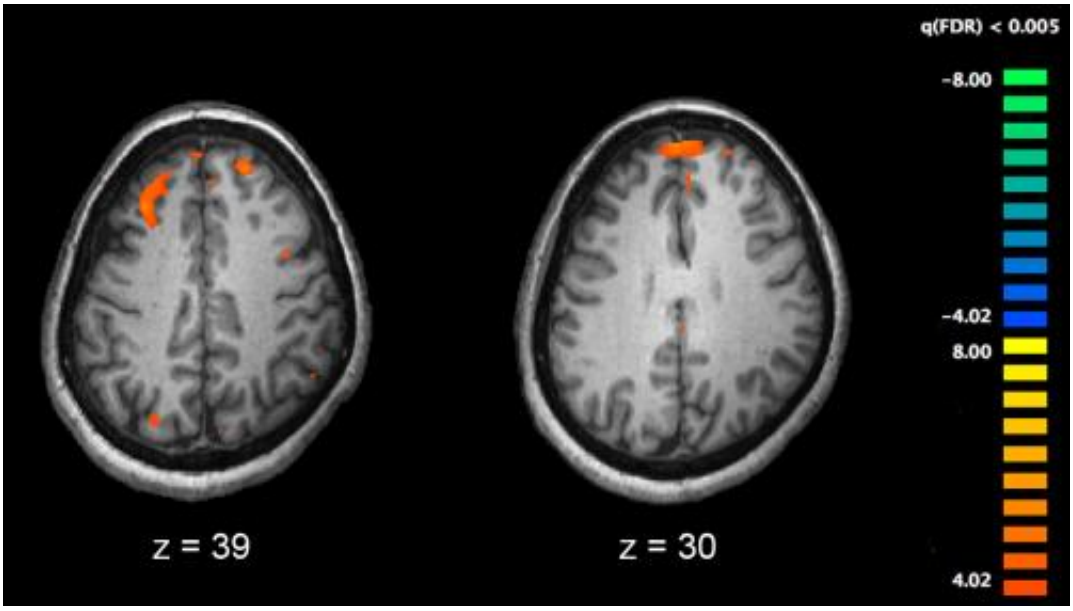
MedicalXpress

Researchers identify potential cause of schizophrenic symptoms

May 7 2015



Functional magnetic resonance imaging (fMRI) and other brain imaging technologies allow for the study of differences in brain activity in people diagnosed with schizophrenia. The image shows two levels of the brain, with areas that were more active in healthy controls than in schizophrenia patients shown in orange, during an fMRI study of working memory. Credit: Kim J, Matthews NL, Park S./PLoS One.

Schizophrenia affects millions of people worldwide but the cause of its wide-ranging symptoms remains largely unknown.

At Brandeis University, researchers believe they have discovered an

abnormality in the schizophrenic brain that could be responsible for many of the disease's symptoms and could provide a drug target for therapeutic treatments.

Led by John Lisman, the Zalman Abraham Kekst Chair in Neuroscience and professor of biology, the research team published their findings in a recent issue of the *Journal of Biological Psychiatry*. The paper was co-authored by Aranda Duan, Carmen Varela, Yuchun Zhang, Yinghua Shen, Lealia Xiong, and Matthew Wilson.

Unusual neural oscillations—brain waves—have long been associated with schizophrenia. The oscillations, called delta waves, are similar to slow oscillations seen in normal brains during sleep, but in schizophrenic brains, they occur during wakefulness. The connection between these oscillations and schizophrenic symptoms, particularly cognitive deficits such as memory impairment, has long been unclear.

Lisman and his team set out to understand that connection by artificially producing delta waves in mammalian brains using a new technique called optogenetics, which activates brain signals using light.

When the delta frequency light was turned on, Lisman observed disruption in the working memory of rats. When it was turned off, the rodents were once again able to perform working memory tasks. More important, Lisman and his team were able activate the abnormal oscillations only in a tiny subpart of the thalamus, a region of the brain that has long been a focus of schizophrenia research.

An information hub and relay center, the thalamus is central to working memory, sleep, consciousness and sensory-information processing.

"The oscillations produce an artificial signal that jams normal communication," Lisman says. "The part of the thalamus that is

supposed to carry information about working memory couldn't do the task at all with these sleep-like delta waves. We suspect the abnormal delta oscillations seen in patients with schizophrenia are producing a similar jamming of normal signals."

Delta waves require a specific type of ion channel called a T-type Ca channel. These channels are of particular interest because they are one of the few types of ion channel implicated in schizophrenia by genetic studies. The next step, Lisman says, is to figure out what kind of agents could be used to block these channels.

"If you could block these channels, you could block these bad oscillations," he says. "That may have therapeutic value in patients."

Provided by Brandeis University

Citation: Researchers identify potential cause of schizophrenic symptoms (2015, May 7) retrieved 3 May 2024 from https://medicalxpress.com/news/2015-05-potential-schizophrenic-symptoms.html