Targeted Delivery of Biomaterials for Tissue Regeneration (Yissum)

code: 7-2009-2262

Dan Gazit, HUJI, Faculty of Dental Medicine, Institute of dental sciences
Gadi Pelled, HUJI, Faculty of Science

Combines placement of tissue engineering scaffold and cell poration

Categories	Regenerative medicine, Bone/cartilage, Stem cells, Tissue engineering, Biomaterials
Development Stage	Proof of concept in mice. Manuscript for publication in preparation.
Patent Status	Provisional patent filed in the United States.
Market	Global market for tissue regeneration products is expected to surpass $118 billion in 2013.

Highlights

- Method for targeted delivery of bioactive molecules (genes, proteins) for controlled tissue regeneration directly to a site that has been damaged by trauma, surgical intervention, genetic or disease processes.
- Direct delivery of therapeutic genes or proteins is usually poorly targeted because there is limited control of the exact location in which the molecule is introduced and functions. There is a need to specifically target the site for regeneration. In addition, it is crucial to target the specific cells to that need to be induced by the molecule to repair the damaged site.
- The method consists of three steps:
- A scaffold is placed at a location in the body where new tissue is required by direct administration by injection or by implantation of a solid tissue graft.
- Bioactive molecules may be already attached to scaffold, or may be introduced by direct injection of the molecule into the scaffold prior to or after implantation of the scaffold.
- The cell poration pulse is applied to the site of implanted scaffold to deliver the molecules into the cells within the scaffold.

Our Innovation

- The invention relates to a method used to deliver bioactive molecules into the body of a subject using biocompatible tissue engineering scaffolds and the application of a physical pulse that causes cell poration. The poration transiently opens small pores in the membranes of the cells and allows the bioactive molecules to penetrate in and affect the cells (i.e. induce differentiation). The pores then close spontaneously, so there is no damage to the cells.

Key Features

Targeted delivery of bioactive molecules.

- Enables tissue regeneration at a specific site and with specific dimensions.
- Does not require cell implantation; makes direct use of stem cells that reside in the tissue.
- Clinical translation is highly feasible since the method relies on medical devices that are already in clinical practice, such as ultra sound, electroporators and collagen scaffolds.

Development Milestones

- Seeking funding to complete a feasibility test in large animals and collaboration to move forward.

The Opportunity

- Method may be used to generate ligament, tendon, cartilage, intervertebral disc or bone tissue.
- Cartilage tissue needed to treat defects due to rheumatoid arthritis, osteoarthritis, trauma, cancer surgery or for cosmetic surgery.
- Bone tissue required in treating osteoporosis, periodontal disease, osteolytic bone disease, post-plastic surgery, post-orthopaedic implantation, for spine fusion, and in vertebral fractures.

Contact for more information:

Ariela Markel ✉, VP, Business Development, Healthcare, +972-2-6586608

Yissum Research Development Company of the Hebrew University of Jerusalem
Hi-Tech Park, Edmond J. Safra Campus, Givat-Ram, Jerusalem P.O. Box 39135, Jerusalem 91390
Israel Telephone: 972-2-658-6688, Fax: 972-2-658-6689