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Regenerative Medicine Resource Center

Controlled Released System for Immunoregulation and Treatment of Periodontal Disease

Steven Little, PhD
University of Pittsburgh

"This new class of treatments is extremely exciting in that organizing extraordinarily tiny amounts of proteins that are already found in the body seem to be capable of influencing the body's own cells to repair the destructive inflammation that produces periodontal disease. To give perspective, it is possible to deliver millions of times less drug and achieve a better effect than the current gold standard."

www.littlelab.pitt.edu

Clinical Need

Periodontitis is one of the most pressing oral health concerns today. While about 65 million adults in the U.S. are diagnosed with periodontitis, there are approximately 12 million patients who suffer from the most severe form of the disease. Antibiotics (killing of bacteria) are currently used as an adjunct therapy to scaling and root planing (removal of bacteria), which remains the current gold standard of care for periodontitis. However, with all medical practice shifting away from the overuse of antibiotics, new treatment modalities are needed.

Solution

A team at the University of Pittsburgh led by Dr. Steven Little has developed a non-antibiotic, controlled release system that repairs the underlying immunomodulation dysfunction responsible for tissue degeneration in periodontitis. Studies in canine and murine models suggest that this system reduces bone resorption and results in the expression of factors indicative of tissue regeneration.

Competitive Advantage

Current clinical therapies for periodontitis focus on removal of bacterial species by scaling and root planing or debridement, often in conjunction with local or systemic antibiotics. While this approach has shown clinical benefit, it does not directly address the host's chronic inflammatory response, which has ultimately been found to be responsible for tissue destruction in periodontal disease. By targeting the underlying immunoregulatory discourse in periodontitis, this controlled release system is thought to overcome the current limitation in the treatment of periodontal diseases.

How the ITP Program Supports this Project

The team has demonstrated the effectiveness of this approach in preclinical canine model of periodontitis. The goal of the work under the ITP program is to develop GMP-grade manufacturing and sterilization protocols to produce quality-controlled product for pharmacokinetic testing and toxicology studies in support of an FDA submission.

Clinical Translation Pathway

Publications:

Glowacki, A.J., Yoshizawa, S.A., Jhunjhunwala, S., Vieira, A.E., Garlet, G.P., Sfeir, C.S., Little S.R. (2014) Prevention of Inflammation-Mediated Bone Loss in Murine and Canine Periodontal Disease via Recruitment of Regulatory Lymphocytes. Proceedings of the National Academy of Science, 110(46):18525-30). *(https://www.ncbi.nlm.nih.gov/pubmed/24167272)*

Garlet, G.P., Sfeir, C.S., Little, S.R. (2014) Restoring Host-Microbe Homeostasis via Selective Chemoattraction of Tregs. Journal of Dental Research, invited review, 93(9):834-839). *(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4213252/)*

Intellectual Property:

US 8,846,098 Artificial cell constructs for cellular manipulation *(https://patents.google.com/patent/US8846098B2)*

Commercialization Strategy:

In development with the MPWRM Commercialization/ Market Needs Core

Regulatory Pathway:

IND

Product Launch Strategy:

In development with the MPWRM Commercialization/Market Needs Core

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