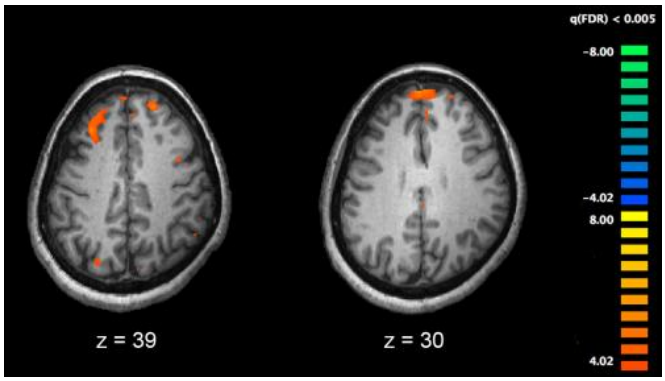
# MRI scans detect 'brain rust' in schizophrenia

7 December 2016




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.

A damaging chemical imbalance in the brain may contribute to schizophrenia, according to research presented at the American College of Neuropsychopharmacology Annual Meeting in Hollywood, Florida.

Using a new kind of MRI measurement, neuroscientists reported higher levels of oxidative stress in patients with schizophrenia, when compared both to healthy individuals and those with bipolar disorder.

"Intensive energy demands on brain cells leads to accumulation of highly reactive oxygen species, such as free radicals and hydrogen peroxide," according to the study's lead investigator, Dr. Fei Du, an Assistant Professor of Psychiatry at Harvard Medical School. In schizophrenia, excessive oxidation - which involves the same type of chemical reaction that causes metal to corrode into rust - is widely thought to cause inflammation and cellular damage. However, measuring this process in the living human brain has remained challenging.

Du and colleagues at McLean Hospital measured oxidative stress using a novel magnetic resonance spectroscopy technique. This technique uses MRI scanners to non-invasively measure brain concentrations of two molecules, NAD+ and NADH, that give a readout of how well the brain is able to buffer out excessive oxidants.

Among 21 patients with chronic schizophrenia, Du observed a 53% elevation in NADH compared to healthy individuals of similar age. A similar degree of NADH elevation was seen in newly diagnosed schizophrenia, suggesting that oxidation imbalance is present even in the early stages of illness. More modest NADH increases were also seen in bipolar disorder, which shares some genetic and clinical overlap with schizophrenia.

In addition to offering new insights into the biology of schizophrenia, this finding also provides a potential way to test the effectiveness of new interventions. "We hope this work will lead to new strategies to protect the brain from oxidative stress and improve brain function in schizophrenia," Du concludes.

Provided by American College of Neuropsychopharmacology