

***In Vivo* Assessment of Spinal Neuromuscular Neutral Zones in Humans**

When engaging in repetitive motions for a long period of time (months/years), such as in a workplace environment, an individual can develop a condition known as cumulative trauma disorder (CTD). This condition is characterized by pain, reduced range of motion, inability to generate normal forces, and frequent muscle spasms. Despite many years of investigations addressing low back pain and CTD, the etiology of mechanisms remains elusive.

Recent focus on low back pain and CTD has been directed at concepts of neuromuscular control and maintenance of dynamic stability. Our laboratory has been instrumental in pioneering the existence in ligament-mediated reflexes that exist in the lumbar spine of animal models and establishing the deleterious effect of repetitive motions. Since data from animal models cannot be easily extrapolated to humans, the main purpose of this investigation is to establish the reliability of measuring *in vivo* neuromuscular neutral zones (NNZs) in the lumbar spine of human subjects using minimally invasive procedures. NNZs will be quantified during different three movement paradigms collected in two separate sessions. The results will be used to assess the reliability of each paradigm and also to investigate potentially confounding factors resulting from gender.

Methodology and results developed from this investigation will be used to investigate hypotheses regarding the etiology of occupational low back pain and CTD, the effects of various work-related parameters on NNZs (prolonged lumbar flexion, cyclic lumbar flexion, localized lumbar fatigue, and work/rest cycles), and the quantification of NNZs in individuals with low back pain.