The Journal of Pain
Volume 20, Issue 4, Supplement, April 2019, Page S33

(234) Cortical Hemodynamic Response to Contact Thermal Stimuli in Older Adults with Knee Osteoarthritis: A Functional Near Infrared Spectroscopy Pilot Study

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https://doi.org/10.1016/j.jpain.2019.01.155

Since the brain is the organ that is principally responsible for processing the experiences of pain, the emergence of neuroimaging for quantifying pain-related responses is promising. Functional near-infrared spectroscopy (fNIRS) is particularly favorable for studying pain since this optical method is noninvasive, portable, and cost-effective. However, no studies have directly evaluated the cortical hemodynamic response to pain in older adults with knee osteoarthritis (OA) using fNIRS. In this pilot study, we sought to investigate the cortical response of older adults with knee OA to contact thermal stimuli. Fourteen community-dwelling adults with knee OA pain aged 50 – 85 years underwent testing. Using a blocked design paradigm consisting of 6 blocks of 20 seconds of stimuli followed by 30 seconds of rest, we applied contact thermal stimuli at 45 degree Celsius to the ventral part of the ipsilateral forearm to the most affected knee using a computer-controlled Medoc TSA-II Neurosensory Analyzer. We used a continuous wave, multichannel fNIRS imaging system (LIGHTNIRS, Shimadzu, Kyoto, Japan) incorporating three semiconductor lasers at 780, 805, and 830 nm and an avalanche photodetector in each optical channel to measure cerebral hemodynamic activity. The instrument encompasses an array of 8 sources and 8 detectors connected to the subject's scalp in a geometrical layout that covered the prefrontal and somatosensory cortex regions bilaterally. Results indicate substantial brain activation patterns in contralateral prefrontal and somatosensory regions, with differing intensity between subjects in response to the stimulus. Our findings extend the use of fNIRS imaging to older adults with knee OA, and adds to the growing literature regarding neuroimaging measures of pain using fNIRS.

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