

Evidence suggests contact sports played by amateurs increase risk of degenerative disorder

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Scientists have recently found evidence that professional football players are susceptible to a progressive degenerative disease, chronic traumatic encephalopathy (CTE), which is caused by repetitive brain trauma. Now, researchers on Mayo Clinic's Florida campus have discovered a significant and surprising amount of CTE in males who had participated in amateur contact sports in their youth.

About one-third of these men whose brains had been donated to the Mayo Clinic Brain Bank had evidence of CTE pathology. CTE only can be diagnosed posthumously.

The Mayo study, published in the December issue of *Acta Neuropathologica*, links amateur [contact sports](#)—football, boxing, wrestling, rugby, basketball, baseball and others played while in school—with the development of CTE, which when severe can affect mood, behavior and cognition.

"The 32 percent of CTE we found in our brain bank is surprisingly high for the frequency of neurodegenerative pathology within the general population," says the study's lead author, Kevin Bieniek, a predoctoral student in Mayo Graduate School's Neurobiology of Disease program.

"If 1 in 3 individuals who participate in a contact sport goes on to develop CTE pathology, this could present a real challenge down the

road," Bieniek says. It remains to be determined if the brain changes produce any observable effects on behavior or cognition of the former athletes.

This study is the first to use CTE neuropathologic criteria established by the National Institute of Neurological Disorders and Stroke (NINDS) earlier this year to look for incidence of the disease in nonprofessional athletes, says the study's senior author, Dennis Dickson, M.D., a neuropathologist at Mayo Clinic.

"Using these criteria, Bieniek's report is the first detailed description of CTE pathology in a brain bank. As such, his work is groundbreaking," Dr. Dickson says. "The frequency with which he found CTE pathology in former athletes exposed to contact sports was surprising. It is pathology that had gone previously unrecognized." Bieniek is a member of Dr. Dickson's laboratory.

"The purpose of our study is not to discourage children and adults from participating in sports because we believe the mental and physical health benefits are great," Bieniek says. "It is vital that people use caution when it comes to protecting the head. Through CTE awareness, greater emphasis will be placed on making contact sports safer, with better protective equipment and fewer head-to-head contacts."

Bieniek led the team that examined the clinical records of 1,721 cases in the Mayo Clinic Brain Bank. They found 66 males who had documented participation in contact sports during their youth and young adult years. Of these cases, 32 percent had CTE pathology when the researchers examined brain tissue. In comparison, none of the 198 brains of individuals without documentation of participation in contact sports, including 66 women, had CTE pathology.

The researchers also compared a number of clinical and genetic features

between cases with and without CTE [pathology](#), and found two genetic markers that seemed to possibly modify risk of developing CTE. "These markers need to be further studied in a larger group of CTE cases, but they could be very important in determining whether an individual is at greater risk of developing these brain changes," Bieniek says.

Bieniek notes that the Mayo Clinic Brain Bank includes donors who have died with varying disorders of dementia. "We decided to examine our brain bank of neurodegenerative disorders, because CTE, found in older people, rarely occurs in isolation," Bieniek says. "Many cases of CTE previously reported have other neurodegenerative pathologies in addition to CTE. So, the same risk factors that may increase risk for other neurodegenerative diseases could very well play a role in development of CTE."

Provided by Mayo Clinic

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