Biphasic Osteochondral Construct for Cartilage Tissue Repair (09-026)

Construct repairs synovial joint in patients who are not candidates for total joint replacement

Market Overview

This osteochondral construct is seeded with mesenchymal stem cells to encourage repair of cartilage and subchondral bone in synovial joints. The global market for tissue engineering and regeneration is expected to grow from $13.6 billion in 2016 to $60.8 billion in 2021, in part due to the 5.4 million patients projected to require joint and cartilage regeneration procedures by 2019 in the United States. Currently, many patients are living with pain caused by osteoarthritis until it progresses to require total joint replacement or they are old enough to become candidates for the surgery. For patients with moderate pain, there are no treatments providing 100 percent repair of the cartilage and subchondral bone damaged by osteoarthritis. Cartilage transplants and scaffold plugs, the current standard of care, do not integrate well with surrounding bone and cartilage. Clemson University researchers have developed an anchored biphasic osteochondral construct that encourages bone and articular cartilage repair and cell growth.

Technical Summary

This biphasic construct has two parts: a top and bottom portion. The top portion, or cartilage portion, is made of alginate and has a surrounding ring of high friction material to provide enhanced fixation. The bottom, or bone portion, is made of a co-polymer with hydroxyapatite, and has a barbed pin extending below to anchor the construct to surrounding bone. A bundle of specialized fibers runs through the middle to allow fluid transport to the interior of the scaffold, or a large bundle that serves as the entire bone portion. Furthermore, the construct can be seeded with mesenchymal stem cells that can be differentiated towards cartilage and bone cells.

Application

Tissue Engineering

Development Stage

Validated Prototype

Advantages

- Utilizes a biphasic structure, encouraging both bone and articular cartilage tissue repair in synovial joints
- Provides an alternative to patients who are not candidates for traditional procedures, improving patient care and quality of life
- Uses seeding with mesenchymal stem cells, improving integration of developing tissue
- with the surrounding implant area

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Utility	United States	12/763,515	8,475,531	09-026	Dr. Karen Burg Scott Maxson

About the Inventors

Dr. Karen Burg

Professor Emerita of Bioengineering at Clemson University

Dr. Karen Burg earned her bachelor's degree in chemical engineering, with a minor in biochemical engineering, from North Carolina State University and M.S. and Ph.D. in bioengineering from Clemson University. Burg served as interim vice provost and dean of the Graduate School at Clemson University from 2011 to 2014, and interim vice provost for research and innovation from 2007 to 2011, during which time she established the South Carolina Institute for Biological Interfaces of Engineering.

For more information on this technology contact:

A. Chris Gesswein
Director of Licensing for Technology Transfer

E: agesswe@clemson.edu
P: (864) 656-0797