

# I feel your pain: Neural mechanisms of empathy

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Is it possible to share a pain that you observe in another but have never actually experienced yourself? A new study uses a sophisticated brain-imaging technique to try and answer this question. The research, published by Cell Press in the January 29th issue of the journal *Neuron*, provides insight into brain mechanisms involved in empathy.

Brain-imaging studies have shown similar patterns of brain activity when subjects feel their own emotions or observe the same emotions in others. It has been suggested that a person who has never experienced a specific feeling would have a difficult time directly empathizing with a person through a "mirror matching" mechanism that requires previous experience and would instead have to rely on a higher inferential processes called "perspective taking."

"Patients with congenital insensitivity to pain (CIP) offer a unique opportunity to test this model of empathy by exploring how the lack of self-pain representation might influence the perception of others' pain," explains lead author Dr. Nicolas Danziger from the Department of Clinical Neurophysiology and Pain Center at the Pitie-Salpetriere in Paris, France.

Dr. Danziger and colleagues had previously shown that CIP patients underestimated the pain of others when emotional cues were lacking and, in contrast with control subjects, the ability to fully acknowledge others' pain depended on a capacity for empathy. In this study, the researchers used functional magnetic resonance imaging (fMRI) to

compare brain activation patterns in CIP patients and controls who were asked to imagine the feelings of a person in a photo that showed body parts in painful situations or facial expressions of pain.

CIP patients showed decreased fMRI activation of visual regions, a result indicative of their reduced emotional arousal to the view of others' pain. On the other hand, in the CIP patients but not the controls, the capacity for empathy strongly predicted activation of key midline brain structures involved in processes linked to inferring the emotional states of others.

These results suggest that in the absence of functional resonance mechanisms shaped by personal pain experiences, CIP patients might rely crucially on their empathetic abilities to imagine the pain of others, with activation of midline brain structures being the neural signature of this cognitive-emotional process.

"Our findings underline the major role of midline structures in emotional perspective taking and in the ability to understand someone else's feelings despite the lack of any previous personal experience of it—an empathetic challenge frequently raised during human social interactions," concludes Dr. Danziger.

Source: Cell Press

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