

# Disease caused by repeat brain trauma in athletes may affect memory, mood, behavior

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New research suggests that chronic traumatic encephalopathy (CTE), a brain disease associated with repeat brain trauma including concussions in athletes, may affect people in two major ways: initially affecting behavior or mood or initially affecting memory and thinking abilities. The study appears in the August 21, 2013, online issue of *Neurology*, the medical journal of the American Academy of Neurology. CTE has been found in amateur and professional athletes, members of the military and others who experienced repeated head injuries, including concussions and subconcussive trauma.

"This is the largest study to date of the clinical presentation and course of CTE in autopsy-confirmed cases of the disease," said study author Robert A. Stern, PhD, a professor of neurology and neurosurgery at Boston University School of Medicine. "However, the overall number of cases in the study is still small and there may be more variations in CTE than described here."

For the study, scientists examined the brains of 36 male [athletes](#), ages 17 to 98, diagnosed with CTE after death, and who had no other brain disease, such as Alzheimer's. The majority of the athletes had played amateur or professional football, with the rest participating in hockey, wrestling or boxing.

The participants' family members were interviewed about the athletes' life and medical history, specifically dementia, changes in thinking, [memory](#), behavior, [mood](#), motor skills or ability to carry out daily living

tasks. Researchers also reviewed the athletes' medical records.

A total of 22 of the athletes had behavior and mood problems as their first symptoms of CTE, while 11 had memory and thinking problems as their first symptoms. Three of the athletes did not show any symptoms of CTE at the time of death.

Those with behavior and mood problems experienced symptoms at a younger age, with the first symptom appearing at an average age of 35, compared to an average age of 59 for those with memory and thinking problems.

Almost all people in the mood/behavior group, or 91 percent, experienced symptoms of memory and thinking decline at some point, but fewer in the cognition group experienced mood and behavior symptoms throughout their disease, with 55 percent experiencing [behavior](#) symptoms and 64 percent experiencing mood symptoms at some point.

The group that experienced mood symptoms was more explosive, out of control, physically and verbally violent and depressed than the group that experienced memory and thinking deficits, with family members reporting that 73 percent of those in the first group were "explosive," compared to 27 percent in the second group.

A total of 64 percent of the first group were described as being "out of control," compared to 27 percent of the second group, and 68 percent were physically violent, compared to 18 percent. A total of 74 percent were verbally violent, compared to 18 percent. And 86 percent had depression, compared to 18 percent of those with memory symptoms.

Stern noted that the findings also should be viewed with caution, as there was no comparison group of former athletes without CTE in the study.

In addition, families choosing to participate in the study may have been more likely to witness more severe symptoms than those not participating, which could have affected the results. Stern also added that these findings suggest that the diagnosis of dementia in older individuals with a history of repeat [brain trauma](#) may be difficult because many of the [symptoms](#) of CTE are similar to other diseases such as Alzheimer's.

Provided by American Academy of Neurology

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