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Comparison Of Basal And Cytokine Stimulated Metabolism Of Tendon Autografts For Anterior Cruciate Ligament Reconstruction

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INTRODUCTION: Over 200,000 anterior cruciate ligament (ACL) reconstruction surgeries are performed annually in the U.S for treatment of ACL ruptures. Patellar tendon (PT), quadriceps tendon (QT), and hamstring tendon (HT) are common autograft choices for ACL reconstruction (ACLR). Understanding how tendon autograft tissue responds to the pro-inflammatory environment of the injured knee may provide insight into mechanisms of failure after ACLR. This study was designed to identify the metabolic responses of the different tendons to pro-inflammatory stimulation. It was hypothesized that the metabolic profiles for each graft type would not be significantly different without cytokine stimulation, but that pro-inflammatory cytokine stimulation would incite production of significantly higher levels of inflammatory and degradative biomarkers from PT grafts when compared to QT and HT grafts.

METHODS: With IRB approval, tendon normally discarded after surgery was collected from patients undergoing ACLR (PT n=16, QT n=30, and HT n=9). Two 4mm explants were created from the tendon of each patient and cultured in media with or without rhIL-1β After 3 days of culture, media was collected for biomarker analysis. Biomarker concentration was standardized to tissue weight. Significant differences between IL-1β treated and untreated controls for each tissue type were determined using Mann-Whitney Rank sum tests. Significant differences among tissue types with or without stimulation were determined using a Kruskal-Wallace test with post-hoc analysis. Significance was set at $p<0.05$.

RESULTS: PT and QT autografts increase production of inflammatory and degradative biomarkers in response to cytokine stimulation at a similar level, while HT autografts overall did not. PT and QT autografts' basal production of inflammatory and degradative biomarkers were similar to each other, but significantly different from HT autografts.

CONCLUSION: It is not yet clear whether the heightened metabolic response seen in the QT and PT will improve or inhibit the healing of the graft after ACLR surgery. Ongoing studies in our lab will relate these observations to graft healing in patients and compare these responses to clinical measures in order to improve outcomes for patients undergoing ACLR.