

Gel-Factor Delivery for Reinnervation

Clinical Need

Craniofacial skeletal muscle plays a number of crucial roles, including control over facial expression, mastication, and respiration. There is a significant need for functional skeletal muscle tissue in reconstructive craniofacial surgery, where the current standard treatment for facial paralysis is the microvascular transfer of an innervated gracilis muscle to the affected side. However, this approach is limited by the unpredictable recovery and reinnervation of the muscle after transfer, leaving some patients with less than desirable functionality post-treatment.

Solution

A team of researchers at the Wyss Institute led by Dr. David Mooney has developed a degradable hydrogel that provides sustained release of growth factors when injected into transferred muscle. These hydrogels provide a direct neuroprotective role to the transplanted tissue, enhance reestablishment of neuromuscular junctions, and promote muscle engraftment. With these added functionalities, this approach is expected to enhance the success of the current clinical standard for skeletal muscle replacement in the craniofacial complex.

Competitive Advantage

There is currently no approach utilized in the clinic to enhance the function of these grafts. This new strategy is envisioned to be used with the current standard of care and is anticipated to provide a practical and clinically relevant approach that could be readily translated to the clinic. Furthermore, this product is expected to find utility in other clinical applications once it is established in the craniofacial complex.



David Mooney, PhD
Harvard University

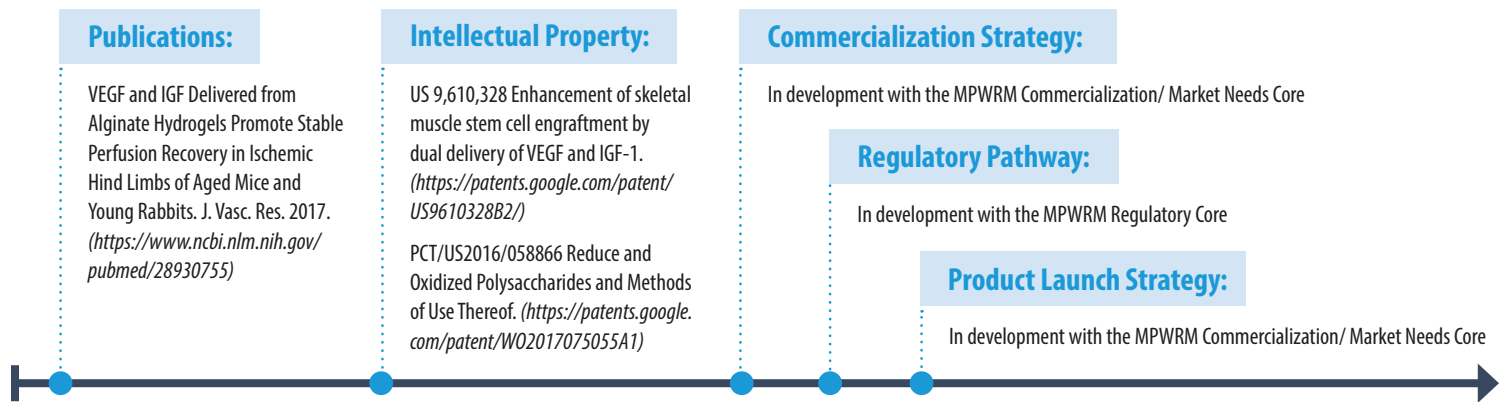
"With minimally invasive injections we can deliver a combination of these active molecules while controlling degradation rates, and our tests in different ischemia animal models are very promising."

mooneylab.seas.harvard.edu

How the ITP Program Supports this Project

The goal of the work under the ITP program is to develop and validate a process to terminally sterilize the final hydrogel/ growth factor product. Demonstrating an effective terminal sterilization process that can provide sterility assurance without compromising the effectiveness of factor delivery, biocompatibility, and mechanical properties would be a major advancement towards clinical trials and potential commercial launch.

Clinical Translation Pathway



Michigan-Pittsburgh-Wyss Regenerative Medicine Resource Center is supported in part by the National Institute of Dental & Craniofacial Research of the National Institutes of Health under Award Number U24DE026915. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.