

The Role of Load in Initiation and Progression of Cartilage Pathology

Sree Sai Satish Adusumilli

Dr. James L. Cook, Dissertation Supervisor

Abstract.

Articular cartilage is primarily responsible for dissipation of load in diarthrodial joints. Load plays a critical role in maintaining cartilage health, but can also be a primary contributing factor in cartilage disease such as osteoarthritis. IL-1 β is a cytokine involved in the initiation and progression of osteoarthritis through inciting cascades which cause inflammation and degradation. Corticosteroids are used extensively in the equine industry to treat the symptoms of osteoarthritis. They have beneficial effects in lameness and inflammation, but can exacerbate cartilage degradation and hinder tissue healing. It is important to understand the roles and interactions of load, IL-1 β , and corticosteroids in regards to cartilage health and disease. To understand the effects of corticosteroids and IL-1 β on articular cartilage in vivo relevant gene expression, extracellular matrix composition, and biomarker production of cartilage were measured after subjecting to various combinations of load, corticosteroids, and IL-1 β . The results from this study have given us insight into the effects of various loads on articular cartilage. Higher frequencies and durations of compressive loading seemed to have more pronounced deleterious effects on cartilage, even within physiological loading ranges. In combination with corticosteroids, compressive loads at 2 and 6 MPa delivered at high frequencies resulted in changes similar to those reported in corticosteroid-induced arthropathy. However similar compressive load delivered at lower frequencies at 2 and 6 MPa seemed to mitigate some of the deleterious effects of IL-1 β as evidenced by decreased expression of matrix metalloproteinases when compared to unloaded samples and samples loaded at higher frequencies.