samples from each treatment were used to obtain growth curves and to prepare post-12,000 g supernatant, used for enzymatic activities determination. The results shows that ascorbate counteracted growth inhibition, the decrease of ALP and CAT activities, as well as...
the increase of GR antioxidants activities, caused by 2 mM V$_2$O$_5$, to values similar of control cells.

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Comparison of synthetic chelates and compost at enhancing phytoextraction of Cd, Ni and Pb from contaminated soil under canola cultivation

M. Hajishah 1, M. Choram 2, A. Alizadeh 2

1 SAZAPARDAZAN CON. ENG. CO., Iran, 2 College of Agriculture, Shahid Chamran University, Iran

The plant which can be used to clean up the soil of heavy metals contamination are named phytoremediation. Phytoremediation has received increasing attention because of its low environmental impact and cost-effectiveness. But, it is slowly process and needs long time. Synthetic chelates and low molecular weight organic acids are the most common chemical amendment that have been used in chemically assisted phytoextraction of metals from soils. The objective of this work was comparison of EDTA and sugarcane by product compost in enhancing phytoextraction of Cd, Pb, and Ni by canola in an artificially contaminated soil. Two levels of contamination (800 and 1600 ppm) were performed. The soil was placed in dark condition for 2 weeks and compost of sugarcane was applied in two levels (20 and 50 ton per hectare). A number of 5 canola seeds with grower power 95% germination were cultivated in discrete pots. After two weeks, the treatments included EDTA (0, 10 and 20 mmol/kg soil) in irrigated water, were added to some pots. Eight weeks after cultivating the plants were cut and the soils as well as the plants were analyzed. All treatments significantly increased the concentrations of Cd, Pb and Ni in the shoots of plants compared with the control. Therefore, the influence of EDTA and compost were observed more powerful for enhanced phytoextraction of the heavy metals. The effectiveness of EDTA and compost to stimulating the accumulation of the Cd, Pb and in shoots plants were (4.3 and 4.1), and (2.8 and 2.9) times respectively, than the control. Also, the result of this study indicated that all treatments were superior in terms of solubilizing soil Pb, Cd and Ni for root uptake and translocation into shoots canola but, in different levels.

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Particulate cobalt and soluble cobalt: Same metal but different toxicities as assessed by cellular biology and innovative proteomic approaches

V. Malard 1, N. Sage 1, P. Gueraud 1, W. Naudin 1, M. Floriani 2, J. Armengaud 1, E. Quemeneur 1

1 CEA, DSV, IBER, Service de Biochimie et Toxicologie Nucléaire, France, 2 Laboratory of Radioecology and Ecotoxicology, IRSN/DEI/SECRE, France

Cobalt is widely used in the industry as it is included in the production of drying agents, pigments, and catalysts, and it is a major constituent of hard metal alloys. Radioactive isotopes of cobalt are also used in industry, medicine and nuclear research. In nuclear power plants, 58Co-containing alloys can be activated into radioactive 60Co oxides, dispersed in the cooling water, and represent a major concern. Occupational exposure to Co occurs mainly via inhalation leading to various lung diseases, such as pneumoni-

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