Minor Gland-Derived Human Stem Progenitor Cells as a Cell Source for Tissue Engineering Applications

Caitlynn Barrows,[1,2] Danielle Wu,[1,4] Simon Young[2], and Mary C. Farach-Carson[1,3,4]

[1]Department of Diagnostic and Biomedical Sciences and [2]Katz Department of Oral and Maxillofacial Surgery at The University of Texas Health Science Center at Houston, Houston, Texas, United States; [3]Department of Biosciences and [4]Bioengineering at Rice University, Houston, Texas, United States

Introduction. Patients with xerostomia have poor oral health and low quality of life. No treatments exist for xerostomia and current treatments are palliative consisting of oral rinses, sialagogues, and chewing gum. One option for treating xerostomia includes developing a tissue engineered replacement gland from resident stem/progenitor cells (hS/PCs). Previous work has focused on isolating stem/progenitor cells from healthy margins of major salivary glands. However, minor salivary glands are numerous (approximately 1000 in the oral cavity) and are minimally invasive to obtain.
Objectives. Establish a method for isolating hS/PCs from minor salivary glands and characterize them for progenitor cell markers. Demonstrate their feasibility to grow in 3D biomimetic hydrogels.
Experimental Methods. Glands were harvested from patients undergoing trans-oral surgeries and rinsed in antimicrobial buffers. Tissues were minced and plated in cell culture flasks in a modified Williams E Media. Following cell expansion, cells were trypsinized and replated in cell culture well plates and ICC was conducted for cytokeratin 5 (K5), 14 (K14) and tumor protein 63 (p63). Cells were encapsulated in biomimetic Hyaluronic acid-based hydrogels with pegylated peptides 'PQ' (an MMP-labile crosslinker) and 'RGD' an integrin-binding motif. Cells were characterized in 3D for progenitor markers and mature salivary marker, mucin 7 (MUC7).
Results. human minor gland-derived stem/progenitor cells expressed progenitor markers K5, K14 and p63. In some instances, improper care and technique from over-trypsinization and over confluency from delayed passaging, yielded flat "egg-like" cells with aberrant progenitor marker expression. In 3D experiments, cells with the progenitor markers continued to express them in 3D with slightly reduced expression of K14, indicating potential differentiation. Minor salivary derived hS/PCs also expressed mature salivary marker, MUC7.
Conclusions. hS/PCs can be isolated from minor salivary glands and express stem/progenitor markers making them a potentially useful and easily accessible source of cells for tissue engineered salivary replacements.

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