

# MRI reveals relationship between depression and pain

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The brains of individuals with major depressive disorder appear to react more strongly when anticipating pain and also display altered functioning of the neural network that modifies pain sensitivity, according to a report in the November issue of *Archives of General Psychiatry*.

"Chronic pain and depression are common and often overlapping syndromes," the authors write as background information in the article. Recurring or chronic pain occurs in more than 75 percent of patients with depression, and between 30 percent and 60 percent of patients with chronic pain report symptoms of depression "Understanding the neurobiological basis of this relationship is important because the presence of comorbid pain contributes significantly to poorer outcomes and increased cost of treatment in major depressive disorder."

Irina A. Strigo, Ph.D., of the University of California San Diego, La Jolla, and colleagues studied 15 young adults with major depressive disorder (average age 24.5) who were not taking medication and 15 individuals who were the same age (average 24.3 years) and had the same education level but did not have depression. Patients with depression completed a questionnaire that evaluated their tendencies to magnify, ruminate over or feel helpless in the face of pain. All participants underwent functional magnetic resonance imaging (fMRI) while their arms were exposed to a thermal device heated to painful levels (an average of 46.4 degrees to 46.9 degrees Celsius, or about 115 degrees to 116 degrees Fahrenheit) and also to non-painful temperatures. Visual cues (a green shape for non-painful warmth and a red shape for painful warmth) were presented before the heat was applied.

Compared with the controls, patients with depression showed increased activation in certain areas of their brain—including the right amygdala—during the anticipation of painful stimuli.

They also displayed increased activation in the right amygdala and decreased activation in other areas, including those responsible for pain modulation (adjusting sensitivity to pain), during the painful experience.

To examine whether the activation of the amygdala was associated with passive coping styles, the researchers compared the percentage change in the activations of the amygdala with the helplessness, rumination and ramification reported by the participants with depression. "Significant positive correlations were observed in the major depressive disorder group between greater helplessness scores and greater activity in the right amygdala during the anticipation of pain," the authors write.

"The anticipatory brain response may indicate hypervigilance to impending threat, which may lead to increased helplessness and maladaptive modulation during the experience of heat pain," the authors write. "This mechanism could in part explain the high comorbidity of pain and depression when these conditions become chronic."

Source: JAMA and Archives Journals

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