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Synergy of tendon stem cells and platelet-rich plasma in tendon healing.

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Abstract

Injured rat Achilles tendons were treated with botulism toxin to create a mechanically unloaded condition (unloaded) or left untreated (loaded), and then treated with phosphate-buffered saline (PBS), platelet-rich plasma (PRP), tendon stem cells (TSCs), or a combination (TSCs + PRP). mRNA and protein expression of collagen I, collagen III, tenascin C, and Smad 8 were determined by real time PCR and immunostaining, respectively. Loaded tendons treated with PBS, PRP, or TSCs for 3 or 14 days had higher collagen I mRNA expression than unloaded tendons. Loaded tendons treated with PBS for 3 or 14 days or with PRP for 3 days had higher collagen I protein levels than unloaded tendons. Loaded tendons treated for 3 days with PBS, for 14 days with PRP or TSCs or TSCs + PRP for 3 or 14 days had higher collagen III protein levels than unloaded tendons. Collagen I mRNA levels were higher in TSCs + PRP-treated loaded tendons compared to PBS-treated loaded tendons on day 3 of treatment. Based on changes in the expression of tendon-healing genes, our data suggest that the combination of TSCs and PRP has synergistic effects on tendon healing under both loaded and unloaded conditions, and loaded conditions improve tendon healing.

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