

Title: Evaluation of the Biocompatibility of Orthodontic Brackets and Wires: An In-Vitro Study

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Abstract: Orthodontic treatment involves the use of various materials, including brackets and wires, which come into direct contact with oral tissues. Biocompatibility of these materials is crucial to ensure patient safety and treatment success. This study aims to evaluate the biocompatibility of orthodontic brackets and wires through an in-vitro investigation. Orthodontic brackets and wires commonly used in clinical practice were selected for this study. A series of in-vitro tests were conducted to assess the biocompatibility of these materials. Cell culture assays were performed to evaluate cytotoxicity, cell proliferation, and inflammatory response. In addition, scanning electron microscopy (SEM) was used to examine the surface characteristics of the materials. The cytotoxicity assays revealed minimal adverse effects on cell viability, with cell viability percentages ranging from 90% to 95% for all materials tested. Cell proliferation assays demonstrated similar rates of cell growth on the surfaces of both brackets and wires. SEM analysis indicated smooth surfaces with minimal irregularities, suggesting favorable biocompatibility. The findings of this in-vitro study suggest that the orthodontic brackets and wires examined exhibit satisfactory biocompatibility characteristics. Minimal cytotoxicity and favorable cell proliferation indicate that these materials are well suited for use in orthodontic treatment. Further clinical studies are warranted to validate these findings and ensure the safety and efficacy of orthodontic appliances in patient care.

Keywords: Biocompatibility, Brackets, In-vitro study, Orthodontics, Wires

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