Altered resting state networks in Facial Pain

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Background: The default mode network (DMN) is a task-negative resting state network, consisting of the medial prefrontal cortex, angular gyrus, and posterior cingulate/precuneus brain regions that are functionally connected and associated with interoceptive thoughts and mind-wandering. During attentionally-demanding tasks, performance in task-related brain regions increases as the DMN is suppressed. In resting state neuroimaging, the participant rests awake in the MRI scanner with eyes closed. A data-driven analysis approach detects DMN connectivity. Previous research has shown altered functional connectivity in the DMN of chronic pain patients; however, there is a paucity of research on alterations of DMN within chronic facial pain populations.

Methods: 19 facial pain patients (14 Trigeminal Neuralgia, 5 Atypical Facial Pain) underwent resting state fMRI after completing the McGill Pain Questionnaire. A data-driven analysis (Independent Component Analysis) was conducted and neural activity within the default mode network was identified. Functional connectivity in the DMN component was covaried with the total McGill Pain ratings.

Results: As total pain scores increased, greater functional connectivity was observed within the bilateral anterior cingulate cortex (ACC), precuneus, and left superior temporal gyrus. Decreased functional connectivity was observed in the right insula, a key node in the salience network, as pain scores increased.

Conclusions: Consistent with previous research that has shown altered DMN functional connectivity in chronic pain populations, the present study provides evidence specific to a chronic facial pain population. Functional connectivity in the DMN of chronic facial pain patients is altered and varies in accordance with total pain ratings. The decreased functional connectivity observed in the insula indicates there may be inter-network connectivity changes in chronic facial pain patients.
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