

Evaluation of the effect of mechanical loading on angiogenic factors in tendinopathy

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BACKGROUND Tendon disorders are a significant cause of pain and morbidity amongst athletes, workers and the general public (1,2). Tendinopathy is often viewed as the result of failed or inadequate healing response through repetitive overuse (3). The clinical symptoms of tendinopathy are activity-related pain, focal tenderness, and intratendinous imaging changes. Previous authors have suggested there may be an association between pain and neurovascular changes resulting from tendon overuse in tendinopathy patients (4,5). In order to examine the effects of repetitive overuse on the expression of angiogenic genes which regulate neovascularization in tendinopathy, primary human tendon cells were subjected to cyclic strain.

METHODS By using Flexcell® Tension Systems, the isolated tendon cells from human hamstring tendons (excess ACL autograft material) were exposed to cyclic tension (1Hz frequency and 10% strain). RNA samples were isolated at different time points and gene expression was evaluated by qPCR. Zymography assay was also conducted in order to measure the activity of MMP-2 in the supernatant of tendon cell culture.

RESULTS Initial experiments show that cyclic strain of two-dimensional primary tenocyte cell cultures (1 Hz) promotes increased expression of VEGF, bFGF, Cox-2 and IL-6 genes, and increased activity of MMP-2. But, by increasing the time course (~ after 4 hours), bFGF, Cox-2 and VEGF are progressively downregulated.

CONCLUSION It seems that the early response of the tendon cell to overuse tensile loading leads to upregulation of some angiogenic factors which may play an important role in tissue homeostasis following periods of overuse.

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