

The Effects of Extracellular Matrix Allograft Administration on Knee Inflammation Following an Anterior Cruciate Ligament Injury in Mice

Caroline Bice¹, **Peyton Estes**¹, Ben Loflin², Roufael Hanna³, Stephen Schlecht²

¹Indiana University School of Medicine; ²Indiana University School of Medicine; Department of Orthopaedic Surgery; ³School of Health and Human Sciences, Indiana University Purdue University-Indianapolis

Background and Hypothesis:

A human placental-derived extracellular matrix (ECM) allograft has previously been developed and is indicated by the manufacturer for reducing tissue inflammation and accelerated repair. To evaluate the efficacy of this product for reducing post-anterior cruciate ligament (ACL) injury inflammation, we used a novel murine in vivo ACL injury model. This model has previously been shown to induce significant synovitis, infrapatellar fat pad (IFP) fibrosis, and articular cartilage (AC) degradation within 2 weeks following an ACL injury. We hypothesized that intra-articular injections of the allograft would correspond with a decrease in synovitis, fibrosis, and articular cartilage degradation.

Experimental Design or Project Methods:

Ten-week-old C57BL/6J mice were randomly placed into 4 groups (n=10/group). For all mice, the right ACL was ruptured. One group served as sham controls, with a single intra-articular saline injection 24-hours following injury. The remaining three groups received 1, 2, and 6 allograft injections respectively beginning 24-hours after injury. Mice were euthanized 14 days after injury. Following euthanasia, the degree of IFP fibrosis, knee synovitis, and AC degradation were histopathologically evaluated.

Results:

Thus far, 5 mice per group have been analyzed. Within this subset of mice, those that received 6 injections demonstrated a significantly higher synovitis score ($p < 0.01$) than the sham group. The 1-injection ($p < 0.01$), 2-injection ($p = 0.16$), and 6-injection ($p = 0.03$) groups each displayed greater IFP fibrosis, relative to sham. No significant differences were found in AC degeneration across groups.

Conclusion and Potential Impact:

If the current results hold, following the analyses of the remaining mice, then this particular orthobiologic may not be suitable for reducing the post-ACL injury inflammatory response in

mice. However, there are several limitations to this pilot study that will first need to be accounted for to confirm the lack of efficacy found.