

Student name: David Fiedler

Faculty name: Dr. Karl Wenger

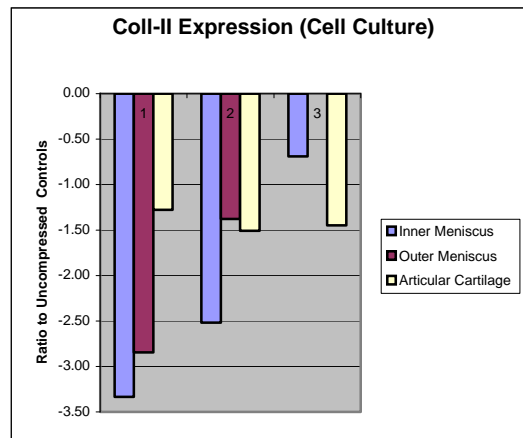
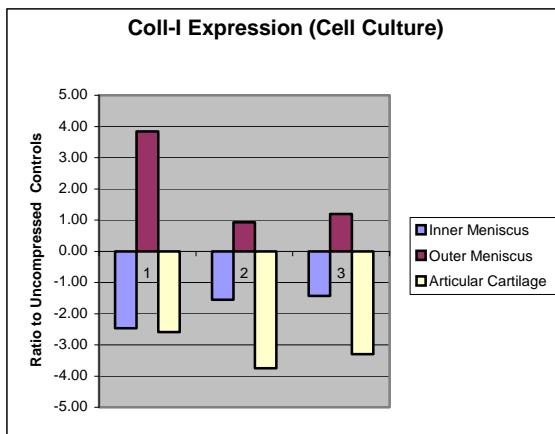
Department: Orthopedics

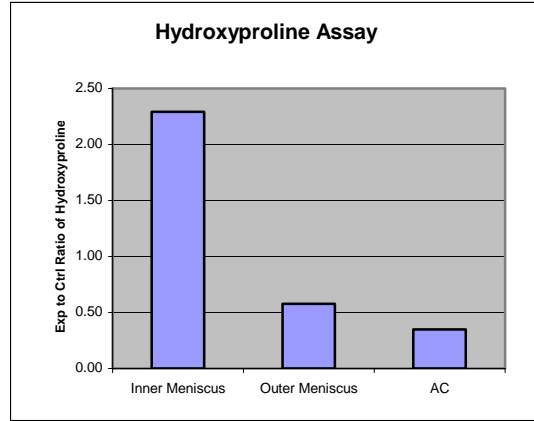
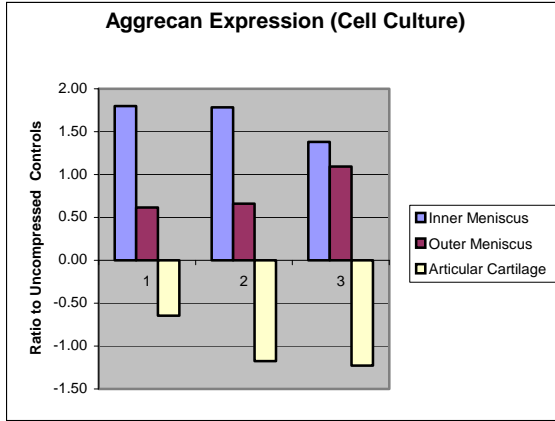
Project title: Matrix Remodeling Expression in Fibrocartilage of the Annulus Fibrosus and Meniscus Under Compressive Load

Introduction/Objectives: The objective of this study was to test hypotheses regarding a shift in the expression of genes and extracellular matrix (ECM) proteins responsible for mechanical viability. It has been previously shown that under increased compressive load conditions, fibrochondrocytes of the annulus fibrosus begin to remodel and regulate the expression of ECM and matrix modulator components.

Methods: The meniscus and annulus fibrosus, as well as fibrochondrocytes from the annulus fibrosus, meniscus, and articular cartilage (AC) were aseptically recovered from 12-week old rabbits (n=6). Cell and organ cultures were hydrostatically compressed using a custom bioreactor at 225psi for 3 hours a day for 3 consecutive days at 37°C. After stimulation, RNA was isolated, reverse transcribed, and evaluated by real-time PCR (RT-PCR) for expression of type I (Coll-I) and type II (Coll-II) collagen and aggrecan. For protein analysis, cell cultures were placed in fresh media and incubated for 48 hours at 37°C. The media was then removed and analyzed for total protein and hydroxyproline content.

Results:





Summary/Discussion: Differential regulation of the two primary collagen types with high pressure indicates a capacity for the annulus to remodel according to pathomechanical conditions. The results in cell culture experiments showed an increase in Coll-I for the outer meniscus, but a decrease in expression in the inner meniscus and articular cartilage and a decrease in the expression of Coll-II in all samples. An increase in the aggrecan expression in both the inner and outer meniscus was also observed. The experiments should be repeated for a more thorough study and the assays fine-tuned to maximize the usefulness of the data.