

News Release

The Hebrew University of Jerusalem האוניברסיטה העברית בירושלים

Good News for Athletes from Hebrew University: Stem Cells Can Repair Torn Tendons or Ligaments

Jerusalem, April 4, 2006 -- Weekend athletes who overexert themselves running or playing basketball may one day reap the benefits of research at the Hebrew University of Jerusalem that shows that adult stem cells can be used to make new tendon or ligament tissue.

Tendon and ligament injuries present a major clinical challenge to orthopedic medicine. In the United States, at least 200,000 patients undergo tendon or ligament repair each year. Moreover, the intervertebral disc, which is composed in part of tendon-like tissue, tends to degenerate with age, leading to the very common phenomenon of low-back pain affecting a major part of the population.

Until the present time, therapeutic options used to repair torn ligaments and tendons have consisted of tissue grafting and synthetic prostheses, but as yet, none of these alternatives has provided a successful long-term solution.

A novel approach for tendon regeneration is reported in the April issue of the *Journal of Clinical Investigation*. Researchers Prof. Dan Gazit and colleagues at the Skeletal Biotechnology Laboratory at the Hebrew University Faculty of Dental Medicine engineered mesenchymal stem cells (MSCs), which reside in the bone marrow and fat tissues, to express a protein called Smad8 and another called BMP2.

When the researchers implanted these cells into torn Achilles tendons of rats they found that the cells not only survived the implantation process, but also were recruited to the site of the injury and were able to repair the tendon. The cells changed their appearance to look more like tendon cells (tenocytes), and significantly increased production of collagen, a protein critical for creating strong yet flexible tendons and ligaments.

Tendon tissue repair was detected using a special type of imaging known as proton DQF MRI, developed by Prof. Gil Navon at Tel Aviv University, which recognizes differences among collagen-containing tissue such as tendon, bone, skin, and muscle. The authors note that BMP and Smad proteins are involved in other tissues such as nerve and liver, suggesting that this type of delivery technology may be helpful for other degenerative diseases.

In an accompanying commentary in the *Journal of Clinical Investigation*, Dwight A. Towler and Richard Gelberman from the Washington University School of Medicine in St. Louis, Missouri, state, "Given our limited understanding of how MSCs become tenocytes, the recent progress demonstrated in these studies is quite remarkable and may be potentially useful in cell-based therapeutic approaches to musculoskeletal injuries."

The study was supported by GENOSTEM, an integrated project of the European Union for the engineering of mesenchymal stem cells in connective tissue disorders.

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