Characterizing the Metabolic Profile of the Infrapatellar Fat Pad from Osteoarthritic Knees

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INTRODUCTION: Osteoarthritis (OA) is an irreversible musculoskeletal disability commonly seen in middle-aged to elderly populations. Recent studies suggest that the infrapatellar fat pad (IPFP) plays a significant role in the development and progression of OA, but little is known about its metabolism in OA knees. Understanding the IPFP's production of biomarkers may provide insight into the cellular pathways activated by the presence of OA. It was hypothesized that OA IPFPs would have strong ($r>0.7$) correlations between relevant OA-related biomarkers for inflammation and degradation.

METHODS: With IRB approval, IPFPs were obtained from ten OA patients undergoing total knee arthroplasty. Grape-sized explants were made from each IPFP and cultured in 7 ml of DMEM at 37ºC and 5% CO_2. Media was collected after 3 days and used for biomarker analysis. A Pearson's correlation was performed on the data to identify linkages in OA IPFP biomarker production.

RESULTS: Of the degradation-related biomarkers, MMP-1, MMP-2, MMP-9, and TIMP-3 had the most moderate to strong correlations to production of pro-inflammatory biomarkers. There were only two important correlations between degradative enzyme production and TIMPs. There was a strong correlation between IL-1β and TNF-α, but the production of TNF-α had more moderate to strong correlations to production of other pro-inflammatory biomarkers produced by the IPFP.

CONCLUSION: The data from this study indicates potential linkages in the degradative and inflammatory metabolism of the OA IPFP. These results suggest that the IPFP may play a role in the development and progression of OA in the knee.