

Do veterans who experience concussions have an increased risk of Alzheimer's?

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Middle-age veterans who experienced concussions due to blasts from explosive devices may have biomarkers in their spinal fluid similar to people who develop Alzheimer's disease, according to a new study

published in the March 13, 2024, online issue of *Neurology*.

Traumatic brain injury (TBI) is caused by a bump, blow or jolt to the head or by an injury to the head caused by falls, motor vehicle crashes, assaults or in [military personnel](#), blast and impact injuries.

Mild TBI, also known as a concussion, is when a person may lose or have an alteration of consciousness. A loss of consciousness is brief, lasting anywhere from moments to up to 30 minutes.

"Previous research has shown that moderate to severe traumatic brain injuries may increase a person's risk of Alzheimer's disease," said study senior author Elaine Peskind, MD, of the Northwest Mental Illness Research, Education and Clinical Center at the VA Puget Sound Health Care System and the University of Washington School of Medicine in Seattle.

"What is lesser known is whether mild traumatic brain injuries from military training and combat may also increase a person's risk. Our study found that these concussions may indeed increase a person's risk of Alzheimer's disease."

The study involved 51 veterans who experienced concussion from at least one war zone blast or a combination of blast and impact injuries. They were compared to 85 veterans and civilians who had never experienced a TBI. Participants had an average age of about 35, and all but one participant were male.

People in the concussion group experienced an average of 20 blast concussions and an average of two impact concussions each.

All participants took thinking and [memory tests](#). They also had lumbar punctures to collect cerebrospinal fluid. Researchers measured levels of

amyloid-beta and tau in the spinal fluid, biomarkers that can be early signs of Alzheimer's disease.

Researchers found with increasing age, those with blast concussion had lower levels of amyloid beta, both A β 42 and A β 40, in the spinal fluid than the group without concussion. At age 50, those with blast concussion had A β 42 levels an average of 154 picograms per milliliter (pg/mL) lower than the group without concussion; A β 40 levels in those with [blast](#) concussion were 1,864 pg/mL lower than the group without concussion.

The results were unchanged with the presence of the APOE- ϵ 4 allele, a genetic risk factor for Alzheimer's disease. Researchers did not find a difference in spinal fluid tau levels between the two groups.

Peskind noted, "A reduction in the levels of A β 42 in the spinal fluid had been shown in other studies to be a marker of amyloid accumulation in the brain, reflecting one of the earliest steps in the development of Alzheimer's disease. The levels we saw in this study began at around age 45, approximately 20 years earlier than is seen in the general population."

Researchers also found that lower levels of spinal fluid amyloid were associated with poorer performance on memory and thinking tests at older ages.

At age 50, for a trail-making test where participants connect a series of dots as quickly as possible while remaining accurate, the average time for the group with concussions was 34 seconds longer than the group without concussions. In addition, on a test that measures verbal memory and includes asking people to recall words after a 20-minute delay, those with concussion scored an average 4.2 points lower than those without concussion. Those with concussion scored 8.8 points compared to those

without [concussion](#) with 13.1 points.

"Our data show that biomarkers in the [spinal fluid](#) associated with concussions from blasts share some properties with the processes that lead to Alzheimer's disease later in life," said Peskind. "While our research does not fully address whether veterans who experience these injuries will develop Alzheimer's disease, it raises the possibility that they may be on a pathway leading to dementia."

A limitation of the study was that the study group was young and had a small number of participants older than 45, an age well before the process underlying Alzheimer's disease typically begin to emerge. Li said longer studies with more participants are needed that incorporate scans that measure amyloid levels in the brain.

More information: Ge Li et al, CSF β -Amyloid and Tau Biomarker Changes in Veterans With Mild Traumatic Brain Injury, *Neurology* (2024). DOI: 10.1212/WNL.0000000000209197 , www.neurology.org/doi/10.1212/WNL.0000000000209197

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