study supports the hypothesis that pandemic-related disruptions may be accompanied by increased neuroinflammation in chronic pain populations and, in cLBP patients, also by accelerated brain aging. While the specific mechanisms remain unknown, our results underscore the deleterious effect of the pandemic on chronic pain and brain health. P01-AT009965 nd R01-NS095937-01A1.

Accelerated Brain Age Mediates The Association Between Psychological Profiles And Clinical Pain In Knee Osteoarthritis

Pedro A. Valdes-Hernandez, Alisa Johnson, Soamy Montesino-Goicolea, Chavier Laffitte Nodarse, Vishnu Bashyam, Christos Davatzikos, Roger B. Fillingim, and Yenisel Cruz-Almeida; University of Florida

Chronic pain is driven by factors across the biopsychosocial spectrum. Previously, we demonstrated MRI-based brain-predicted age differences (brain-PAD: brain predicted age minus chronological age) to be significantly associated with pain severity in individuals with chronic knee pain. We also previously identified distinct, replicable, multidimensional psychological profiles significantly associated with clinical pain. The brain aging/psychological characteristics interface in persons with chronic pain promises elucidating factors contributing to their poor health outcomes, yet this relationship is poorly understood. We examined the interplay between previously identified psychological profiles in chronic knee pain participants (n=124), brain-PAD and clinical pain severity. Controlling for demographics and MRI scanner, we compared the brain-PAD among psychological profiles and over time. We also explored whether profile-related differences in pain severity were mediated by brain-PAD. Brain-PAD differed significantly between profiles (p=0.013), with Profile-2 (high coping; p=0.027) and Profile-3 (high negative/low positive emotions; p=0 .041) having higher brain-PAD than Profile-1 (low somatic reactivity). No significant change in profile-related brain-PAD differences over time was observed, but there was a significant decrease in brain-PAD (p=0.022) for Profile-4 (high optimism/high positive affect). Moreover, profile-related differences in pain severity at baseline were partly explained by brain-PAD; but brain-PAD did not significantly mediate the influence of variations in profiles on changes in pain severity over time. Our findings suggest that brain-PAD is integral to the previously observed relationship between psychological function and pain, and that psychological characteristics may dispose individuals with chronic knee pain for worse health outcomes, via neuropsychological processes. NIH/NIA Grants R01AG059809, R01AG067757 (YCA); R37AG033906 (RBF), and T32AG049673 (SMG). A portion of this work was performed in the McKnight Brain Institute at the National High Magnetic Field Laboratory's Advanced Magnetic Resonance Imaging and Spectroscopy (AMRIS) Facility, which is supported by National Science Foundation Cooperative Agreement No. DMR-1157490 and DMR-1644779 and the State of Florida.

White Matter Changes In A Randomized Double-Blind Placebo- Controlled Trial Of Cranial Electrical Stimulation For Fibromyalgia In Veterans

Rowan Salls, Mark Vernon, Chanse Denmon, Christine Towler, Anna Ree, Jennifer Stevens, Sheila Rauch, Jessica Turner, Vitaly Napadow, and Anna Woodbury; Emory University

Our study aims to understand and identify white matter tracts to visualize neural changes and develop white matter tractography as a biomarker of pain and treatment response to Cranial Electrical Stimulation (CES). Subjects were randomized to a control group (n=25) or an experimental (n=25) auricular CES group. Participants in the CES group were given the Alpha-stim device to take home, which delivered CES for 60 minutes, while participants in the control group were given the placebo Alpha-stim device which does not deliver electrical stimulation. To determine brain correlates of CES-related treatment, diffusion MRI scans, self-reported pain scores, and function scores were evaluated at baseline, 6-, and 12-weeks post-treatment. Pain and function among veterans with fibromyalgia in both the CES experimental and control groups were significantly improved at 6 and 12 weeks of treatment. The diffusion data were reconstructed in MNI space using q-space diffeomorphic reconstruction (Yeh et al., Neuroimage, 58(1):91-9, 2011). Quantitative anisotropy (QA) was extracted as the local connectome fingerprint (LCF, Yeh et al. PLoS Comput Biol 12(11): e1005203) and used in the connectometry analysis. Diffusion MRI connectometry (Yeh et al. NeuroImage 125 (2016): 162-171) was used to derive correlational tractography of longitudinal changes in quantitative anisotropy (QA) correlated with which group the participant was in. The correlational tractography results showed a decrease in QA of white matter tracts in the experimental CES group compared to control in regions previously associated with pain such as the anterior cingulate cortex and insula. This suggests that while both groups experienced significant decreases in pain scores, experimental CES may work through a different neural mechanism that leads to neural plasticity and altered white matter connectivity. Funded in part by the US Department of Veterans Affairs Rehabilitation Research and Development Service Career Development Award, 1IK2RX003227 (Anna Woodbury), and Center Grant 5I50RX002358.

BOLD Functional Connectivity Associated With Alpha Power Decreases During Thermal Pain

Sarah Margerison, Brent Stewart, Andrew J. Furman, Michael L. Keaser, Darrah Spies, and David A. Seminowicz; University of Maryland Baltimore