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Diffusion tensor imaging detects microstructural reorganization in the brain associated with chronic irritable bowel syndrome

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Summary

The current study involving patients with chronic visceral pain associated with irritable bowel syndrome demonstrates microstructural differences in the brain compared with healthy control subjects, indicative of long-term neural reorganization of chronic pain pathways and regions associated with sensory integration.

Abstract

Irritable bowel syndrome (IBS) is a common gastrointestinal disorder characterized by recurring abdominal pain associated with alterations in bowel habits. We hypothesized that patients with chronic visceral pain associated with IBS may have microstructural differences in the brain compared with healthy control subjects (HCs), indicative of long-term neural reorganization of chronic pain pathways and regions associated with sensory integration. In the current study we performed population-based voxel-wise diffusion tensor imaging (DTI) comparisons and probabilistic tractography in a large sample of phenotyped patients with IBS ($n = 33$) and in HCs ($n = 93$). Patients had lower fractional anisotropy (FA) in thalamic regions, the basal ganglia (BG) and sensory/motor association/integration regions as well as higher FA in frontal lobe regions and the corpus callosum. In addition, patients had reduced mean diffusivity (MD) within the globus pallidus (GP) and higher MD in the thalamus, internal capsule, and coronal radiata projecting to sensory/motor regions, suggestive of differential changes in axon/dendritic density in these regions. Sex differences in FA and MD were also observed in the patients but not in HCs. Probabilistic tractography in patients confirmed a higher degree of connectivity between the thalamus and prefrontal cortex, as well as between the medial dorsal thalamic nuclei and anterior cingulate cortex, and a lower degree of connectivity between the GP and thalamus. Together, these results support the hypothesis that patients with chronically recurring visceral pain from IBS have long-term microstructural changes within the brain, particularly in regions associated with integration of sensory information and corticothalamic modulation.

Keywords: [Diffusion Tensor Imaging](#), [DTI](#), [Irritable Bowel Syndrome](#), [IBS](#), [Chronic Pain](#), [Reorganization](#)

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