

Spectrochemical analysis of metals in gingival fluid of patients with dental implants and different prosthetic materials

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Titanium dental implants are in an electrolytic hostile media composed by bacterial colonies, gingival fluid, and inflamed tissues. It triggers an electrochemical degradation process known as corrosion. During this process, different ions are released to the media and to the organism from the implant. This can result in the degradation of the implant surface, i.e., increase of the roughness and decrease of the TiO₂ protective layer. In addition, it leads to cytotoxic responses and inflammatory processes that can cause pathological conditions such as peri-implantitis.

Trace and ultra trace elements present in gingival fluid can be studied using very specialized spectrochemical techniques like total-reflection x-ray fluorescence analysis induced by synchrotron radiation (SR-TXRF).

In this paper, studies of metals in gingival fluid of patients with dental implants and different prosthetic materials were performed by SR-TXRF. Prosthetic materials based in zirconium, noble metals and nickel-chromium alloys were considered.

The results indicate that concentrations of Ni, Cu, and Zn in gingival fluid of patients with implants with prosthetic components of nickel-chromium alloys and inflamed gums are higher than those of patients with healthy gums. Similar (statistically) results were found for the same elements and vanadium when the prosthetic material was noble metals. In the case of prostheses made in base of zirconium, the only element with a significant statistical difference was titanium.

These results indicate the importance of metal release to the organism and the influence of it on the prosthetic restoration. Moreover, further research is needed regarding the release of metals by dental implant and prostheses in order to obtain clinical applications.

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