

Development of a novel model for the investigation of implant-soft tissue interface

Type: Journal Article

Abstract:

Background: In dental implant treatment, the long-term prognosis is dependent on the biologic seal formed by the soft tissue around the implant. The in vitro investigation of the implant-soft tissue interface is usually carried out using a monolayer cell-culture model that lacks a polarized-cell phenotype. This study developed a tissue-engineered threedimensional oral mucosal model (3D OMM) to investigate the implant-soft tissue interface. **Methods:** A 3D OMM was constructed using primary human oral keratinocytes and fibroblasts cultured on a skin-derived scaffold at an air-liquid interface. A titanium implant was inserted into the engineered oral mucosa and further cultured to establish epithelial attachment. The 3D OMM was characterized using basic histology and immunostaining for cytokeratin (CK) 10 and CK13. Histomorphometric analyses of the implant-soft tissue interface were carried out using a light-microscopy (LM) examination of ground sections and semi-thin sections as well as scanning electron microscopy (SEM). **Results:** Immunohistochemistry analyses suggests that the engineered oral mucosa closely resembles the normal oral mucosa. The LM and SEM examinations reveal that the 3D OMM forms an epithelial attachment on the titanium surface. **Conclusion:** The 3D OMM provided mimicking peri-implant features as seen in an in vivo model and has the potential to be used as a relevant alternative model to assess implant-soft tissue interactions.

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