INTEGRATING PHYSICAL IMPAIRMENTS, BIOMECHANICS AND NEUROIMAGING IN PATIENTS WITH CHRONIC LOW BACK PAIN: A PILOT STUDY

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Background and Purpose: Classical diagnosis of chronic low back pain (cLBP) is limited to radiographic presentation and evaluation of physical impairment. Unfortunately, pain presentation does not correlate well with these features. The objective of this research was to integrate cLBP characteristics including physical impairment, biomechanics, and neuroimaging to aid in classifying cLBP patients and facilitate the development of patient specific treatment strategies.

Methods and Materials: The current pilot study reports on two subjects with cLBP and one asymptomatic subject. The outcome measures included the Oswestry Disability Index (ODI), the Fear Avoidance Beliefs Questionnaire (FABQ) and a modified Waddell’s Physical Impairment Index (PII). Biomechanics of the subject’s lumbar-pelvic kinematics were measured during activities of daily living using an Optical Motion Analysis System. A 3T MRI utilizing BOLD contrast functional sequence was then used to record subject response to pain provocative (legs flat) and non-provocative positions (legs flexed on bolsters). The Numerical Pain Rating Scale (NPRS) was acquired throughout testing.

Results: Physical impairment presented differently in cLBP subjects sampled with modified Waddell’s PII, ODI, FABQ, and NPRS. Both subjects with cLBP had decreased flexion and spinal tenderness; increased impairment of active sit-up and straight leg raise concomitant with pain. Biomechanically, lumbar flexion and extension was decreased in subjects with cLBP compared to the asymptomatic control. cLBP brain activity was found in orbitofrontal and ventromedial prefrontal cortex; areas related to anticipatory pain coping, negative affect, and decision making.

Conclusions / Implications: Multifactorial correlation requires greater sample size however, our preliminary results suggest neuroimaging of positional provocation in cLBP patients is consistent with reports of pain evoked utilizing other stimuli. This integration of multiple physical and biomechanical factors to differentially diagnose cLBP may reveal a more precise means of evaluating and directing treatment for LBP.