

USC researcher identifies stem cells in tendons that regenerate tissue in animal model

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Athletes know that damage to a tendon can signal an end to their professional careers. But a consortium of scientists, led in part by University of Southern California (USC) School of Dentistry researcher Songtao Shi, has identified unique cells within the adult tendon that have stem-cell characteristics—including the ability to proliferate and self-renew. The research team was able to isolate these cells and regenerate tendon-like tissue in the animal model. Their findings hold tremendous promise for the treatment of tendon injuries caused by overuse and trauma.

The results of their research will be published in the October 2007 issue of the journal *Nature Medicine* and will be available online on Sunday, September 9, 2007.

Tendons, the tough band of specialized tissues that connect bone to muscle, are comprised of strong collagen fibrils that transmit force allowing the body to move. Tendon injuries are a common clinical problem as damaged tendon tissue heals slowly and rarely regains the integrity or strength of a normal, undamaged tendon.

“Clinically, tendon injury is a difficult one to treat, not only for athletes but for patients who suffer from tendinopathy such as tendon rupture or ectopic ossification,” Shi says. “This research demonstrates that we can use stem cells to repair tendons. We now know how to collect them from

tissue and how to control their formation into tendon cells.”

Prior to this research, little existed on the cellular makeup of tendons and their precursors. By looking at tendons at the molecular level, the research team identified a unique cell population—termed tendon stem/progenitor cells (TSPCs) in both mice and adult humans—that when guided by a certain molecular environment, form into tendon cells. The team included leading scientists from the National Institute of Dental and Craniofacial Research at the National Institutes of Health, Johns Hopkins University and the University of Maryland School of Medicine.

Songtao Shi, a researcher for USC’s Center for Craniofacial Molecular Biology, a Division within the USC School of Dentistry, has published numerous studies on the role of stem cells in regeneration. He was part of an international research team that successfully generated tooth root and supporting periodontal ligaments to restore tooth function in the animal model. Earlier this year, his research was published in the journal Stem Cells after he and his team discovered that mesenchymal stem cells are capable of regenerating facial bone and skin tissue in the mouse and swine models.

Source: University of Southern California

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