

# Study finds certain concussions may lead to cognitive changes

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A study of former National Football League players led by neurologists and neuropsychologists at the Center for BrainHealth at The University of Texas at Dallas and The University of Texas Southwestern Medical Center has found cognitive and structural brain changes in athletes with a history of concussion who experienced loss of consciousness.

Researchers, including UT Dallas professors from the School of Behavioral and Brain Sciences, say their novel study, published online in *JAMA Neurology*, identified for the first time a correlation between [concussion](#) severity, hippocampal volume and [memory performance](#). Results show the hippocampus, a part of the brain involved in [memory](#), was found to be smaller in the aging NFL players who had memory complaints and who experienced loss-of-consciousness concussions as compared to a control group of men of similar age and education. The former NFL players were also found to have lower verbal memory performance.

"This is a preliminary study, and there is much more to be learned in the area of concussion and cognitive aging," said Dr. Munro Cullum, professor of psychiatry and neurology and neurotherapeutics at UT Southwestern, a co-author of the study. "While we found that aging individuals with a history of concussion and loss of consciousness showed smaller hippocampal volumes and lower memory test scores, the good news is that we did not detect a similar relationship among subjects with a history of concussion that did not involve loss of consciousness, which represents the vast majority of concussions."

In the study, 28 ex-NFL players, ranging in age from 36 to 79, underwent structural MRI and detailed neurologic and neuropsychological assessments beginning in 2010. Researchers also gathered detailed retrospective histories of concussion experiences. Twenty-one healthy men of similar age, educational level and intelligence

with no history of concussion or professional football experience served as control subjects. Study authors found that after age 63, athletes who reported a loss-of-consciousness concussion were significantly more likely to have mild cognitive impairment, a preclinical stage of Alzheimer's disease.

"We know that traumatic brain injury can negatively affect memory and has also been reported as a risk factor for Alzheimer's disease and other dementias," said Dr. John Hart Jr., Medical Science Director at the Center for BrainHealth and Distinguished Chair in Neuroscience and the Jane and Bud Smith Distinguished Chair, and study co-author. "What we have not known before is how loss of consciousness affects brain function longitudinally. While the sample size for this study was small, it does illustrate the need for continual monitoring of athletes following a concussion."

**More information:** "Imaging Correlates of Memory and Concussion History in Retired National Football League Athletes." *JAMA Neurol.* Published online May 18, 2015. [DOI: 10.1001/jamaneurol.2015.0206](#)

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