Shock wave therapy on Cultured Tenocytes may play an important role in clinical treatment of tendinopathy

Rosemont, Il – April 8, 2009 – This award-winning study published in the February 2009 *Foot & Ankle International*, the official journal of the American Orthopaedic Foot & Ankle Society (AOFAS), was the first research done on the biologic effect of extracorporeal shock wave therapy (ESWT) on normal or pathological human tendon cell tissue (tenocytes), specifically in the foot and ankle. The lead author of this study, AOFAS member Lew C. Schon, MD, Director of Foot & Ankle Services at Union Memorial Hospital in Baltimore, is deeply involved in research studies devoted to discovering the causes of chronic tendinopathy of the foot and ankle to more effectively treat this condition non-surgically.

What happens to diseased tendons in the foot or ankle to make them become painful and swollen? Usually, it comes after some type of over stimulation. If caught in its early stages, several weeks of rest in an orthopaedic brace or boot may be all that’s needed for healing. Sometimes, a tendon ruptures completely and then the only cure is surgical repair of that tendon or implantation of a new tendon transplanted from another part of the patient’s body. In some instances, the tendon always remains swollen and painful resulting in chronic tendinopathy and the chances of it becoming better non-surgically diminish.

Dr. Schon said, “Our goal in this study was to test the possibility of healing these chronically painful tendons without surgical intervention by discovering why they don’t get better with non-surgical treatments. What is happening internally to the human tendon cell that makes it resistive to healing through rest and bracing?”
Shock wave therapy has been used successfully as a non-surgical treatment for many musculoskeletal diseases, such as plantar fasciitis and Achilles tendinopathy, without knowing exactly “how” it is helping. This is the first time a study has found out why shock waves have helped as opposed to knowing they help but not knowing why. Studies have been done in the past on animal cells which differ, however, from the human cell. What made this study unique was its ability to compare healthy and diseased human tendon cells from the same group of patients. As Dr. Schon noted, “We wanted to look at what these human tendon cells are producing when they’re healthy versus when they’re diseased. With the approval of our patients, we were able to grow these two types of tendon cells in the lab over a two-year period to learn what would be required to convert a diseased cell back to being a healthy cell without the need for surgery when other non-surgical methods had failed.”

He continued,” We catalogued the make-up of the diseased cells before receiving shock wave treatment. We then calculated the appropriate dosage of shock waves needed to make the cell proliferate and analyzed that cell after receiving extracorporeal shock wave therapy. Our hypothesis was that the diseased cell would have higher levels of matrix metalloprotease (MMP) and interleukins (ILs) than the healthy cell. MMP is the enzyme which mainly digests the collagen fibers in our body so they can be reused again in development of new collagen. This enzyme plays a great role in tissue breakage and tumor growth process as well as other processes in the body. ILs are inflammatory cytokines, which mediate the inflammatory process in the body.

After shock wave therapy, we were able to compare the changes in the cells. We discovered the levels of MMP decreased, which meant that the cells were no longer digesting collagen at the same rate. When these levels were reduced, the cell was appeared to behave like a healthy cell. The shock wave therapy has a measurable effect on human tendon cells."

This study offered a very specific cellular explanation on why shock waves improve chronically diseased tendon cells. “Before we knew it helped, but we didn’t know why,” Dr. Schon stated. “Understanding how to alleviate damage to a cell is a very dramatic breakthrough clinically, biomechanically and biologically. Our goal is to be able to treat diseased tendon cells faster and better with less-invasive surgical methods. The affect of tendinopathy on people includes pain, dysfunction, reduction in quality of life and often loss of wages. Our study has shown that tendinopathy and other soft tissue related disease are good candidates for shockwave therapy.”

Due to the success of this study, Dr. Schon and his co-authors have received a grant to further study all elements of this problem. Dr. Schon is a member of the American Orthopaedic Foot & Ankle Society. Members of the American Orthopaedic Foot & Ankle Society are orthopaedic surgeons (MD or DO) who have extensive training in the diagnosis, non-surgical care and surgical treatment of the musculoskeletal system, including bones, joints, ligaments, tendons, muscles, and nerves with a special interest in the foot and ankle.

To find an AOFAS orthopaedic surgeon in your area, go to www.aofas.org.
About AOFAS

The AOFAS promotes quality, ethical and cost-effective patient care through education, research and training of orthopaedic surgeons and other health care providers. It creates public awareness for the prevention and treatment of foot and ankle disorders, provides leadership, and serves as a resource for government, industry and the national and international health care community.

About Orthopaedic Foot and Ankle Surgeons

Orthopaedic foot and ankle surgeons are medical doctors (MD and DO) who specialize in the diagnosis, care, and treatment of patients with disorders of the musculoskeletal system of the foot and ankle. This includes the bones, joints, ligaments, muscles tendons, nerves, and skin. Orthopaedic foot and ankle surgeons use medical, physical, and rehabilitative methods as well as surgery to treat patients of all ages. They perform reconstructive procedures, treat sports injuries, and manage and treat trauma of the foot and ankle.

Orthopaedic foot and ankle surgeons work with physicians of many other specialties, including internal medicine, pediatrics, vascular surgery, endocrinology, radiology, anesthesiology, and others. Medical school curriculum and post-graduate training provides the solid clinical background necessary to recognize medical problems, admit patients to a hospital when necessary, and contribute significantly to the coordination of care appropriate for each patient.

Education

AOFAS members have the following credentials:

- Completed four years of medical school. The curriculum covers basic and clinical sciences, surgery, internal medicine, pediatrics, family medicine and all other medical specialties
- Completed five years of accredited graduate medical education (residency training) in orthopaedic surgery
- Many orthopaedic foot and ankle surgeons also complete advanced fellowship training in foot and ankle surgery.
- Satisfactory completion of the national medical licensing examination
- Continuing medical education credits over a specific time period.
- Board certification: Certified by or eligible for examination and certification by the American Board of Orthopaedic Surgery or the American Osteopathic Board of Orthopedic Surgery
- Each member must hold membership in the American Academy of Orthopaedic Surgeons (AAOS).

When selecting a medical provider to care for your feet and ankles, be sure to ask him/her about:

- Medical school education
- Accredited residency training
- Areas of practice specialization
- Experience in your prescribed treatment (surgical and/or non-surgical)

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