ASSESSMENT OF BIOMARKER PRODUCTION BY OSTEOARTHRITIC OSTEOCHONDRAL TISSUES
AND CORRELATION TO THE BIOMECHANICAL, BIOCHEMICAL, AND HISTOLOGICAL PROPERTIES

Nicole C. Werner
Aaron M. Stoker, Thesis Supervisor

ABSTRACT

Osteoarthritis (OA) is the most prevalent form of arthritis and is a significant cause of pain and disability worldwide. It is generally accepted that changes in the structural orientation, biochemical parameters, and biomechanical properties together with inflammation are the main contributors to the development and progression of OA. Early stages of OA are characterized by alterations in the structure and environment of the cartilage progressing to irreversible macroscopic tissue damage. Further, chondrocytes become activated, increasing the production of inflammatory, degradative, and extracellular matrix proteins, which could serve as relevant biomarkers. We aimed to investigate relationships between the production of biomarkers and changes in physical and structural properties of osteochondral tissue from patients with OA. We show significant relationships between many of the tissues physical properties associated with OA as well as the production of relevant protein biomarkers. We concluded that biomarkers of inflammation, degradation, apoptosis, and chondrocyte viability produced by osteoarthritic cartilage show moderate to strong correlations to each other and physical changes in the tissues properties, suggesting that there is a correlation to OA biomarker production and the severity of pathology. Utilizing these relationships, it may be possible to identify early changes in OA which may be potential targets for diagnosis and treatment in future studies.