New: 87 Deceased NFL Players Test Positive for Brain Disease

A total of 87 out of 91 former NFL players have tested positive for the brain disease at the center of the debate over concussions in football, according to new figures from the nation's largest brain bank focused on the study of traumatic head injury.

Researchers with the Department of Veterans Affairs and Boston University have now identified the degenerative disease known as chronic traumatic encephalopathy, or CTE, in 96 percent of NFL players that they've examined and in 79 percent of all football players. The disease is widely believed to stem from repetitive trauma to the head, and can lead to conditions such as memory loss, depression and dementia.

In total, the lab has found CTE in the brain tissue in 131 out of 165 individuals who, before their deaths, played football either professionally, semi-professionally, in college or in high school.

Forty percent of those who tested positive were the offensive and defensive linemen who come into contact with one another on every play of a game, according to numbers shared by the brain bank with FRONTLINE. That finding supports past research suggesting that it's the repeat, more minor head trauma that occurs regularly in football that may pose the greatest risk to players, as opposed to just the sometimes violent collisions that cause concussions.

But the figures come with several important caveats, as testing for the disease can be an imperfect process. Brain scans have been used to identify signs of CTE in living players, but the disease can only be definitively identified posthumously. As such, many of the players who have donated their brains for testing suspected that they had the disease while still alive, leaving researchers with a skewed population

to work with.

Even with those caveats, the latest numbers are "remarkably consistent" with past research from the center suggesting a link between football and long-term brain disease, said Dr. Ann McKee, the facility's director and chief of neuropathology at the VA Boston Healthcare System.

"People think that we're blowing this out of proportion, that this is a very rare disease and that we're sensationalizing it," said McKee, who runs the lab as part of a collaboration between the VA and BU. "My response is that where I sit, this is a very real disease. We have had no problem identifying it in hundreds of players."

In a statement, a spokesman for the NFL said, "We are dedicated to making football safer and continue to take steps to protect players, including rule changes, advanced sideline technology, and expanded medical resources. We continue to make significant investments in independent research through our gifts to Boston University, the [National Institutes of Health] and other efforts to accelerate the science and understanding of these issues."

The latest update from the brain bank, which in 2010 received a $1 million research grant from the NFL, comes at a time when the league is able to boast measurable progress in reducing head injuries. In its 2015 Health & Safety Report, the NFL said that concussions in regular season games fell 35 percent over the past two seasons, from 173 in 2012 to 112 last season. A separate analysis by FRONTLINE that factors in concussions reported by teams during the preseason and the playoffs shows a smaller decrease of 28 percent.

Off the field, the league has revised safety rules to minimize head-to-head hits, and invested millions into research. In April, it also won final approval for a potential $1 billion settlement with roughly 5,000 former players who have sued it over past head injuries.

Still, at the start of a new season of play, the NFL once again finds itself grappling to turn the page on the central argument in the class-action lawsuit: that for years it sought to conceal a link between football and long-term brain disease.

The latest challenge to that effort came two weeks ago with the trailer for a forthcoming Hollywood film about the neuropathologist who first discovered CTE. When the trailer was released, it quickly went viral, leaving the NFL bracing for a new round of scrutiny over past efforts to deny any such connection.

The film, *Concussion*, starring Will Smith, traces the story of Bennet Omalu, who in 2005 shocked the

football establishment with an article in the journal *Neurosurgery* detailing his discovery of CTE in the brain of former Pittsburgh Steelers center Mike Webster. At the VA lab and elsewhere, CTE has since been found in players such as Hall of Famer Junior Seau, former NFL Man of the Year Dave Duerson, and Colts tight end John Mackey, a past head of the player's union.

While the story is not a new one, for the NFL, it represents a high-profile and potentially embarrassing cinematic interpretation of a period in which the league sought to refute research suggesting football may contribute to brain disease.

From 2003 to 2009, for example, the NFL's now disbanded Mild Traumatic Brain Injury Committee concluded in a series of scientific papers that "no NFL player" had experienced chronic brain damage from repeat concussions, and that "Professional football players do not sustain frequent repetitive blows to the brain on a regular basis."

In the case of Omalu, league doctors publicly assailed his research, and in a rare move, demanded a retraction of his study. When Omalu spoke to FRONTLINE about the incident for the 2013 documentary, *League of Denial: The NFL's Concussion Crisis*, he said, "You can't go against the NFL. They'll squash you."

In a conversation with FRONTLINE, McKee said that her biggest challenge remains "convincing people this is an actual disease." Whatever pockets of resistance still exist, she said, have primarily come from those with a "vested interest" in football.

"People want to make this just Alzheimer's disease or aging and not really a disease," according to McKee. "I think there's fewer of those people, but that's still one of our major hurdles."

Related film: *League of Denial: The NFL's Concussion Crisis*

FRONTLINE reveals the hidden story of the NFL and brain injuries.