PREMIUM HEALTH

A New Discovery Could Finally Make It Possible to Diagnose CTE

For decades, doctors have only been able to confirm the brain disease after death. Now, two studies point to a blood biomarker that could help change that.



Two new studies have identified a potential blood biomarker for chronic traumatic encephalopathy (CTE), a brain disease linked to repeated head impacts. The findings could bring researchers closer to diagnosing the condition in living patients for the first time.

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There is no way to definitively diagnose chronic traumatic encephalopathy (CTE) in a living person. The neurodegenerative disease, linked to repeated head impacts, can only be confirmed by examining the brain after death. But two new studies have identified a potential blood biomarker that could bring researchers closer to diagnosing CTE in living patients.

The need for such a test is substantial. An **October study** estimated that nearly three-quarters of former NFL players who died between 2008 and 2023 had CTE.

at the University of California, San Francisco Memory and Aging Center. “People who have had trauma also have a higher risk of Alzheimer's disease and Parkinson's and all the other protein aggregation disorders.”

Like Alzheimer’s, CTE is associated with abnormal accumulations of a protein called tau, which normally helps support nerve cells. When tau forms tangles in the brain, it can damage these cells and contribute to cognitive problems.

Although it’s not considered a gold-standard biomarker for Alzheimer’s, **a 2025 study** showed eMTBR-tau, a protein found in blood, was associated with Alzheimer’s-related tau tangles in the brain. What they didn’t know was whether that protein was also associated with CTE.

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In a **November 13 study** involving 229 participants, researchers compared blood samples collected during life with brain examinations performed after death. They found elevated eMTBR-tau levels in people with advanced CTE, although only 11 participants had both an autopsy-confirmed diagnosis and blood samples available for analysis. A **November 19 study** from a separate research team reported similar findings in 21 former football players.

(*Learn more about the race to develop a CTE Test for football players.*)

The protein was highest in participants who also had Alzheimer’s-related brain changes. But even among those without Alzheimer’s, eMTBR-tau levels were nine times higher in participants with advanced CTE than in those without CTE. That comparison, however, involved just 11 participants with advanced CTE and three without the disease.

More research is needed before eMTBR-tau is officially considered a biomarker for CTE. For one, in these studies eMTBR-tau was detected in advanced-stage CTE, not earlier stages. And, looking at known neurodegenerative biomarkers in conjunction with eMTBR will be necessary to rule out Alzheimer’s and zero in on CTE. Still, the findings represent a potential step toward identifying CTE-related brain changes while a patient is alive—something researchers have long struggled to do.

researchers will need to test it in larger, more diverse groups to determine how accurately it identifies CTE and distinguishes it from other neurodegenerative diseases.

Although the disease cannot currently be definitively diagnosed during life, **a 2024 study** found that roughly one in three former NFL players surveyed believed they had it.

“We've seen that guys who think that they have CTE are more likely to think about harming themselves and suicide,” says **Rachel Grashow**, the director of research initiatives and co-principal investigator for the Football Players Health Study at Harvard University.

That makes it especially important to understand what a potential blood test can—and cannot—tell patients.

“The identification of a biomarker like this is very exciting and potentially very, very useful,” adds Grashow’s colleague **Marc Weisskopf**, an epidemiologist at Harvard. “It’s just that we really want the research to come before the conclusions...I just hope we can do the research on it before people jump to ‘I've got CTE in my blood and therefore I have dementia.’”

(***What are the early warning signs of CTE? New clues emerge***.)

Still, as researchers continue to work toward diagnosing CTE in living patients, pharmaceutical companies may move to develop anti-tau therapeutics that could be useful for multiple neurodegenerative diseases, says **Kanta Horie**, a neuroscientist at Washington University in St. Louis and a researcher on one of the studies.

But for patients, the hope is more immediate: understanding what is causing their symptoms.

“If you have thinking and memory or behavior changes, I think it’s our job as neurologists to explain why,” Vandevrede says. “And this is another tool in our toolbox that can increase that certainty.”

Helen Bradshaw is a freelance science writer based in Florida. She reports on wildlife and health for National Geographic.

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