The Impact of Type 2 Diabetes on Bone Metabolism and Growth after Spinal Fusion
Melodie Metzger, PhD; Viorica Ionut, MD, PhD; Rick Delamarter, MD

Diabetes mellitus is a chronic metabolic disease with an enormous impact on public health. The incidence of type II diabetes (T2DM) has skyrocketed to epidemic proportions and is expected to rise. As the prevalence of diabetes continues to increase, so does the percentage of diabetics among patients undergoing spinal fusion surgery. Diabetes has previously shown to have detrimental effects on many organs including the renal, circulatory, and nervous systems, and has been increasingly recognized to adversely affect bone health. Some clinical reports suggest diabetes may have a negative effect on spinal fusion outcomes, although no conclusive experimental research has been conducted to investigate the causality, impact, and inherent risks of this growing patient population. Therefore, the purpose of this study is to analyze the hypothesis that type II diabetes inhibits the formation of a solid bony union after spinal fusion surgery by altering the local microenvironment at the fusion site through a reduction in growth factors critical for bone formation. To accomplish this we will employ a well-validated rat model of T2DM that best mimics the human condition. Once the diabetic condition is created and stable a posterolateral tail autograft fusion will be performed on both diabetic and control rats. Several rats from each group will be sacrificed early to determine alterations in growth factors in the fusion bed that are important for osseous healing. The remaining rats will be sacrificed at week 8 after the fusion has been able to heal. The spines will be harvested and analyzed using manual palpation, microCT, histology, and biomechanics. Data generated in this study will provide further insight into the underlying mechanism of diabetes-induced bone alterations and will eventually help determine whether pharmacological interventions or lifestyle changes can modulate the rate of nonunion in diabetic patients.