Non-Viral Aquaporin-1 Gene Therapy to Restore Salivary Flow in Patients Suffering from Radiation-Induced Xerostomia

CLINICAL NEED

In the treatment of head and neck cancers, radiotherapy is commonly prescribed in conjunction with other modalities such as surgery and/or chemotherapy. Because of the anatomical proximity, salivary glands receive secondary damage, where xerostomia is one of the common effects of this damage. While intensity-modulated radiotherapy has significantly reduced the incidence of radiation-induced xerostomia, a pressing need exists for the remaining patients, especially for those in whom amifostine leads to significant side effects.

SOLUTION

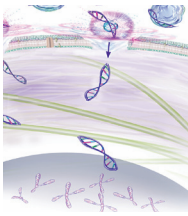
A team of researchers at the Allegheny Health Network led by Michael Passineau, PhD, has developed an ultrasound-assisted gene transfer technique (UAGT), to deliver AQP1 gene for the amelioration of radiation-induced xerostomia. This non-viral gene delivery is based on sonoporation generated by the ultrasound, enabling gene transfer as cell membrane permeability is altered. The delivery of AQP1 to the parotid glands in a mini-swine model has restored salivary flow to pre-treatment levels, demonstrating the efficacy of non-viral AQP1 gene transfer.

COMPETITIVE ADVANTAGE

While a recent clinical trial using AQP1 gene delivery demonstrated increase in saliva production, this approach has not advanced beyond a successful Phase I/II trial to regulatory approval due to the utilization of the adenovirus vector for gene delivery. With the preclusion of a virus for gene transfer, this approach is anticipated to provide enhanced safety and enable serial dosing to provide patients with the benefit of the AQP1 gene transfer throughout their lifetime.

ITP SUPPORT

The long-term objective of this research program is to improve the quality of life in patients who have suffered from radiation-induced xerostomia. In collaboration with Dr. Isabelle Lombaert at the University of Michigan, the ITP program will support the continued validation and characterization of UAGT for the delivery of AQP1 gene towards enabling FDA submission.



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Allegheny Health Network

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"We are working to develop a safe gene therapy to provide lifelong relief from dry mouth in patients whose salivary function has been damaged by radiotherapy for head and neck cancers."

http://media.dent.umich.edu/labs/lombaert

CLINICAL TRANSLATION PATHWAY

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

Intellectual Property:
In development with MPWRM Core

Regulatory Pathway:
Anticipated: Biologic, IND to enable PMA

Commercialization Strategy:
In development with the MPWRM Commercialization/ Market Needs Core

Product Launch Strategy:
In development with the MPWRM Commercialization/ Market Needs Core

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