

APPLICATION OF NEUTRON ACTIVATION ANALYSIS TO THE
CORROSION STUDY OF GOLD COATED STUDS USED FOR
PIERCING EARS

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Gold is known as a metal having little or no toxicity and it has been widely used for coating studs for ear piercing. However, for some people gold coated studs have caused serious allergy and inflammation problems. After piercing, the studs are usually kept in the ear lobes for at least one week, and during this period the stud surfaces in contact with the body fluids have caused swelling, pain and redness of the skin. Consequently, it is of great interest to evaluate if elements from the metallic substrate underneath the gold coatings migrate to the body fluids due to the corrosion and the presence of defects in gold coatings.

The solutions for corrosion test were obtained by placing the gold coated studs in contact with the solutions of NaCl and of culture medium. Elemental analyses of these solutions by radioanalytical method of neutron activation analysis indicated the occurrence of substrate corrosion since the elements Cr, Fe, Ni and Zn were found in these solutions. These elements are substrate material components of alloys used to make the studs and they were quantified by X-ray fluorescence analysis. The defects of the coatings were also detected by scanning electron microscopy and energy dispersive spectroscopy analysis of the gold coated studs before and after the corrosion tests. Cytotoxicity studies indicated that after corrosion test the solution used was toxic in the culture cell assay. Among the elements quantified in the test solutions, Ni is considered responsible for most of allergic reactions. Results obtained in this work indicated the necessity to improve quality control of the coating process of studs and in the appropriate choice of material used as substrate.

IPEN-DOC- 6207