Pain disrupts thalamic and nucleus accumbens functional connectivity in chronic widespread pain

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\textbf{Background:} Chronic widespread pain (CWP) such as fibromyalgia or is characterized by altered neural functional connectivity (fc) [1,2]. We investigated short-term neural plasticity in CWP by observing whether fc would change during resting state after a pressure-pain experience, and mainly expected changes in pain processing pathways.

\textbf{Methods:} Resting state fMRI was obtained from 38 CWP and 36 controls pre and post pain-stimulation session (10 min rest, 20 min pain, 10 min rest) at a Philips 3T Ingenia, SENSE coil, single-shot EPI gradient echo, TR/TE/FA/resolution = 2.2s/35ms/77°/3mm\textsuperscript{3}, cerebrum coverage. Preprocessing in SPM12 for realigned, normalized and smoothed images (8mm FWHM). A ROI-to-ROI fc analysis (with CONN-toolbox [3]) was employed to test for Pre-/PostPain and group effects, at p<0.05 FDR corrected.

\textbf{Results:} Group-independent Pre- vs PostPain fc disruptions were seen between thalamus and temporal regions, right hippocampus, left amygdala. PostPain fc disruptions specific to CWP were observed between left nucleus accumbens (NAc) and bilateral thalamus, cuneus and intercalcarine sulcus.

\textbf{Conclusions:} PostPain fc showed changed thalamic connections. The thalamus modulates pain information and shows decreased blood flow in fibromyalgia [4]. Specific to CWP was a PostPain fc decrease between NAcc and thalamus as well as occipital lobe. The NAc is part of the cortical-basal ganglia-thalamic loop, and affected in fibromyalgia in the form of a decrease in mu-opioid receptor availability [5]. Aberrant functioning of NAc in a mouse model of chronic pain was linked to decreased motivation [6], in line with the NAc role in integrating cognitive and affective information for action selection [7]. Depression is also associated with disrupted fc with the cuneus [8], alterations in thalamic fc have also been related to persisting depression [9] The results indicate that CWP experience enhanced negative effects of pain on affective processing pathways, spurring further analysis of the impact of depression and anxiety symptoms in CWP.