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| 발표제목 | Regeneration and Protection of Salivary Glands |
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| 초록내용 | Saliva, one of the most important bodily fluids, is produced by the salivary glands. Dysfunction in these glands can lead to hyposalivation or xerostomia, causing deterioration in both oral and systemic health. Therefore, there is a growing need to develop regenerative medicine and protective materials for salivary glands. This seminar aims to introduce various approaches for protecting and regenerating salivary glands, depending on the type of damage, including radiation and autoimmune diseases such as Sjogren's syndrome.  In terms of salivary gland protection, we have developed an inorganic nanozyme capable of neutralizing reactive oxygen species (ROS) generated during salivary gland irradiation. A novel nanozyme, composed of Ceria oxide/Manganese oxide (CeO2/Mn3O4) heterostructures, has been developed as a systemic and salivary gland radioprotector.  Regarding salivary gland regeneration, we have discovered the regenerative effects of hyaluronic acids on salivary glands. These findings were inspired by studying the branching morphogenesis mechanism during salivary gland development. We have applied high-molecular-weight hyaluronic acids to salivary gland tissue engineering using various platforms. Surface-immobilized hyaluronic acids have been found to enhance the production of growth factors, vascularization, progenitor cell activity, and reorganization of embryonic salivary gland cells.  For the functional recovery of salivary glands, we present a conceptual study based on epigenetic regulations. After severe irradiation, salivary gland acinar cells undergo apoptosis, while duct cells remain alive. We have discovered that the expression of ANO1, which is an acinar-specific channel critical for saliva production, is regulated by methylation. Recovery of functional expression of ANO1 in salivary gland duct cells via treatment of demethylating agent shows a potential to make duct cells functioning like saliva-producing acinar cells.  Additionally, our focus extends to elucidating the epithelial factors contributing to the pathogenesis of primary Sjogren's syndrome (pSS), a systemic autoimmune disease that affects exocrine glands. Firstly, we have found that downregulation of FoxO1 in salivary gland epithelial cells (SGEC) from pSS patients leads to decreased expression of AQP5, which may contribute to the severity of xerostomia associated with pSS. Secondly, we have observed increased levels of cleaved Semaphorin 4D (Sema4D) in pSS patient SGECs, and this elevation affects both epithelial and immune cells, exacerbating lymphocytic infiltration. Injection of an anti-Sema4D blocking antibody has shown promising results in reducing salivary gland lymphocytic infiltration and restoring salivary flow rate in Non-obese diabetic (NOD) mice.  In conclusion, salivary gland dysfunction is a complex issue, and a comprehensive understanding of its pathophysiology is crucial for discovering effective therapeutic approaches. Additionally, studying the mechanisms of branching morphogenesis during salivary gland development is important for uncovering regenerative mechanisms and exploring regenerative medicine options for salivary glands. |