Non-Viral Aquaporin1 Gene Therapy to Restore Salivary Flow

Clinical Need

In the treatment of head and neck cancers, radiotherapy is commonly executed in conjunction with other modalities, such as surgery and/or chemotherapy. Because of the anatomical proximity, salivary glands receive secondary radiation damage, which results in xerostomia. While intensity-modulated radiotherapy significantly reduces the incidence of radiation-induced xerostomia, a need still exists for patients suffering from xerostomia, especially those in whom amifostine leads to significant side effects.

Solution

The method of ultrasound-assisted gene transfer (UAGT) was developed to deliver the AQP1 gene in irradiated salivary gland for the amelioration of radiation-induced xerostomia. This non-viral gene delivery is based on sonoporation generated by the ultrasound, enabling gene transfer into radiation-surviving salivary gland cells. The delivery of the water channel AQP1 to the parotid glands in a mini-swine model restored salivary flow post-radiation to pre-treatment levels, demonstrating the efficacy of our non-viral AQP1 gene transfer approach.

Competitive Advantage

While a recent clinical trial using a viral-based AQP1 gene delivery demonstrated an increase in saliva production, this approach has not advanced beyond a successful Phase I/II trial due to side-effects generated by the adenovirus vector. With our non-viral based approach, it is anticipated that enhanced safety is provided and that serial dosing is feasible to provide patients with AQP1 gene therapy throughout their lifetime.

ITP Support

The long-term objective of this research program is to improve the quality of life in patients who suffer from radiation-induced xerostomia. Through the ITP support, the team has demonstrated the safety of the UAGT method, and collected data on the efficacy of UAGT for the delivery of AQP1 gene therapy towards enabling FDA submission.

Clinical Translation Pathway

Publications: Wang et al. Ultrasound-assisted nonviral gene transfer of AQP1 to the irradiated minipig parotid gland restores fluid secretion. Gene Ther 2015

IP: In development

Anticipated regulatory pathway: Biologic; IND to enable BLA

Anticipated commercialization strategy: New company formation/ license to industry partners

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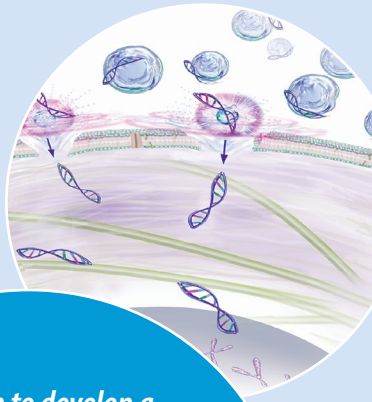

"We aim to develop a safe and non-viral gene therapy approach to provide lifelong relief of xerostomia in head-and-neck cancer patients whose salivary function is affected by radiation therapy."

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