

Schizophrenia study identifies shifts in patterns of glutamate and GABA in visuospatial working memory network

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A new study in *Biological Psychiatry* has characterized the patterns of brain neurotransmitters glutamate and GABA in a network of regions that temporarily maintain and process visual information about the location of objects in space, a cognitive ability referred to as visuospatial working memory. The study, conducted by researchers at the University of Pittsburgh, reports that the patterns are altered in people with schizophrenia, suggesting a potential explanation for the impairments in visuospatial working memory that characterize people with the disorder.

The new findings suggest that the precise balance between the excitatory, or "accelerator", and inhibitory, or "brake", neurotransmitters might be shifted in certain regions in [schizophrenia](#). Optimal function of visuospatial working memory requires a precise balance of the activity between glutamate and GABA, so the alterations may be what's leading to disrupted visuospatial working memory in the disorder.

In the study, first author Gil Hoftman, MD, Ph. D., and colleagues first mapped the normal levels of [gene products](#) involved in the production and use of glutamate and GABA in brain tissue from people unaffected by schizophrenia. They examined four regions of the cortex—the outermost layers of the brain where high level thinking takes place—that form the network responsible for visuospatial working memory. Levels of the gene products appeared in distinct patterns across the regions. Compared to the normal brain, the levels of the gene products were

altered in the [cortical regions](#) in schizophrenia—increased or decreased in some regions, and unchanged in others.

According to David Lewis, MD, who led the study, the results suggest two new insights into the brain mechanics of working memory and how it goes wrong in schizophrenia. "First, in the normal human brain, the relative weighting of markers of excitatory and inhibitory neurotransmission differ markedly across the distributed cortical network that mediates working memory," said Dr. Lewis. "Second, in schizophrenia this weighting is disrupted by [region](#)-specific alterations in markers of both excitatory and inhibitory neurotransmission," he added.

The findings suggest that multiple disruptions may occur as information passes through the different regions in the network. "This paper highlights that differences in the cortical abnormalities across [brain regions](#) may give rise to the profile of symptoms associated with schizophrenia," said Dr. John Krystal, Editor of *Biological Psychiatry*.

More information: Gil D. Hoftman et al, Altered Gradients of Glutamate and Gamma-Aminobutyric Acid Transcripts in the Cortical Visuospatial Working Memory Network in Schizophrenia, *Biological Psychiatry* (2017). [DOI: 10.1016/j.biopsych.2017.11.029](https://doi.org/10.1016/j.biopsych.2017.11.029)

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