Effects and Comparison of the Characteristics of Ni-Cr and Co-Cr Dental Alloys

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Abstract. Due to the increasing research on biocompatibility and the use of dental alloys for bridges, crowns and prostheses, it was decided to compare the corrosion effects and mechanical properties of two samples based on Co-Cr and Ni-Cr, using metallography, electrochemical and three-point bending tests. Before applying the study techniques, the surfaces of the samples were prepared by cutting, mounting and subsequent polishing. This last step was performed using progressive grain silicon carbide grinding papers and 0.1 micrometers alumina suspension [1]. Also, the samples were then immersed in an ultrasonic machine to remove all traces of dirt and chemically etched. After the application of the techniques, the metallographic test showed the crystalline structures of both dental alloys, as well as some porosities and defects. In the corrosion potential test, the samples tend to passivate and, when applying the Electrochemical Impedance Spectroscopy technique, it was observed that the corrosion resistance increases the more positive the applied potential and the higher the impedance and phase angle values, so the Co-Cr alloy presents a better corrosion resistance. On the other hand, in the three-point bending test, the Co-Cr alloy has the lowest modulus of elasticity values.

Keywords: biomaterial, corrosion test, metallographic test, three-point bending test, dental alloys.

References:

[1] López Ríos, M., Socorro Perdomo, P. P., Voiculescu, I., Geanta, V., Crăciun, V., Boerasu, I., & Mirza Rosca, J. C. (2020). Effects of nickel content on the microstructure, microhardness and corrosion behavior of high-entropy AlCoCrFeNix alloys. *Scientific Reports* 2020 10:1, 10(1), 1-11. https://doi.org/10.1038/s41598-020-78108-5