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Bioartificial Intervertebral Disc

The management of chronic low back pain is a prevalent problem to the clinician. It has been estimated that 70% of the population in the United States has experienced low back pain during their lives. The degeneration of the intervertebral disc (IVD) is a leading source of chronic low back pain. Collectively, disc-degeneration related problems account for 80% of all elective surgeries on the spine and an annual healthcare cost of over \$30 billion. The IVD is a fibrocartilaginous tissue that separates the bony vertebral bodies of the spine. The central, gel-like core region is known as the nucleus pulposus (NP) and plays central role in the structural integrity and flexibility of the spine. Surrounding the nucleus pulposus is a more fibrous collagenous structure known as the annulus fibrosus (AF). Degenerative disc disease is found to correlate with loss of viable NP cells and a significant decrease in the amounts of proteoglycans and collagen resulting in a loss in the degree of hydration within the NP of the disc. For those patients for whom nonoperative treatment fails, there are few effective treatment options. The current surgical treatment methods for intervertebral disc degeneration primarily involve the surgical stabilization and/or fusion of adjacent vertebrae of the spine. However, the outcome of disc fusion is unpredictable and often leads to other serious problems. Therefore, bioartificial nucleus pulposus and annulus fibrosis have been invented using a combination of tissue engineering and cell culture techniques. This treatment of degenerative disc disease incorporates an artificial support structure made from a biocompatible material that contains nucleus pulposus or nucleus pulposus-like cells.

The University of Toledo is seeking a company interested in utilizing this method of producing a bioartificial nucleus pulposus adapted for replacing at least a portion of a natural nucleus pulposus in an intervertebral disc in a spinal column.

Applications:

1. Patients with intervertebral disc disease
2. For intervertebral disc and full/partial nucleus replacement

Advantages:

1. Utilizes live cells
2. Recreates the characteristics of the nucleus pulposus into the carrier material
3. Allows for partial and full nucleus replacement

This invention is protected by issued patent: 6,598,078

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