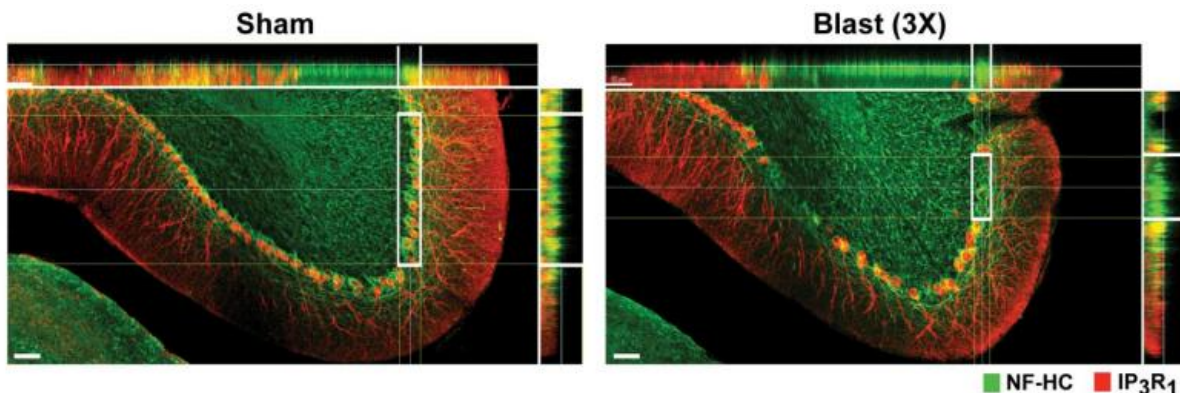


Repetitive blast exposure causes cerebellar dysfunction in combat veterans

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Purkinje cell loss increases with the number of blast exposures in mice. Representative confocal images of cerebellar lobule 9 in sham- and 3× blast-treated mice 30 days after treatment, immunostained for neurofilament heavy chain (NF-HC)-positive basket cells (green) and IP3R1- positive Purkinje cells (red). Credit: Meabon et al., Science Translational Medicine (2016)

Mild traumatic brain injury (mTBI) has been called the signature injury of the wars in Iraq and Afghanistan. Worldwide, more than a quarter million U.S. military have been diagnosed with mTBI. Numerous reports show that many veterans exposed to explosions have suffered mTBIs, but exactly how their brains are affected has been unclear.

A team of [brain](#) injury experts led by researchers at the VA Puget Sound Health Care System and the University of Washington have found that

the more blasts [veterans](#) are exposed to, the more they show chronic changes in neuron activity in specific brain regions. They also found that in mild blast-exposed mice, neurons are lost in the same brain regions; and that the pattern of loss is similar to findings in retired boxers that were seen more than 40 years ago.

Their findings, "Repetitive Blast Exposure in Mice and Combat Veterans Causes Persistent Cerebellar Dysfunction," published in *Science Translational Medicine* January 13 are helping to uncover the mysteries of how [combat veterans](#) have been injured by repetitive blast exposure. These results can help guide the search for more effective treatments, said the researchers.

"There is a huge gulf separating our understanding of what kind of brain injuries develop because of mild blast and how they relate to the neuroimaging changes many research groups have detected," said Dr. David Cook, VA scientist and UW research associate professor of medicine and pharmacology "The similarities we see in the pattern of neuron injury in the cerebellum of mice, the neuron loss previously seen in boxers, and our neuroimaging findings in veterans is a step toward reducing this knowledge gap."

Study author Dr. Elaine Peskind, co-director of the Mental Illness Research, Education, and Clinical Center at VA Puget Sound, said TBI and PTSD are the invisible wounds of war and that 75 percent of the mTBI patients she treats also have PTSD. Although the cerebellum is best known as the part of the brain which coordinates movements, researchers now believe that the cerebellum can also influence a person's emotional state. "Problems with mood, irritability, and impulsivity are very common in our mTBI veterans," said Peskind "These findings suggest we should pay more attention to how mTBI affects the cerebellum if we want to fully understand the emotional difficulties experienced by veterans with mTBI."

First author, Dr. James Meabon, VA scientist and UW acting assistant professor of psychiatry and behavioral sciences, is a U.S. Army veteran infantryman and said that he is determined to help veterans. "Something is going on with them that they don't understand and at this point, neither do we. We have a lot of work ahead, but these results are a step in the right direction," he said.

More information: "Repetitive blast exposure in mice and combat veterans causes persistent cerebellar dysfunction," [DOI: 10.1126/scitranslmed.aaa9585](https://doi.org/10.1126/scitranslmed.aaa9585)

Provided by University of Washington

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