Prevention of Salivary Gland Hypofunction by Suppression of Apoptosis

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Technology description

Background

Head and neck cancers affect over 55,000 patients in the United States every year, most of whom undergo some form of radiation therapy, often requiring multiple doses. This therapy has long been known to cause damage to salivary gland tissue, leading to a "dry mouth" syndrome called xerostomia. Xerostomia diminishes the quality of life for these patients as it makes articulation (clear speech) difficult, makes swallowing foods difficult and dangerous, and makes the oral cavity more susceptible to chronic infection. Most attempts to prevent this hypofunction involve limiting the total radiation exposure of the gland, shielding of the gland, or target irradiation; while these approaches have resulted in better protection of the gland, they may not always provide the best treatment of the tumor located in the region. Once incurred, this damage is incurable — current treatments are palliative, and the costs are exorbitant to the insurance industry. Invention It has long been thought that this salivary damage was necrotic in nature and thus not preventable, but Drs. Steven Anderson and Kirsten Limesand of the University of Colorado have shown that this damage is actually apoptotic and is affected by the Akt pathway. Insulin-like growth factor 1 (IGF-1) is a known activator of Akt, and Drs. Anderson and Limesand have gone on to show that IGF-1 can be used to protect salivary gland tissue from the radiation induced damage, thereby preventing the onset of xerostomia. The model has been partially validated in mice and a provisional U.S. Patent Application was filed on the technology as a method for preventing xerostomia in patients undergoing radiation therapy for head and neck cancers (except for salivary gland tumors). Benefits Because there is no known cure for xerostomia, preventing the onset of the syndrome is the only way to effectively treat the disease. There are no preventatives known, so IGF-1 represents the frontline therapy for prevention of xerostomia. Since there is no way in advance of treatment to know which patients will develop xerostomia, all patients undergoing radiation treatment for head and neck cancers (except for those patients with cancers of the salivary glands themselves) are target subjects for IGF-1 injection or treatment prior to each radiation dosing. (By way of comparison, Herceptin, a monoclonal antibody used to treat certain forms of breast cancer, is given to only 40,000 patients per year at a cost of $50,000 per year. This high cost is market driven and a similar pricing model would justified in this setting because it is estimated that each patient that develops xerostomia is a $300,000 lifetime loss to insurance companies, representing a multi-million if not billion dollar savings opportunity for the insurance industry.)

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