Conclusions: This study is consistent with the hypothesis that endogenous TGF-β signaling is involved in gene expression and protein synthesis of PRG4 in response to mechanical injury. While injury significantly increased TGF-β gene expression, inhibition of the TGF-β type-I receptor suppressed PRG4 gene expression and protein release. Injury did not appear to affect the ability of the blocker to suppress PRG4 gene expression. Yet, there is a trend towards dose dependence of the ability of the blocker to suppress PRG4 protein release in the presence of injury. The PRG4 protein concentration in the conditioned medium of injured cartilage explants tracks closely with values in the literature (~0.1 μg/g/disc-day).

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LOW-INTENSITY ULTRASOUND ENHANCES TENDON GRAFT-BONE INTERFACE HEALING IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION. A BIOCHEMICAL AND IMAGE ANALYSIS IN HUMAN

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Purpose: The present study investigates the effect of low-intensity pulsed ultrasound (LiUS) during ligamentization process on the healing at tendon graft-bone interface through biochemical and imaging analysis.

Methods: Sixty patients who underwent arthroscopically assisted anterior cruciate ligament (ACL) reconstruction using semitendinosus and gracilis tendon autograft were selected for the study. LiUS (200-μsec bursts of 1 MHz sine waves with pulse repetition rates of 1 KHz and average intensity of 30 mW/cm²) was applied daily in 30 patients (study group) for 20 days, while 30 patients didn’t receive LiUS (control group). Blood samples were collected pre-operatively and 1, 2, 3 and 6 weeks post-operatively. The serum levels of TGF-β1, IGFBP, OPG, sRANKL, procollagen I and NTX from both groups were measured using ELISA. Multiple Direction Computer Tomography (MDCT) in different time periods were used to monitor the progress of healing in both groups postoperatively. MDCT with MPR in 3 planes evaluated the direct integration by means of quantitative measurement of the degree of the cross sectional ossification.

Results: Analysis of the serum levels of all the factors showed statistically significant alterations in the study group compared to the control group. Interestingly, IGF and OPG levels were found elevated, sRANKL was decreased and TGF-β1 exhibited a bimodal profile in the study group. Imaging analysis supported the biochemical findings, indicating a faster healing rate and a more efficient ligamentation process after ultrasound treatment.

Conclusions: Our results suggest that LiUS enhances the healing rate of the tendon graft-bone interface in ACL reconstruction, possibly by affecting the expression levels of significant genes.