

[HEALTH NEWS](#)

Brain scans on former NFL players detect abnormal proteins found in CTE

Scientists caution that using PET scans to diagnose CTE is still 'a long ways away', but note that this discovery opens the door for more research.



Katherine Brearley, mother of the late Owen Thomas, a former University of Pennsylvania football player, holds her son's high school football helmet after testifying before the House Education and Labor Committee about the Protecting Student Athletes from Concussions Act on Capitol Hill Sept. 23, 2010. Brearley said that a posthumous diagnosis of Chronic Traumatic Encephalopathy in Owen's brain may have caused depression and lead to his suicide. Chip Somodevilla / Getty Images file

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By Shamard Charles, M.D.

An experimental brain scan can now detect abnormal proteins in the brains of living former NFL players affected by chronic traumatic encephalopathy.

The study, conducted by a team of researchers in Boston and Arizona, used positron emission tomography scans in a small group of former NFL players with persistent cognitive, mood and behavioral symptoms such as depression, rage and memory loss characteristic of CTE.



[College football star who died by suicide had CTE](#)

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They found that tau – the abnormal protein that forms after the destruction of normal brain matter – was present at significantly higher levels on the PET scans of the 26 players, compared to those who had not participated in contact sports or experienced symptoms. The tau deposits were also seen in the same specific areas, in the same general pattern, of previously studied brains diagnosed with CTE on autopsy. Notably, the scientists found no relationship between the amount of tau seen on the PET scans and the severity of behavior and mood symptoms or performance on cognitive tests. The results of the study were published Wednesday in the [New England Journal of Medicine](#).

This isn't the first time tau has been found in a living human being. In 2017, doctors found a unique pattern of [CTE in the brain of former Minnesota Vikings linebacker Fred McNeill](#). But doctors were unsure if this was a finding specific to McNeil or if this was a trend among players who exhibited CTE symptoms – so they performed more tests.

“The results of this study provide initial support for the flortaucipir PET scan to detect abnormal tau from CTE during life,” said lead author Robert Stern, professor of neurology, neurosurgery, and anatomy and neurobiology at the Boston University School of Medicine.

“This is an exciting development because it's the first step in helping us answer many of the questions we have regarding the disease, such as why do some people get it and some others do not? What are some of the risk factors? The protective factors? And most importantly, how do we prevent it,” Stern said.

Co-author Dr. Eric Reiman, executive director of the Banner Alzheimer’s Institute in Phoenix, added that the results of the study provide further evidence that CTE differs from Alzheimer’s disease and that more research needs to be done to discern the impact of contact sports on the development of CTE.

“Our findings suggest that mild cognitive, emotional and behavioral symptoms observed in athletes with a history of repetitive impacts are not attributable to AD, and they provide a foundation for additional research studies to advance the scientific understanding, diagnosis, treatment, and prevention of CTE in living persons,” Reiman said in a statement.

CTE is a neurodegenerative disease found most commonly in athletes with a history of repetitive brain injuries, including symptomatic concussions as well as asymptomatic subconcussive hits to the head that do not cause symptoms. Traumatic brain injuries, including concussions and repeated blows to the head, can lead to a buildup of abnormal proteins that kill brain cells, according to [the Centers for Disease Control and Prevention](#). The blows don't necessarily have to be high impact and the symptoms usually don't appear until years after they occur. Currently, there is no way to predict if or when someone will develop CTE and a diagnosis can only be made after someone has died.

Like Alzheimer’s, CTE has been suggested to be associated with a progressive loss of brain cells, but in contrast to Alzheimer’s, the diagnosis of CTE is based in part on a pattern of tau deposits and a relative lack of amyloid plaques, commonly found in Alzheimer’s patients.

Many scientists believe that repeated blows to the head increases the risk for developing CTE. Combat veterans and athletes in rough contact sports such as football and boxing are among those thought to be the most at risk. In fact, a 2017 [study](#) found that the [brains of 110 out of 111 former NFL players had CTE](#).

Stern says that CTE's existence has been known since the 1920s but it was initially called punch drunk syndrome, because it classically affected boxers. In 2002, Mike Webster, a deceased ex-Pittsburgh Steeler, was the first player to be diagnosed with CTE. Since then, Stern and his team have worked on ways to diagnose the condition while players are living. Stern notes that great progress has been made in CTE research, but cautions that using PET scans to diagnose CTE is still not in the imminent future as more research needs to be done to replicate and expand the study's findings.

“We’re not there yet,” Stern told NBC News. “These results do not mean that we can now diagnose CTE during life or that this experimental test is ready for use in the clinic. Maybe I’m being cautious, but we are a ways away from using this technology in a clinically meaningful way.”

Stern, who has researched CTE for the past 11 years, hopes that looking at the brains of high school, college and professional athletes who suffer from classic CTE symptoms such as irritability, depression, rage and erratic behavior may help discover the extent of the incurable disease, help assess and limit the potential damage done, and provide an opportunity to test potential treatments.

“Me and 50 co-researchers around the world are conducting further research, the DIAGNOSE CTE project, and our primary goal is to develop and refine methods of diagnosing CTE during life,” Stern said. “We plan to examine the course of the disease over a three-year period and to assess risk factors including genetics and exposures to repetitive head injuries. And when we’re done, we plan to share our vast data to different researchers around the world.”

The results of the National Institutes of Health-funded DIAGNOSE CTE follow-up study are expected to be released in 2020.



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