

Mild blast injury causes molecular changes in brain akin to Alzheimer, team says

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A multicenter study led by scientists at the University of Pittsburgh School of Medicine shows that mild traumatic brain injury after blast exposure produces inflammation, oxidative stress and gene activation patterns akin to disorders of memory processing such as Alzheimer's disease. Their findings were recently reported in the online version of the *Journal of Neurotrauma*.

Blast-induced [traumatic brain injury](#) (TBI) has become an important issue in [combat casualty care](#), said senior investigator Patrick Kochanek, M.D., professor and vice chair of [critical care medicine](#) and director of the Safar Center for Resuscitation Research at Pitt. In many cases of mild TBI, MRI scans and other conventional imaging technology do not show overt damage to the brain.

"Our research reveals that despite the lack of a lot of obvious neuronal death, there is a lot of molecular madness going on in the brain after a blast exposure," Dr. Kochanek said. "Even subtle injuries resulted in significant alterations of [brain chemistry](#)."

The research team developed a rat model to examine whether mild blast exposure in a device called a shock tube caused any changes in the brain even if there was no indication of direct cell death, such as bleeding. Brain tissues of rats exposed to blast and to a sham procedure were tested two and 24 hours after the injury.

Gene activity patterns, which shifted over time, resembled patterns seen

in neurodegenerative diseases, particularly Alzheimer's, Dr. Kochanek noted. Markers of inflammation and oxidative stress, which reflects disruptions of cell signaling, were elevated, but there was no indication of energy failure that would be seen with poor tissue oxygenation.

"It appears that although the neurons don't die after a mild injury, they do sustain damage," he said. "It remains to be seen what multiple exposures, meaning repeat concussions, do to the brain over the long term."

Provided by University of Pittsburgh Schools of the Health Sciences

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