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Review

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Buccal drug delivery technologies for patient-centred treatment of radiation-induced xerostomia (dry mouth)

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Abstract

Radiotherapy is a life-saving treatment for head and neck cancers, but almost 100% of patients develop dry mouth (xerostomia) because of radiation-induced damage to their salivary glands. Patients with xerostomia suffer symptoms that severely affect their health as well as physical, social and emotional aspects of their life. The current management of xerostomia is the application of saliva substitutes or systemic delivery of saliva-stimulating cholinergic agents, including pilocarpine, cevimeline or bethanechol tablets. It is almost impossible for substitutes to replicate all the functional and sensory facets of natural saliva. Salivary stimulants are a better treatment option than saliva substitutes as the former induce the secretion of natural saliva from undamaged glands; typically, these are the minor salivary glands. However, patients taking cholinergic agents systemically experience pharmacology-related side effects including sweating, excessive lacrimation and gastrointestinal tract distresses. Local delivery direct to the buccal mucosa has the potential to provide rapid onset of drug action, i.e. activation of minor salivary glands within the buccal mucosa, while sparing systemic drug exposure and off-target effects. This critical review of the technologies for the local delivery of saliva-stimulating agents includes oral disintegrating tablets (ODTs), oral disintegrating films, medicated chewing gums and implantable drug delivery devices. Our analysis makes a strong case for the development of ODTs for the buccal delivery of cholinergic agents: these must be patient-friendly delivery platforms with variable loading capacities that release the drug rapidly in fluid volumes typical of residual saliva in xerostomia (0.05 to 0.1 mL).

Keywords

Radiation-induced xerostomia, saliva, salivation, salivary substitutes, salivary stimulants, orally disintegrating films, orally disintegrating tablets, patient-centred, pilocarpine HCl, dry mouth, head and neck cancer.

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