From scientist to salesman

How Bennet Omalu, doctor of 'Concussion' fame, built a career on distorted science

(Sarah L. Voisin/The Washington Post)

By **Will Hobson** Jan. 22, 2020

In 2017, Bennet Omalu traveled the globe to accept a series of honors and promote his autobiography, "Truth Doesn't Have A Side."

In a visit to an Irish medical school, he told students he was a “nobody” who “discovered a disease in America’s most popular sport.”

In an appearance on a religious cable TV show, he said he named the disease chronic traumatic encephalopathy, or CTE, because “it sounded intellectually sophisticated, with a very good acronym.”

And since his discovery, Omalu told Sports Illustrated, researchers have uncovered evidence that shows adolescents who participate in football, hockey, wrestling and mixed martial arts are more likely to drop out of school, become addicted to drugs, struggle with mental illness, commit violent crimes and kill themselves.

A Nigerian American pathologist portrayed by Will Smith in the 2015 film, “Concussion,” Omalu is partly responsible for the most important sports story of the 21st century. Since 2005, when Omalu first reported finding widespread brain damage in a former NFL player, concerns about CTE have inspired a global revolution in concussion safety and fueled an ongoing existential crisis for America’s most popular sport. Omalu’s discovery — initially ignored and then attacked by NFL-allied doctors — inspired an avalanche of scientific research that forced the league to acknowledge a link between football and brain disease.

Nearly 15 years later, Omalu has withdrawn from the CTE research community and remade himself as an evangelist, traveling the world selling his frightening version of what scientists know about CTE and contact sports. In paid speaking engagements, expert witness testimony and in several books he has authored, Omalu portrays CTE as an epidemic and himself as a crusader, fighting against not just the NFL but also the medical science community, which he claims is too corrupted to acknowledge clear-cut evidence that contact sports destroy lives.

After more than a decade of intensive research by scientists from around the globe, the state of scientific knowledge of CTE remains one of uncertainty. Among CTE experts,

many important aspects of the disease — from what symptoms it causes, to how prevalent or rare it is — remain the subject of research and debate.

But across the brain science community, there is wide consensus on one thing: Omalu, the man considered by many the public face of CTE research, routinely exaggerates his accomplishments and dramatically overstates the known risks of CTE and contact sports, fueling misconceptions about the disease, according to interviews with more than 50 experts in neurodegenerative disease and brain injuries, and a review of more than 100 papers from peer-reviewed medical journals.

Omalu did not discover CTE, nor did he name the disease. The alarming statistics he recites about contact sports are distorted, according to the author of the studies that produced those figures. And while Omalu cultivates a reputation as the global authority on CTE, it's unclear whether he is diagnosing it correctly, according to several experts on the disease.

The Science and Selling of CTE

This year, The Washington Post is examining the state of CTE research and the people promoting — and, in some cases, profiting from — their views of this growing field of brain science.

Omalu's definition for CTE, as described in his published papers, is incredibly broad and all-encompassing, describing characteristics that can be found in normal, healthy brains, as well as in other diseases, according to experts including Ann McKee, lead neuropathologist for Boston University's CTE Center.

"His criteria don't make sense to me," McKee said. "I don't know what he's doing."

McKee's assessment was supported by three neuropathologists who worked with her to develop guidelines for diagnosing CTE used by researchers around the world.

"My God, if people were actually following [Omalu's] criteria, the prevalence of this disease would be enormous, and there's absolutely no evidence to support that," said Dan Perl, one of those experts and professor of pathology at the Uniformed Services University.

McKee and other experts confirmed, in interviews, something that long has been an open secret in the CTE research community: Omalu's paper on Mike Webster — the former Pittsburgh Steelers great who was the first NFL player discovered to have CTE — does not depict or describe the disease as the medical science community defines it.

McKee and other experts believe Webster had CTE, based on his history of head trauma and his mental disorders. But the paper Omalu published shows images that are not CTE and could have come from the brain of a healthy 50-year-old man, they said.

"This is the problem," McKee said. "People lump me with him, and they lump my work with him, and my work is nothing like this."

"My God, if people were actually following these [Omalu's] criteria, the prevalence of this disease would be enormous, and there's absolutely no evidence to support that."

Dan Perl, professor of pathology at the Uniformed Services University

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Omalu declined several requests for an interview and refused to answer any questions for this story. In an email, he dismissed questions raised by experts as coming from "a minority of doctors who are seeking very cheap and bogus popularity . . . who work directly or indirectly with these sports organizations."

“Your paper engaging in such bogus controversies will bolster some people’s allegations of ‘Fake News,’” Omalu wrote.

This is typically how Omalu responds to criticism: by claiming it comes from scientists corrupted by relationships with sports leagues. But his depiction of the science of CTE and his prominence in the CTE research community have yielded his own financial benefits.

Billing himself as the man who discovered CTE, Omalu has built a lucrative business as an expert witness for hire in lawsuits — including in the growing CTE-related litigation field — charging a minimum of $10,000 per case, according to his testimony. He also maintains a busy schedule of paid speaking engagements, charging $27,500 per appearance, records show, as he delivers his sermon against contact sports.

A deeply religious man, Omalu has said he believes he is on a mission from God, and he views scientists who question him with suspicion and hostility.

“As a Christian, I believe after death there is judgment,” Omalu told a lawyer in a deposition once, when asked about experts who raised doubts about his theories. “They will all answer for this on judgment day.”

Scientific research of CTE dates from 1928, when a New Jersey pathologist published a paper describing the “punch drunk” syndrome he observed in several boxers. (JPH/Associated Press)

Rebranding

Omalu first drew national news attention in 2007 as the diminutive, quirky local medical examiner in Pittsburgh declaring he had identified a new brain disease in former NFL players.

“We are calling it football-induced chronic traumatic encephalopathy,” Omalu told ESPN.

Contrary to Omalu's claims, doctors have been studying what we now call CTE since 1928, when New Jersey pathologist Harrison Martland described a phenomenon he observed among several boxers that he termed "punch drunk."

Over the next 70 years, doctors around the globe encountered similar ailments in boxers, and the syndrome became commonly known as "dementia pugilistica." In 1949, British neurologist MacDonald Critchley was the first to use the term chronic traumatic encephalopathy. By the early 2000s, the term CTE was in common usage among the then-small community of experts who researched the disease.

In 2005, Omalu published his first paper, in collaboration with doctors at University of Pittsburgh Medical Center, reporting he found CTE in Webster, who had died of a heart attack after enduring an array of behavioral disturbances for years after his retirement.

To the medical science community, the significance of Omalu's paper was that CTE had been found for the first time in a former NFL player. But over the years, Omalu has repeatedly claimed that he discovered CTE.

"I said to myself . . . you need to give it a sexy name," Omalu said in 2013. "You need to give it a name that has a good acronym that people would remember. . . . That was how CTE came about."

In 2009, McKee and her colleagues at BU published their first CTE paper, describing what they found in the brains of two former boxers and a former NFL player — John Grimsley, a former linebacker for the Houston Oilers and Miami Dolphins. McKee's paper described the long history of CTE research and referenced Omalu's Webster paper.

In "Truth Doesn't Have A Side," Omalu falsely accused McKee of trying to take credit for his discovery, referring to her as "the blonde white woman who claimed she discovered CTE."

Asked by email whether she ever has claimed to have discovered CTE, McKee replied: “Ha. No.”

Steven DeKosky, a neurologist and deputy director of the McKnight Brain Institute at the University of Florida, was one of Omalu’s early collaborators. In a phone interview, DeKosky said he and Omalu knew in 2005 they had not discovered a new disease. DeKosky knew the disease as dementia pugilistica, however, and agreed with Omalu that they should rename it because Webster hadn’t been a boxer. Omalu suggested CTE.

DeKosky believed then that Omalu had come up with the name, he said, until he later learned researchers had been using the term for years.

“I was a bit embarrassed,” DeKosky said. He said he has no idea why Omalu continues to claim he discovered and named the disease.

“Maybe, like me, he just didn’t realize that it had been called by that same name before,” DeKosky said. “He’s a complex guy. All of us are.”

In a 2018 deposition in a CTE-related lawsuit against the NCAA, Omalu acknowledged he did not discover CTE.

“Some people who give me credit of discovering CTE, that is not true, really,” he said. Later, Omalu said he had only been “successful in rebranding this disease concept.”

Ann McKee, director of the Boston University CTE Center and chief of neuropathology for the VA Boston Healthcare System, left, conducts the post-mortem study of the brain of former NFL player Aaron Hernandez. (Boston University School of Medicine)

All over the map

CTE became a national news story in 2009 as Omalu and McKee diagnosed the disease in several former NFL players who died young, prompting congressional hearings.

As Omalu and McKee publicized their findings, they dealt with attacks from NFL-allied doctors. Scientists who wanted to conduct their own CTE research, meanwhile, dealt with another problem: Omalu and McKee had different definitions for what CTE looked like and how to diagnose it, a disagreement they have never resolved.

Omalu often uses the phrase “tested positive for CTE,” implying the diagnostic process is black and white, akin to a pregnancy test. In reality, diagnosing CTE is far more complicated, more like looking out into a starry night and spotting a constellation.

There is no reliable technology to detect CTE in the living; the disease can be diagnosed only after someone dies and their brain can be dissected and analyzed.

What CTE looks like

CTE is marked by accumulations of an abnormal or defective form of a protein called tau in the brain.

Tau is a normal protein found in the brain and the central nervous system that has a stabilizing effect on cells.

Tau can become abnormal, however, and clump into formations called tangles.

This can happen as people get older, and small amounts of abnormal tau in the brain are thought by some experts to be benign and part of the aging process.

In significant amounts, however, abnormal tau is a sign of brain damage or disease, such as Alzheimer's, as well as CTE.

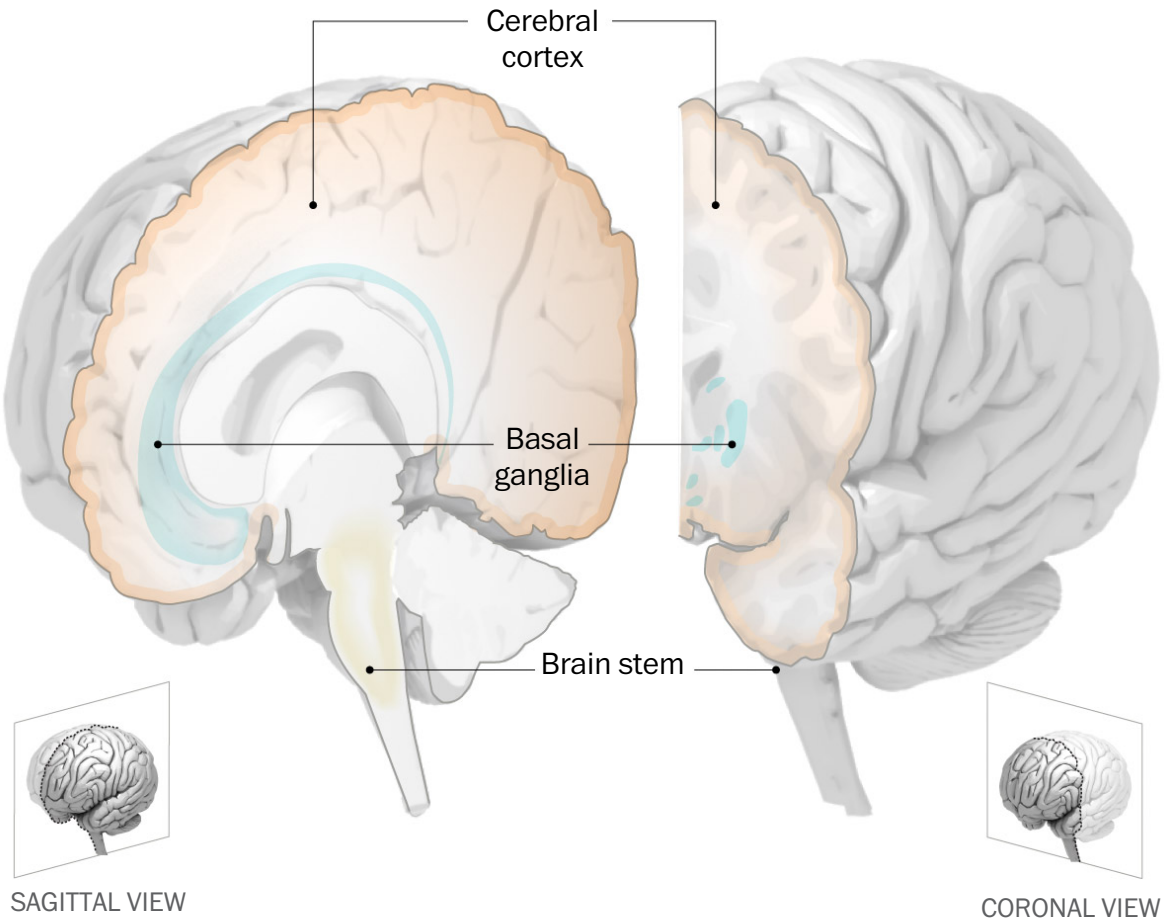
Even under the microscope, diagnosing CTE is complicated by another factor: Abnormal tau is also found in more than a dozen other diseases. Tau also accumulates in healthy brains as people age, with no apparent effect on brain function or behavior.

Scientists can distinguish brains with benign accumulations of abnormal tau from brains with damage and disease based on the amount, pattern and location of the tau, among several factors.

In 2014, the National Institutes of Health stepped in to answer the question of how to diagnose CTE by funding a study overseen by Ann McKee and seven other neuropathologists from around the world. They concluded that CTE's unique characteristic — its signature, essentially — is clusters of tau around blood vessels deep in the folds of the cortex, the brain's outermost region. CTE experts around the globe use this definition in their research.

Omalu's definition for CTE, described in his published papers, is different than the National Institutes of Health's definition. Omalu has identified four types of CTE. In interviews with The Washington Post, experts said two of Omalu's types could be CTE. The other two types, however, experts found problematic.

Omalu's third CTE type is marked by "moderate to frequent" tau tangles in the brain stem, and "none to sparse" tau tangles in the cerebral cortex. Brains can develop tau in these areas through normal aging, experts said, as well as through other diseases.



Omalu's fourth CTE type, which he called "incipient CTE," is marked by "a combination of none to sparse" tau tangles in the cerebral cortex, brainstem and basal ganglia. Tau also can accumulate, in small amounts, in these areas through normal aging and other diseases.

Experts found Omalu's fourth type nonsensical, noting that, as written, it suggested he would diagnose CTE in a brain with no tau.

"It sort of sounds like he's saying, if you had someone who had a history of playing contact sports, it's okay to diagnose them with CTE even if you don't have any" tau, said Perl, an internationally known expert in brain diseases. "That doesn't make any sense."

In a deposition in 2018, Omalu displayed ambivalence when asked whether he followed the NIH guidelines.

"The final decision is still with the doctor who is examining," Omalu said. "Not every CTE case will have all those guidelines."

McKee said she does not believe what Omalu calls "incipient CTE" is actually CTE.

"His criteria for diagnosing CTE are all over the map," McKee said.

McKee and other experts in brain disease have held doubts about Omalu's diagnostic methods since his first, and most famous, CTE paper.

Hall of Fame center Mike Webster was the subject of Bennet Omalu's first paper about CTE. (George Gojkovich/Getty Images)

Mystery of Iron Mike

The tragic decline of the man known around Pittsburgh as "Iron Mike" has been told and retold over the years, in magazine articles, books and in the opening scenes of "Concussion."

Before he died in 2002, at 50, Webster had struggled for years with depression, paranoia and chronic pain so agonizing that he sometimes needed to shock himself unconscious with a stun gun just to get some sleep.

CTE experts, in interviews, did not dispute football damaged Webster's brain. He probably played through many concussions, and the NFL's retirement board acknowledged Webster

suffered from football-related brain damage in 1999.

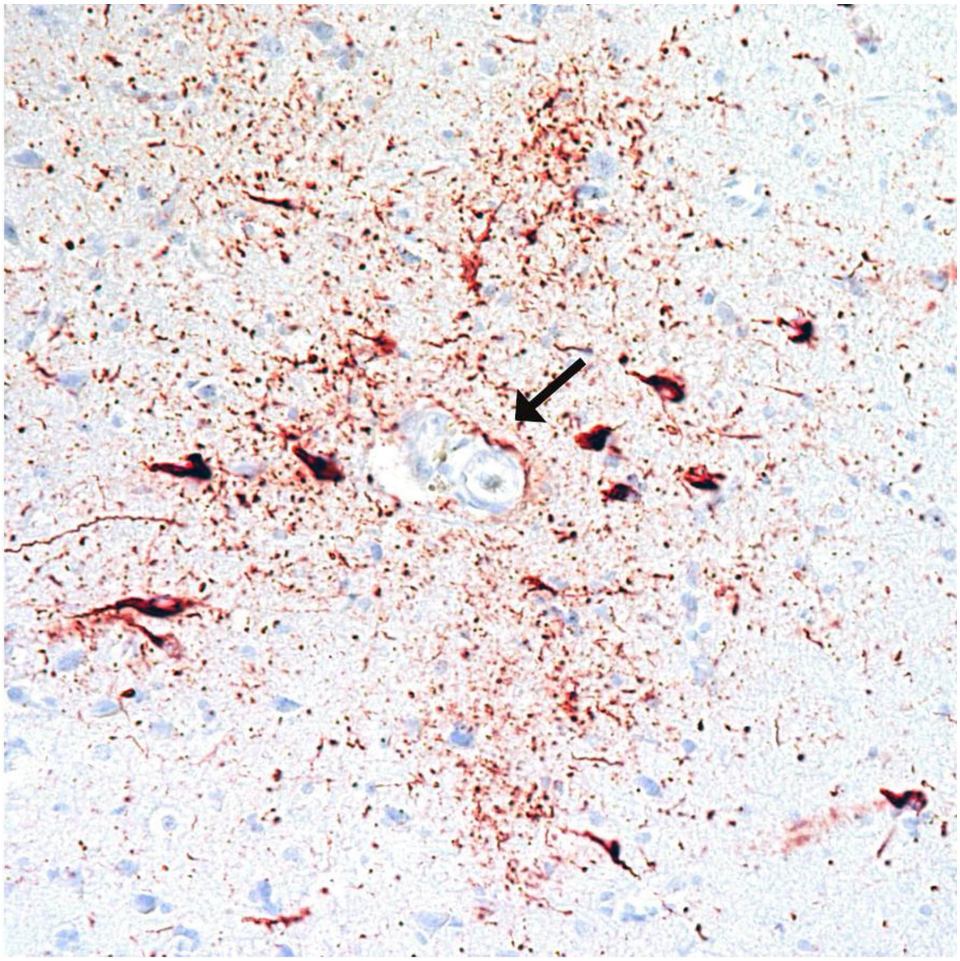
But whether the man who was essentially “Patient Zero” for CTE in football actually had the disease, according to experts, is an unanswered question.

In medical research papers, it is customary to publish, as photos, the most compelling, striking images that depict the paper’s subject. The images Omalu published in the Webster paper do not show CTE, nor do they show alarming amounts of tau for a 50-year-old man, experts said.

The images show tau in formations called tangles. One image shows a single tangle, highly magnified, and another shows a similarly magnified image of two tangles, according to the paper. Both images come from the cortex.

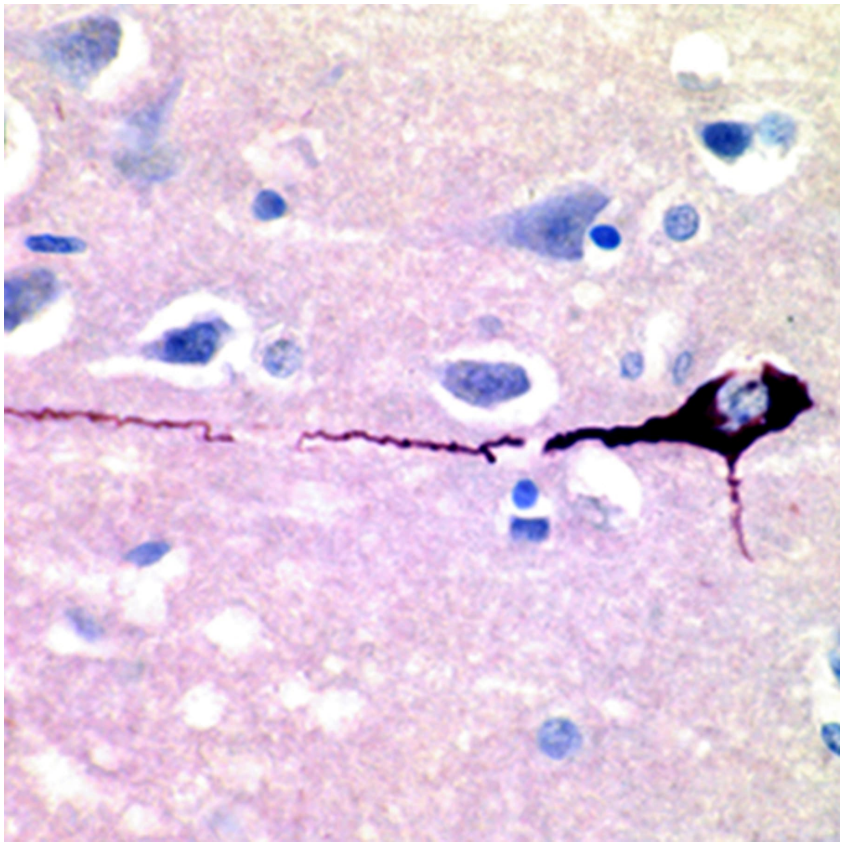
McKee and other experts said one or two tangles can be found in the cortexes of otherwise healthy 50-year-olds. If surrounded by several other tangles, they could be part of a disease. But in isolation, they could be benign. It was as if Omalu had claimed to have found a rare species of bird and then, as proof, published a paper that included only a few close-up images of the tip of the beak.

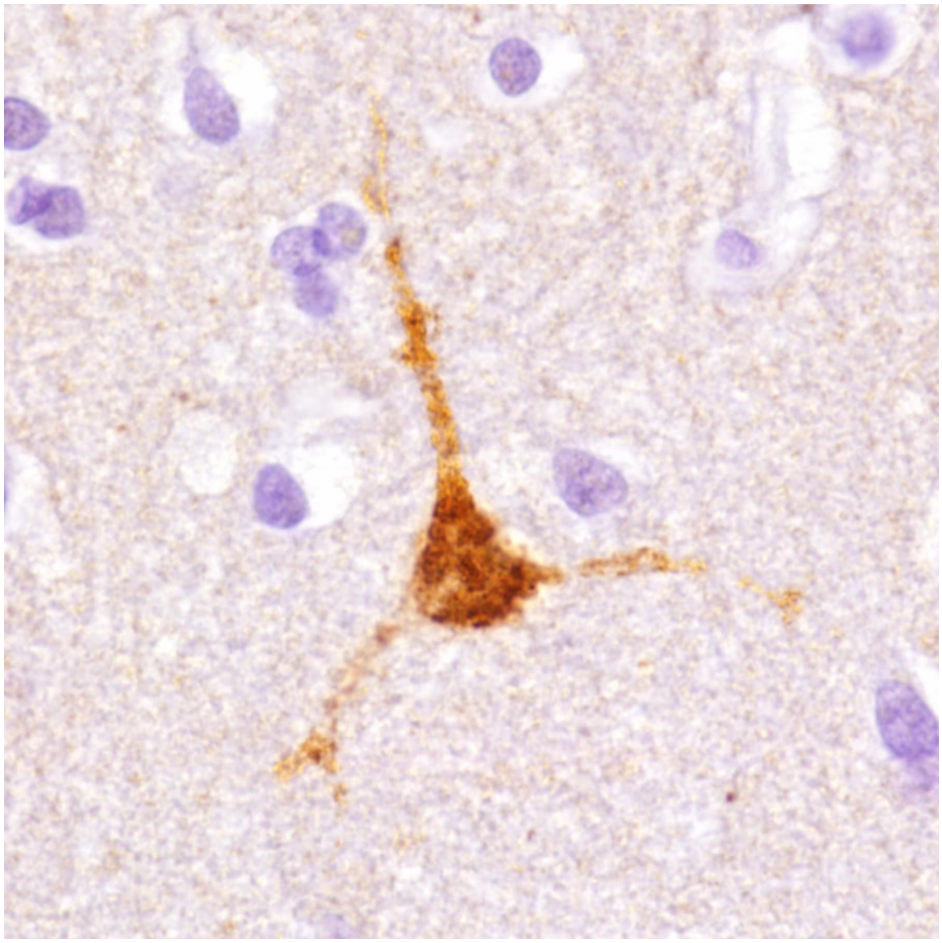
This is CTE’s signature pattern: tau tangles clustered around a blood vessel. The black arrow points to the blood vessel. (Ann C. McKee, MD/VA Boston Healthcare



System and Boston University School of Medicine)

This image, from Omalu's paper on Mike Webster, does not show CTE. It shows a single tau tangle. (Neurosurgery/Oxford University Press)





This is a tau tangle found in the brain of a cognitively normal man who died in his 50s. (Edward Lee, MD, PhD, assistant professor, University of Pennsylvania)

In the text of the paper, Omalu described more tau than doctors would expect to find in the brain of a 50-year-old, experts said, but for reasons he has never explained, he selected images that could have come from the brain of a healthy 50-year-old man.

“What Omalu described is just some tau . . . [with] not enough details to know what kind of tau it was or what the disease was. . . . From reading that paper, I would have no idea the guy had CTE,” McKee said.

“I’m 50. I would expect my brain would have a few tangles here and there,” said Willie Stewart, Britain’s leading CTE researcher, a neuropathologist and honorary clinical associate professor at the University of Glasgow. “The images that Bennet has in that paper, they don’t show CTE.”

In interviews, two of Omalu’s co-authors had conflicting memories about what they saw in Webster’s brain.

DeKosky, the Florida neurology professor, said he recalls seeing the signature CTE pattern but was unsure why the correct images weren’t selected for the paper. Ronald Hamilton, a retired former Pittsburgh neuropathologist, said he does not recall seeing the signature pattern and no longer has his research material from the case.

“There’s a 100 percent chance” Webster had CTE, Hamilton said. “But, yes, I can’t prove it.”

There is one other person who examined Webster’s brain tissue in the 2000s. But his recollection of what he saw only deepens the mystery.

In 2008, Peter Davies, an Alzheimer’s researcher and professor at the Albert Einstein College of Medicine in New York, met with Omalu, who let him take some tissue from Webster’s brain, as well as from five of his other early CTE cases, back to his lab.

Davies said Omalu was right; Webster did have a disease he had never seen, with “buckets of tau.” Tissue from two of the other brains — one from another former NFL player, the other from a former professional wrestler — also had the same widespread tau.

Davies believes, however, that the disease he saw in Webster’s brain and the two others was “extremely rare” and different from the CTE described by other researchers, because of the overwhelming amount of tau he saw under the microscope.

“In my mind, it’s a separate disease,” Davies said.

The reason Omalu picked the wrong images, Davies said, was that Omalu “was not any kind of an expert.”

“He would be very upset to hear me say something like that,” Davies said.

BU’s McKee has never examined Webster’s brain, but she said she has asked doctors at Pittsburgh labs where Omalu worked if they know where the tissue is, with no success.

In “Truth Doesn’t Have A Side,” Omalu wrote that he confiscated the Webster tissue and other CTE brains from the coroner’s office in Pittsburgh because of an attempt by “detractors” to destroy them. DeKosky said he believes Omalu still has Webster’s brain, either at his home or in his private lab outside Sacramento.

Omalu has not published a paper describing refinements to his definition for CTE since 2011. He continues to examine brains of suspected CTE cases, however, and his diagnoses prompt lawsuits and news coverage.

Forensic pathologist and neuropathologist Bennet Omalu participates in a briefing on Capitol Hill in 2016. (Pete Marovich/Getty Images)

Epidemic or rare?

In Omalu's words, CTE is an epidemic, a risk for anyone who plays any contact sport, at any level, and likely affecting every former NFL player.

"No single concussion is safe regarding the risk of developing gridiron dementia," Omalu wrote in his first book, "Play Hard, Die Young."

"I believe there is a very good chance that every person who plays (or has played or will play) in the NFL will suffer from some degree of CTE," he wrote in "Truth Doesn't Have A Side."

In recorded medical literature, there are no documented cases of someone developing CTE from a single concussion. And while mounting scientific evidence suggests CTE is a significant risk for NFL players, studies examining groups of athletes who played other sports suggest it remains possible, if not likely, that Omalu is significantly overestimating the population potentially afflicted with CTE.

Several studies have found former NFL players die with brain disease at significantly higher rates than comparison populations, but nothing approaching 100 percent, with figures ranging from 5 percent to 8 percent. There have been no published studies examining rates of brain disease among former college football players, but one sizable research project, overseen by the NCAA and the Department of Defense, is underway. Three studies of former high school football players who played in Minnesota and Wisconsin between 1946 and 1970 found they had no higher rates of brain disease than their classmates.

"I believe there is a very good chance that every person who plays (or has played or will play) in the NFL will suffer from some degree of CTE."

Bennet Omalu in "Truth Doesn't Have A Side"

Studies examining the rates of brain disease among athletes who played other sports have produced mixed results. A study published late last year of thousands of former professional soccer players in Scotland found higher rates of players dying with brain disease — 11.4 percent among soccer players, compared with 3.2 percent among the general population. But smaller studies examining groups of former NHL players and professional rugby players found no signs of higher rates of brain disease.

At BU, McKee and her colleagues focus criticism on football, which they believe has a relationship with CTE similar to smoking and cancer. They support banning tackle football

before age 12 and rule changes in other sports to reduce head hits. They have not echoed Omalu's call for the abolition of youth wrestling, hockey and mixed martial arts.

"I don't know where he's coming up with those recommendations," McKee said. "I don't think he is basing them on any data."

Omalu repeatedly has cited data that he claims show children who play these sports are at increased risk to see their lives unravel from mental illness, substance abuse or other struggles.

"Studies have shown that if a child plays a high-impact, high-contact sport," Omalu wrote in "Truth Doesn't Have A Side," "that child stands a higher risk of dropping out of high school, not attending college, not doing well in life . . . developing psychiatric and psychological problems . . . and even dying at a younger age."

No studies have found that merely playing a contact sport increases the risk of the tragic life outcomes Omalu has described. In some settings, when citing these figures, he has mentioned "a paper that came out of Sweden." This appears to be a reference to research led by Seena Fazel, professor of forensic psychiatry at the University of Oxford, examining what happened to more than 1.1 million people in Sweden who suffered brain injuries before turning 25.

Fazel was unaware of how Omalu had been interpreting his studies until contacted by a reporter last year.

"That's definitely not what we said. . . . You can't extrapolate that from our work," Fazel said in a phone interview.

Fazel's research examined a population that included people who had suffered concussions in sports but also people who had survived much more severe injuries, such as head impacts during car crashes that resulted in lengthy hospitalizations.

“We’re not just talking about someone who’s had a bang on the head at a sports match. . . . We’re talking about the more severe end of the spectrum,” Fazel said. “These papers don’t say, ‘Don’t play sports.’ . . . They support good [head safety] policies in sports.”

Omalu has cited misinterpretations of Fazel’s data over the years in interviews and public speeches, as well as during his new main vocation: expert testimony.

Bennet Omalu, shown at a 2018 news conference, has generated the bulk of his income through his work as an expert witness. Omalu testified that he charges a minimum of $10,000 per case. (Rich Pedroncelli/AP)

Expert for hire

In November, the world’s leading CTE experts gathered in Bethesda, Md., at the campus of the National Institutes of Health for a two-day conference to discuss the state of CTE research. McKee and her colleagues from BU attended, as did researchers from Canada,

Britain and elsewhere around the globe. Omalu, who has not published new CTE research in several years, did not attend.

Now 51, Omalu lives in Sacramento with his wife and two children. He works part-time as an associate professor at the University of California Davis, but the bulk of his income comes from work as an expert witness, he testified in a deposition last year. He charges a minimum of $10,000 per case and earned about $900,000 in 2018, he testified.

Judges have, on occasion, taken issue with Omalu's reasoning. In 2016, a Pennsylvania judge, citing "numerous methodological errors," dismissed Omalu as the only expert witness for an auto mechanic suing several chemical companies, alleging he had contracted Parkinson's disease from welding solvents and fumes.

"Dr. Omalu admitted to knowing little to nothing about welding, the fumes generated, and publications concerning the topic. . . . [He] repeatedly testified that this subject is outside of his area of expertise," wrote Judge Richard E. McCormick Jr., who also noted that Omalu never examined the man, didn't read his testimony and had no information concerning the man's working conditions and levels of exposure to various fumes. The case was dismissed.

In February 2018, Omalu filed a declaration in a federal lawsuit against the Pop Warner youth football organization in which he suggested playing football increased the risk of drug abuse, mental illness and death before 42, among a long list of harrowing life outcomes. The case was dismissed last month, with a ruling in which U.S. District Judge Philip S. Gutierrez wrote he found Omalu's testimony "unreliable."

In March, Omalu served in a role that doesn't fit neatly into his self-promoted biography of the heroic doctor fighting corporate interests: He worked as an expert witness for Ford Motor Company, which was being sued on behalf of a 53-year-old man killed after being struck by an 8,700-pound metal device in one of the company's assembly plants.

The local medical examiner had determined the man had lived — and probably suffered tremendous pain — for about 30 minutes after the accident. Omalu testified that he believed the man was killed instantly, and because the man had been a smoker, he had a reduced life expectancy, arguments that could reduce Ford's financial liability.

Over the course of the two-hour deposition, Omalu claimed 100 percent of NFL players have CTE and suggested parents who let their children play football or soccer are committing child abuse.

At one point, a lawyer asked Omalu about the Pennsylvania case in which the judge dismissed him as an expert. That had nothing to do with his scientific expertise, Omalu insisted. It was because the judge was from Pittsburgh, he explained, and probably an NFL fan.

"Remember," Omalu told the lawyer, "I discovered CTE."

Will Hobson
Will Hobson is a national sports reporter for The Washington Post. He has previously worked for the Tampa Bay Times, the Daytona Beach News-Journal, and the Panama City News Herald.

Additional credits

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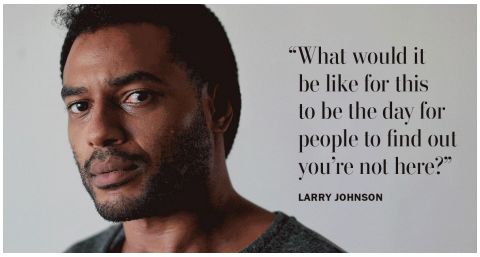

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