

Tendon Stem Cells and Tendon Repair

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Tendons are dense connective tissues that enable joint movement by transmitting muscular forces to bone. Because it bears large mechanical loads, tendon injury is common, especially in athletic settings. Once injured, tendon healing often results in formation of scar tissue, which has inferior mechanical strength and is therefore susceptible to re-injury at the repair site. In fact, restoration of normal structure and function of injured tendons represents one of the most challenging areas in orthopaedic medicine. In recent years, cell therapy has been used on animal models in an attempt to improve the structure and function of injured tendons. However, only limited success in terms of improving structure and function of injured tendons has been achieved, mainly due to lack of characterization of tendon cells. In this lecture, I will present our work on characterization of rabbit tendon cells. I will show that in addition to tenocytes, the residential cells within tendons, a new population of cells exists, referred to as tendon stem cells (TSCs). TSCs exhibit distinct properties compared to tenocytes, including differences in cell marker expression, proliferative and differentiation potential, and cell morphology in culture. In the second part of my presentation, I will present our recent research on the effects of platelet-rich plasma (PRP) on TSCs. Our data show that PRP treatment promotes differentiation of TSCs into tenocytes that are activated as evidenced by high proliferation rates and collagen production capability. The lecture will close with our perspectives on future research directions in the areas of tendon stem cell mechanobiology and TSC-therapy for injured tendons.