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ANALYSIS OF METALLIC BIOMATERIALS OF MEDICAL INTEREST AND THEIR CORROSION PRODUCTS

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Metallic alloys used as biomaterials in human organism are of great susceptibility to corrosion in that biological environment. Therefore the evaluation of elemental composition of these materials and their corrosion products is a matter of continuing concern because of the potentially harmful biological effects that they may cause on local tissues.

In this work, instrumental neutron activation was applied to determine the elemental composition of biomaterials and their corrosion products from in vitro tests. The samples analysed were stainless steel wires used as orthopedic devices, gold coated ear piercing studs, NdFeB magnet used in dental prostheses, and 316L and 17-4PH stainless steels for medical and/or dental uses. In the corrosion tests, these metallic biomaterials were kept immersed in culture medium at 37 °C for 10 days.

Concentrations of As, Co, Cr, Cu, Fe, Mn, Mo, Ni and V were determined in the samples of 316L and 17-4PH stainless steels, however only Co at the level of about 7 ng mL⁻¹ was determined in their corrosion products. The elements Co, Fe and lanthanides La, Pr, Sm, Yb, Ho, Lu and Dy were determined in the NdFeB magnet, and the elements obtained in the analyses of their extracts were Co, Fe and Nd. The analysis of gold-coated copper-zinc piercing studs showed that different metallic materials are used in the production of the studs, for instance, the materials used in the stems and in the butterfly backs were different. The stems presented high concentrations of Cu, Mn, Ni and Zn while the butterfly backs showed high levels of Cr, Fe and Ni. Ni is related to contact dermatitis and Cu may be associated to toxicity effects. (Work supported by CNPq and FAPESP, from Brazil)

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