

Accelerated Healing of the Rat Achilles Tendon in Response to Autologous Conditioned Serum

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Background: Despite advances in the treatment of ruptured Achilles tendon, imperfections of endogenous repair often leave patients symptomatic. Local administration of autologous conditioned serum (ACS) in patients with inflammatory, degenerative conditions has shown beneficial effects.

Purpose: Because ACS also contains growth factors that should accelerate tendon healing, we studied the effect of ACS on the healing of transected rat Achilles tendon. Study Design: Controlled laboratory study.

Methods: In preliminary in vitro experiments, rat tendons were incubated with ACS and the effect on the expression of Col1A1 and Col3A1 was assessed by real-time quantitative polymerase chain reaction. To test its effect in vivo, the Achilles tendons of 80 Sprague Dawley rats were transected and sutured back together. Ten rats from each group (ACS group, n 5 40; control group, n5 40) were euthanized at 1, 2, 4, and 8 weeks ostoperatively for biomechanical (n 5 7) and histologic (n 5 3) testing. Lysyl oxidase activity was assayed by a flurometric assay. The organization of repair tissue was assessed histologically with hematoxylin and eosin- and with Sirius red-stained sections, and with immunohistochemistry.

Results: Tendons exposed to ACS in vitro showed a greatly enhanced expression of the Col1A1 gene. The ACS-treated tendons were thicker, had more type I collagen, and an accelerated recovery of tendon stiffness and histologic maturity of the repair tissue. However, there were no differences in the maximum load to failure between groups up to week 8, perhaps because lsyloxidase activities were unchanged.

Conclusion and Clinical Relevance: Overall, our study demonstrates that treatment with ACS has the potential to improve Achilles tendon healing and should be considered as a treatment modality in man. However, as strength was not shown to be increased within the parameters of this study, the clinical importance of the observed changes in humans still needs to be defined.

Keywords: growth factors; autologous conditioned serum; animal model; biological repair



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