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MRI Scans Detect ‘Brain Rust’ in Patients With Schizophrenia

By Janice Wood

New research has discovered that a damaging chemical imbalance in the brain may contribute to schizophrenia.

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,” said 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 been a challenge.

Du and his 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 percent 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, according to the researchers.

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, according to Du.

“We hope this work will lead to new strategies to protect the brain from oxidative stress and improve brain function in schizophrenia,” he said.

The research was presented at the 2016 American College of Neuropsychopharmacology Annual Meeting in Hollywood, Florida.