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Hypnotic susceptibility modulates brain activity related to experimental placebo analgesia.

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Abstract

Identifying personality traits and neural signatures that predict placebo responsiveness is important, both on theoretical and practical grounds. In the present functional magnetic resonance imaging (fMRI) study, we performed multiple-regression interaction analysis to investigate whether hypnotic susceptibility (HS), a cognitive trait referring to the responsiveness to suggestions, explains interindividual differences in the neural mechanisms related to conditioned placebo analgesia in healthy volunteers. HS was not related to the overall strength of placebo analgesia. However, we found several HS-related differences in the patterns of fMRI activity and seed-based functional connectivity that accompanied placebo analgesia. Specifically, in subjects with higher HS, the placebo response was related to increased anticipatory activity in a right dorsolateral prefrontal cortex focus, and to reduced functional connectivity of that focus with brain regions related to emotional and evaluative pain processing (anterior mid-cingulate cortex/medial prefrontal cortex); an opposite pattern of fMRI activity and functional connectivity was found in subjects with lower HS. During pain perception, activity in the regions reflecting attention/arousal (bilateral anterior thalamus/left caudate) and self-related processing (left precuneus and bilateral posterior temporal foci) was negatively related to the strength of the analgesic placebo response in subjects with higher HS, but not in subjects with lower HS. These findings highlight HS influences on brain circuits related to the placebo analgesic effects. More generally, they demonstrate that different neural mechanisms can be involved in placebo responsiveness, depending on individual cognitive traits.

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KEYWORDS: Humans; Hypnotisability; Pain; Pain anticipation; Placebo; fMRI

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