

Aching Back? Cholesterol Medication Might Help

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Back pain, a hallmark of degenerative disc disease, sends millions of people to their doctor. In fact, more than 80 percent of patients who undergo spine surgery do so because of disc degeneration. And part of the answer may be as close as a patient's medicine cabinet.

In their quest to discover ways to stop or reverse degenerative disc disease, orthopaedic researchers have been removing disc tissue from patients who are having spine surgery and extracting cells from that tissue for cultivation in vitro (a controlled environment outside of a living organism). They then transfer the cells back into the patient. Shu-Hua Yang, MD, PhD, is part of a Taiwanese research team that has discovered that Lovastatin, a cholesterol-lowering medication, helps the differentiation of disc cells in vitro.

Dr. Yang, who is chief of the department of orthopedics at National Taiwan University Hospital, Yun-Lin-Branch, is presenting the group's findings in the poster "Lovastatin Helps Re-Differentiation of Human Nucleus Pulposus Cells During Monolayer Expansion" during the 55th Annual Meeting of the Orthopaedic Research Society, Feb. 22-25, 2009, in Las Vegas. Dr. Yang is also presenting the results of a related study, "Influences of Age-Related Degeneration on Regenerative Potential of Human Nucleus Pulposus Cells," at the same meeting. The two studies reveal the findings of a team of researchers from National Taiwan University Hospital.

In one study, the researchers removed nucleus pulposus tissues from six

human patients. (Nucleus pulposus is the jelly-like substance in the middle of the spinal disc.) The patients, ages 23 to 29, were undergoing surgery for herniated lumbar discs. Researchers then isolated the nucleus pulposus cells and eventually added Lovastatin, hoping to optimize the properties of the regenerative tissues. They hoped to maximize the expression of collagen II and minimize the expression of collagen I, two proteins involved in facilitating bone formation. They reported the following results:

- After 72 hours, researchers found that the number of nucleus pulposus cells had increased.
- Lovastatin increased the synthesis of collagen II, a protein that makes up moveable joints, and decreased the synthesis of collagen I, a protein that is related to fibrosis (the formation or development of excess fibrous connective tissue).
- Lovastatin had no cytotoxicity (the quality of being toxic) on nucleus pulposus cells.

“Regeneration of the nucleus pulposus tissue in the early stage of intervertebral disc degeneration can theoretically retard or even reverse the degenerative process and possibly regain a healthy intervertebral disc,” says Dr. Yang. “Further studies are needed to determine the potentials of statins for regeneration and repair of degenerative disc disorders.”

In a related study, Dr. Yang and his fellow researchers looked at how the patient’s age affected the suitability of nucleus pulposus tissue for regeneration.

Researchers removed tissue from two groups — adolescent patients (who were undergoing surgery for scoliosis) and adult patients (who were undergoing surgery for herniated discs) — to find out how to manipulate the cells in the healthiest way. The researchers found that the

tissue of younger patients was generally more suitable for regeneration than tissue from older patients.

These two studies represent just two of the latest advances in tissue engineering. Spine surgeons at one German institute are already using cells from the discs of human patients for autologous cell transplantation (reimplanting cells back into the same individual the cells came from). Other published studies about disc degeneration have looked at animal cells, instead of human cells.

Degenerative disc disease is one of the leading sources of back and neck pain. Disc degeneration is part of the normal aging of the spine. In this condition, the spinal discs (the pillow-like pads between the bones) lose their cushioning. When this happens, it can cause persistent pain in the lower back, legs, neck or arms. Treatments for pain can include medications and physical therapy. Sometimes surgery is needed if the pain is severe and keeps a person from participating in everyday activities.

Provided by American Academy of Orthopaedic Surgeons

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