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Influence of Dental Alloys and an All-Ceramic Material on Cell Viability and Interleukin-1beta Release in a Three-Dimensional Cell Culture Model

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Abstract: The purpose of this study was to determine the influence of various types of dental casting alloys and ceramic upon cell viability and the synthesis of IL-1beta (β) in a three-dimensional cell culture system consisting of human gingival fibroblast, and to determine their effect in gingival inflammation. Au-Pt-In alloy (Pontostar), Ni-Cr-Mo alloy (Remanium-CS), a titanium alloy (Ti-6Al-4V), copper (Cu), and an all ceramic (In-Ceram) were used as test materials. The materials were exposed to a three dimensional cell culture in order to determine their effect on cell viability and IL-1 (β) secretion level. Cell viability was measured by MTT test after exposure for 24h and 48h. For IL-1 (β) measurement, assay aliquots were taken from exposed media after 1h, 3h, 7h, 24h and 48h. Assays for IL-1 (β) were carried out by ELISA. In-Ceram, Pontostar and Ti-6Al-4V alloy did not influence cell viability. Copper (52-64%), and Remanium CS (17-20%) were found to be cytotoxic, compared to control cultures. In-Ceram, Pontostar and Ti-6Al-4V had no significant influence on IL-1 (β) secretion. Remanium-CS increased IL-1(β) levels two fold compared to untreated control cultures. Our findings suggested that Ti-6Al-4V, In-Ceram and Pontostar did not cause elevated IL-1 (β) release from cells at non-toxic levels. On the other hand, Remanium-CS showed moderate toxicity and caused increase in IL-1 (β) levels.

Key Words: Cell viability, MTT, IL-1 (β), Dental alloys, Three-dimensional cell culture

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