Witold Chmielewski et al., J Mol Genet Med 2018, Volume 12
DOI: 10.4172/1747-0862-C2-027

Engineering human oral mucosa for clinical application

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Soft tissues such as skin and oral mucosa deficits are usually corrected with autologous tissue collected from different donor sites. Considered as the gold standard in damaged tissue reconstruction, this procedure is hampered by significant limitations that include the limited amount of tissue to be collected, the creation of new fragile sites and the possible inappropriate healing of those donor sites. To overcome these limitations, some clinical initiatives have shown the possible use of engineered soft tissues such as oral mucosa for tissue reconstruction. Thus, our primary goal was to optimize the needed conditions for engineering clinically useful gingival human tissue. To reach our goal, we used primary human epithelial cells and fibroblasts that have been isolated from small gingival biopsies. Cells were propagated and then used to engineer human oral mucosa using a collagen scaffold. Before grafting, tissue structure and protein production were investigated using histological and immunohistochemical techniques. The *in vivo* studies were performed by grafting the engineered tissue onto the dorsa of immunodeficient mice. After 15 and 60 days post grafting, biopsies were collected and used to evaluate the structure of the newly generated mucosa. Interestingly, our data demonstrated that isolated gingival cells were able to adhere and proliferate when seeded into collagen scaffold. Epithelial cells gave a well-structured and stratified epithelium, basically being cultured into a connective tissue (collagen matrix populated with gingival fibroblasts). Following grafting, the engineered human oral mucosa was able to generate mucosa that covers all available grafting surfaces. The tissue contained a well-vascularised lamina propria and well-structured epithelium. Both structures communicate through a basement membrane containing lamini-5 and type IV collagen. All together, the results demonstrate the usefulness of engineered oral mucosa tissue as an alternative to replace damaged gingiva.

Biography

Witold Chmielewski is a Professor at the Faculty of Dentistry of Laval University. He is a Clinician and Researcher in the field of Dentistry, Buccal Physiology and Biomaterials. He got his MSc from Montreal and Doctorate in Dentistry from University of Medicine, Warsaw, Poland. He has more than 20 peer reviewed scientific publications and has authored numerous communications at scientific conferences and congresses.

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