

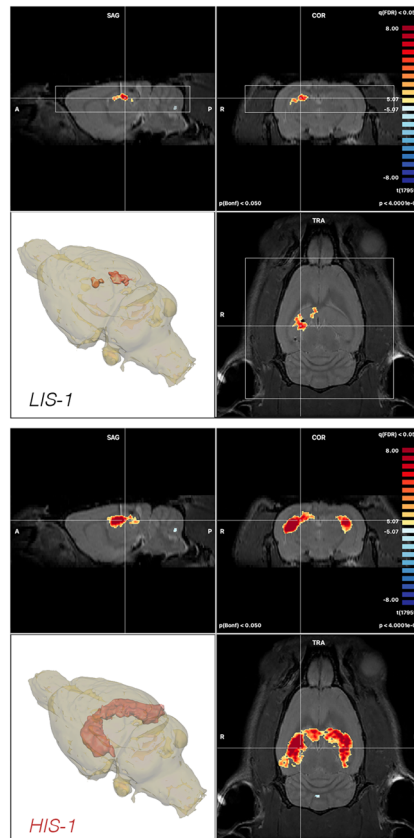
This Week in The Journal

Exploring the Nuances of fMRI

Alberto Arboit, Karla Krautwald, and Frank Angenstein

(see article [e0857262026](#))

Functional magnetic resonance imaging (fMRI) detects blood oxygen levels in different brain areas. Researchers interpret an increase in blood oxygen levels as an increase in neuron activity. In this issue, Arboit and colleagues discovered that fMRI measures may be a bit more nuanced than previously understood. The authors used both fMRI and in vivo electrophysiology in the male rat hippocampus as they stimulated a brain pathway that targets the hippocampus. Low-intensity stimulation of the pathway triggered consistent fMRI signals and neuron activity as recorded by in vivo electrophysiology. Furthermore, the electrophysiology data showed that the first pulse of low-intensity stimulation had longer lasting changes in neuron signal processing than later pulses of low-intensity stimulation. Additional pharmacology experiments suggested that these prolonged changes, in turn, increased fMRI measures of brain activity. When Arboit et al. delivered high-intensity stimulation followed by low-intensity stimulation, fMRI signals were weaker. In vivo electrophysiology recordings showed that, after high-intensity stimulation, the first low-intensity pulse no longer affected neuron signal processing. According to the authors, this work sug-



Visualization of the distribution of activated voxels in the hippocampal formation during the first of three low intensity stimulations (top panel) and the subsequent first high intensity stimulation (bottom panel). Bright insets show activated clusters. See Arboit et al. for more information.

gests that rather than measure general neuron activity, fMRI may point to changes in how brain systems process signals.

Linking an Age-Related Brain Change and Depression

Teodora Markova, Margo B. Heston, and Anne S. Berry

(see article [e2309252026](#))

During typical aging and Alzheimer's disease progression, higher levels of a protein called tau are associated with more depressive symptoms. Markova et al. explored the relationship between tau levels and depressive symptoms in older people with and without cognitive (memory, attention, and thinking) deficits that characterize Alzheimer's disease. The authors assessed data collected by the Alzheimer's Disease Neuroimaging Initiative from elderly men and women with and without cognitive issues. Participants had completed several tau-detecting imaging scans and questionnaires measuring depressive symptoms across multiple visits. Over time, the speed of tau buildup in participants regulated how quickly depressive symptoms rose in individuals with cognitive skills intact. Furthermore, in cognitively intact people, increased tau levels at earlier timepoints could predict higher scores in the depression test later on. Notably, none of these observations were found in individuals with Alzheimer's or even mild cognitive impairment. According to the research team, this work shows that early increases in tau levels during aging may contribute to the rise of depressive symptoms.

This Week in The Journal was written by Paige McKeon
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