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Effects of Glucose and Insulin on Intervertebral Disc Metabolic Responses in an In Vitro Rat Tail Model

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INTRODUCTION: Intervertebral disc degeneration (IVDD) is associated with debilitating low back pain and is a major cause of disability in the U.S. Diabetes is a comorbidity for IVDD and is associated with chronic systemic inflammation. However, the effect of diabetes on IVDD is not fully understood. This *in vitro* study was designed to test the effects of high or low glucose with low or normal insulin levels on the metabolic responses of the IVD using a whole organ culture rat tail model. It was hypothesized that IVDs cultured in high glucose would produce significantly increased inflammatory biomarkers compared to low glucose, and IVDs cultured in low insulin would produce significantly increased inflammatory biomarkers compared to normal insulin.

METHODS: With IACUC (ACUC#9435) approval, tails were harvested from skeletally mature Sprague Dawley rats (n=6) euthanized for reasons unrelated to this study. IVD explants (n=24) were created and assigned to 4500 µg/ml high glucose or 1000 µg/ml low glucose and 1 µg/ml low insulin or 10 µg/ml normal insulin (n=6/group). Explants were cultured for 12 days with media changed and collected every 3 days for biomarker analyses.

RESULTS: Data analyses are ongoing but will be presented on the poster.

CONCLUSION: This study uses a whole organ model to measure the IVD metabolic response when exposed to varying glucose and insulin levels to better understand the relationship between diabetic inflammation in the realm of IVDD. Data analysis is still ongoing, and conclusions will be made on the poster following complete analysis.