"Inflammation model of body-based treatment for chronic musculoskeletal pain."

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Project Summary

Body-based (manual and movement) therapies have been shown to be beneficial for the treatment of chronic musculoskeletal pain. An important component of manual and movement based therapies is stretching of soft tissues (muscle and connective tissue). A recent ultrasound study in humans suggests that connective tissue may play a role in the pathogenesis of chronic low back pain. Importantly very little is known about the innervation of connective tissues in the low back or how these tissues respond to inflammation. The overall objective of this project is to test the hypothesis that tissue stretch attenuates mechanical sensitivity, cytokine production and neuropeptide production induced by local connective tissue inflammation. The specific aims of this project are to quantify the neuropeptide expression of sensory nerve fibers projecting from the connective tissues of the low back in the rat (Aim 1), to develop a model of connective tissue inflammation in the low back of the rat (Aim 2a) and to compare the effect of in vivo tissue stretch vs. no stretch in the model of connective tissue inflammation (Aim 2b). To quantify sensory nerve fiber expression we will use retrograde tracer methods to identify the cells that project from the low back in the rat, and immunohistochemical methods to identify the sensory nerve cells. All cells that project from the low back will be counted and further analysis will involve counting the subpopulation of these cells that also express sensory neuropeptides. To evaluate the effect of tissue stretch on connective tissue inflammation we will apply a method of in vivo animal stretch to a model of connective tissue inflammation in the rat. This inflammatory model and the subsequent changes that may be induced by tissue stretch will be evaluated with behavioral tests for changes in mechanical sensitivity, a pro-inflammatory cytokine array to measure changes in cytokine expression, histology to evaluate inflammation in tissue, enzyme immunoassay to evaluate neuropeptide release in tissue and immunohistochemistry to evaluate neuropeptide expression in dorsal root ganglia.

Relevance to public health: Chronic musculoskeletal pain including low back pain affects millions of people every year. Stretching of connective tissue and muscle is a fundamental component of body-based (manual and movement) therapies and conventional physical therapy both of which are commonly used to treat persistent and chronic musculoskeletal pain. Body-based therapies are non-invasive and if the peripheral mechanism conferring a decrease in pain and inflammation can be elucidated, treatments could be tailored to effect maximal benefit to the patient.