

Study finds biomarker of CTE in some former athletes with multiple concussions

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In a group of former professional athletes who experienced multiple concussions, a new study has found that approximately half the group had higher than normal levels of a protein called tau in their

cerebrospinal fluid, the fluid surrounding the brain and spine. The study is published in the May 8, 2019, online issue of *Neurology*, the medical journal of the American Academy of Neurology.

Tau has been linked to chronic traumatic encephalopathy (CTE), a rare, degenerative brain disease most likely caused by repeated head trauma. People with CTE may develop symptoms like dementia, personality disorders or behavior problems.

The study also found that the athletes who had higher levels of tau scored lower than the athletes with normal levels of tau on a test that measures thinking skills, and brain scans showed the [white matter](#) in their brains was not as healthy. White matter is composed of [nerve fibers](#) that send signals throughout the brain.

"Previous research has shown a link between former professional athletes who suffer multiple concussions and a diagnosis of CTE after death, however we wanted to find a marker of CTE that can be measured while someone is still alive and then see if it related to loss of brain function," said study author Maria Carmela Tartaglia, MD, FRCPC, of the University of Toronto in Canada and a member of the American Academy of Neurology. "Tau has been linked to a higher risk of CTE in the past and our study found higher levels of this protein in the [cerebrospinal fluid](#) of some of the former athletes."

The study involved 22 Canadian male former professional athletes with an average age of 56, including 12 Canadian Football League players, nine hockey players and one snowboarder. They were compared to 12 people with Alzheimer's disease and five healthy individuals.

The athletes all had a history of multiple concussions. All of the participants had tests to determine the amount of tau in their cerebrospinal fluid. The athletes also had [brain](#) imaging scans,

examinations, and tests of thinking, memory and decision-making.

Of the former athletes, 12 out of 22 had high levels of total tau, or 54 percent. The athletes with high levels of tau had higher levels than the [healthy people](#), but lower than the people with Alzheimer's disease. The definition of high tau was a level of more than 300 picograms per milliliter (pg/ml). The athletes had levels of 349 pg/ml, while the healthy participants had levels of 188 pg/ml. The people with Alzheimer's disease had levels of 857 pg/ml.

On the test of executive functioning, which are skills such as paying attention, organizing, planning and prioritizing, the athletes with high tau levels scored lower than the athletes with normal levels of tau, with scores of 46 compared to 62.

The researchers did not find any difference in the number of concussions or the number of years played between the athletes with high levels of tau and the athletes with normal levels.

Tartaglia said, "The findings support the idea that multiple concussions or head impacts put some people at risk of developing neurodegeneration which is the progressive loss of nerve cells, and possibly CTE, and this may be detected by measuring cerebrospinal fluid tau. It also highlights the importance of finding a biomarker of CTE that can be measured while someone is alive, since currently a CTE diagnosis can only be determined in an autopsy, and not all players who suffered multiple concussions had elevated tau."

Limitations of the study include the small number of participants and the lack of women in the former athletes group.

Provided by American Academy of Neurology

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