Engineered Tissue for Treating TMJ Disorder More Effectively

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Technology description

Decellularizes Animal Donor Tissue for Successful Human TMJ Integration

This engineered tissue effectively treats temporomandibular joint (TMJ) disorder. Located on both sides of the jaw, the temporomandibular joints facilitate rotational and translational movements that enable the mouth to open and close. Facial trauma and stress-induced clenching or grinding of teeth cause inflammation in these joints, which potentially leads to TMJ disorder, a painful condition that affects more than 10 million Americans. Treatments to correct TMJ disorders cost the United States approximately $4 billion a year. Available clinical repair options provide inconsistent and largely ineffective results. In studies of patients with unilateral or bilateral TMJ total joint replacements, fifty-three percent of patients reported chronic pain at rest, and sixty-seven percent experienced reduced chewing function.
Researchers at the University of Florida have developed a tissue modification procedure that eliminates the antigens in animal-based TMJ implants that cause implant rejection. Once modified, the tissue serves as a treatment for TMJ disc disorder and possesses both acellular and cell-seeded options for enhanced surgical treatment.

Technology

This procedure engineers tissue from a temporomandibular joint (TMJ) from a pig or other animal for use as a human TMJ implant by eliminating the antigens in the tissue that cause implant rejection. The resulting processed tissue is acellular, meaning that cells from the original organism have been removed. The acellular tissue can then function as a direct implant, or the patient’ s cells can integrate with the processed TMJ disc to initiate the restructuring process. In the tissue engineering process, lasers drill holes in the tissue at specific locations, and added human cells remodel the tissue so that it regenerates to become part of the patient’ s body. This new therapy greatly increases the likelihood that a patient’ s body will successfully integrate the TMJ disc to repair the dysfunctional joint.

Application area

Tissue treatment for TMJ disorder that enhances implant success

Advantages

Utilizes decellularized joints from pigs or other animals, replicating normal human jaw function
Improves both acellular and cell-seeded implants, boosting the number of available treatment options
Mimics the function of a healthy human joint, reducing pain and the need for subsequent surgeries
Permits cell seeding with the patient’ s native tissue, minimizing the risk of implant rejection

Institution

University of Florida

Inventors

Peter McFetridge
Assistant Professor
BIOMEDICAL ENGINEERING