

Brain abnormalities found among those experiencing blast-related mild traumatic brain injury

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Left hemisphere of J. Piłsudski's brain, lateral view. Credit: public domain

Individuals with mild Traumatic Brain Injury (mTBI), particularly those who have had loss of consciousness (LOC), show structural brain abnormalities in their white matter as measured by Diffusion Tensor Imaging (DTI).

These findings, which appear in the journal *NeuroImage: Clinical*, is the only study to date to demonstrate that mTBI with LOC is associated with brain abnormalities that lead to decreased performance in verbal memory.

Blast-related TBI has been a common injury among returning troops due to the widespread use of improvised explosive devices in the Iraq and Afghanistan wars. As most of the TBIs sustained are in the mild range, brain changes may not be detected by standard clinical imaging techniques such as CT. Furthermore, the functional significance of these types of injuries is currently being debated. However, accumulating evidence suggests that DTI is sensitive to subtle white matter abnormalities and may be especially useful in detecting mTBI.

In this study the researchers recruited three groups: a control group with no TBI; a TBI group without LOC and a TBI group with LOC. The study subjects underwent TBI, PTSD and neuropsychological assessments, including tests for executive function and memory along with MRI and DTI imaging. The researchers found that individuals even with mild forms of TBI, particularly when they've experienced LOC, showed unhealthy brain abnormalities, which in turn could be related to poor memory.

"Our hope is that this study will make clear that mTBI, to a greater extent than PTSD, is associated with [white matter](#) abnormalities and thus cognitive changes and other negative outcomes cannot be entirely attributed to mental health disorders," explained corresponding author Jasmeet Pannu Hayes, PhD, assistant professor of psychiatry at Boston University School of Medicine and a research psychologist at the National Center for PTSD at the VA Boston Healthcare System. "We also hope that our study will highlight the usefulness of [diffusion tensor imaging](#) in detecting blast-related mTBI, particularly as TBI from this injury mechanism has become more common in recent years with the

increased use of improvised [explosive devices](#)," she added.

Since the relationship between the observed [brain abnormalities](#) and adverse long-term outcomes such as neurodegenerative disease (e.g. chronic traumatic encephalopathy, Alzheimer's disease) is not clear, the researchers believe it would be important to assess and monitor individuals with mTBI with LOC to help support their cognitive functioning and keep abreast of greater-than-expected cognitive decline.

Provided by Boston University Medical Center

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