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Modulation of soft tissue adhesion and proliferation on lithium disilicate ceramics and zirconia for aesthetic dental rehabilitations

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Ceramics are widely used materials for prostheses, especially in dental fields. Despite biomedical applications, little is known about ceramic surface modifications and the resulting cell behavior at its contact. Presently, lithium-disilicate ceramic could replace zirconia because of their better aesthetic properties. The aim of this study is to evaluate the biological response of embryonic epithelium cultivated on lithium-disilicate and zirconia dental ceramic. We studied a lithium-disilicate and zirconia ceramic with 2 different surface treatments: raw and polished. We compared these ceramics using an organotypic culture model of chicken epithelium and we measured various physico-chemical characteristics (wettability, and roughness). The best cell proliferation was observed on zirconia ceramics whatever the surface modification. Lithium-disilicate raw and polished ceramic provided the best cell adhesion. Our results on the lithium-disilicate showed that the surface roughness influenced the cell adhesion. This material could be interesting to enhance the gingival tissue adhesion. The zirconia showed a better cytocompatibility than lithium-disilicate but the cell adhesion was also drastically reduced on the polished zirconia. However, for aesthetical requirement of the dental implant, a glazing treatment has been performed on the lithium-disilicate which provided no cell adhesion and proliferarion due to its hydrophilicity. Our results demonstrated how simple surface modifications can finely modulate tissue adhesion. This will help dental surgeons to choose the most appropriate biomaterial and the best surface treatment for a specific clinical application, especially for the ceramic implant collar. We are now realizing culture of gingival human tissue in order to validate these results for clinical applications.

Biography

Jean-Luc Duval, 61 years old, has published 74 articles and 2 book chapters. He is engineer of the division of Biomaterials and Biomechanics at University of Technology of Compiègne (France) since 1974. He is member of the European Society for Biomaterial. Jean-Luc Duval is an expert of organotypic culture used to assess the biocompatibility of biomaterials. This technique allows testing biomaterials with the organ concerned by the implantation site.

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