

## **Effects of depression on chronic back pain mechanisms in the brain. Depression Affects the Brain Mechanisms of Chronic Back Pain**

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**INTRODUCTION:** High depression is associated with chronic pain conditions, and is thought to be a significant risk factor for onset of chronic back pain. Our fMRI (functional magnetic resonance imaging) studies show a clear involvement of medial prefrontal cortex (MPFC) in spontaneous pain fluctuations in chronic back pain patients. In addition, there is evidence that MPFC activity relates to levels of depression in chronic rheumatoid arthritis. Here we investigate interaction between depression and chronic pain specifically for MPFC connectivity to the rest of the brain.

**METHODS:** We obtained fMRI scans from twenty chronic low back pain subjects while rating spontaneous pain (pain runs) or a matched visual-motor rating task. The MPFC signal was regressed with activations in the whole brain before and after adding Beck Depression Inventory (BDI) scores and peak pain ratings to the model.

**RESULTS:** The time-course of MPFC activity correlated significantly with posterior insula during pain runs but not during matched visual runs. In addition, peak pain intensity significantly modulated connectivity between MPFC and posterior insula, cingulate and posterior parietal cortex. Furthermore, BDI scores were significantly linked with the correlation between MPFC and the posterior insula. When BDI contribution was covaried out, correlations between peak pain ratings and MPFC connectivity with posterior insula and other regions were no longer significant. **Conclusion:** These findings demonstrate that depression alters connectivity patterns of brain regions that underlie chronic pain.

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