

# Link exists between white matter and concussion-related depression, anxiety

December 3 2014, by Courtney Mccrimmon

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(Medical Xpress)—White matter brain abnormalities in some patients with depression disorders closely resemble abnormalities found in patients who have experienced a mild traumatic brain injury (mTBI), more commonly known as concussion, according to new research presented by University of Pittsburgh School of Medicine researchers this week at the annual meeting of the Radiological Society of North America (RSNA).

The researchers, who also studied anxiety in [concussion patients](#) who underwent imaging, believe determining these [white-matter](#) injuries also could help guide treatment in people who suffer such symptoms, whether they are due to trauma or not.

White matter in the [brain](#) is made up of long, finger-like fibers projecting from nerve cells and is covered by a whitish fatty material. While gray matter, the part of our brain without the fatty covering, holds our knowledge, white matter is what connects different regions of gray matter, allowing different parts of the brain to communicate with one another.

Over the past several years, cognitive consequences of concussion have dominated the news. Any association between concussion/mTBI and the development of psychiatric disorders hasn't garnered the same level of attention. Saeed Fakhran, M.D., assistant professor of radiology at Pitt and his team wanted to determine if a trauma to the brain could be found in imaging as an underlying cause of [depression](#) or anxiety in certain patients.

"We know that neuropsychiatric disorders like depression and anxiety can be as disabling as Alzheimer's dementia and [chronic traumatic encephalopathy](#), affecting a person's quality of life, and are often accompanied by higher rates of obesity, substance abuse and even suicide," said Dr. Fakhran. "We wanted to see if there were commonalities shared by patients with depression and anxiety disorders caused by [brain trauma](#) and those with non-traumatic depression."

For this study, Dr. Fakhran and his team examined MRI scans performed in 74 concussion patients from 2006-14 using an advanced technique called [diffusion tensor imaging](#). Diffusion tensor imaging allows doctors to visualize the white matter and look for places where the white matter may be injured, resulting in decreased connections in the brain and post-concussion symptoms. In patients with depression, researchers found injured regions in the reward circuit of the brain, which has also been found to be abnormal in patients with non-traumatic major depressive disorder. Greater injury to the reward center of the brain correlated with a longer recovery time, similar to patients with non-

traumatic major depressive disorder, the researchers said.

"Finding such similar injuries in mTBI patients with depression and [major depressive disorder](#) may suggest a common pathophysiology in both traumatic and non-traumatic depression that may help guide treatment," said Dr. Fakhran. "The first step in developing a treatment for any disease is understanding what causes it, and if we can prove a link, or even a common pathway, between post-traumatic depression and depression in the general population it could potentially lead to effective treatment strategies for both diseases."

While noting that continuing research is vital in this area, the researchers said their project was limited by its retrospective nature and moderate sample size. Because so few concussion patients undergo imaging, the researchers added that future, prospective research could benefit from following a larger group of patients. Moreover, their findings didn't include irritability, the third neuropsychiatric symptom they set out to study – causing them to determine that not all such post-concussion/mTBI symptoms appear to result in discrete white matter injuries. It also was difficult to determine, they said, if pre-existing brain abnormalities rendered certain patients more susceptible to depression or anxiety.

Provided by University of Pittsburgh

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