Ali Alvarez

Professor Robertson

NSCI 175-002

25 November 2019

Fatal Strikes

The widespread popularity of non-contact sports such as football has made Chronic Traumatic Encephalopathy (CTE) a highly prevalent issue among athletes of all ages and skill levels. CTE’s characteristics can be divided into two categories: neuropathological and behavioral deficits. Neuropathological impairments include: buildup of tau and beta-amyloid proteins (implicated in Alzheimer’s disease) in the frontal cortex, decreased brain mass and the enlargement of 2 ventricles due to accumulation of CSF (Tanaka and Wells). Behavioral deficits range from memory impairment, erratic behavior, and problems with impulse control to depression and suicidal behavior (Tanaka and Wells). Since the severity of these symptoms varies from person to person, it is incredibly difficult to spot the onset of CTE early. When a player endures multiple blows to the head, the axons in their brain shear and snap open, destroying them and resulting in neuronal damage. The microtubules holding the axons together are composed of tau and amyloid precursor proteins, when axons are snapped, these proteins along with glutamate leak into the CSF and clump onto nearby neurons (Tanaka and Wells).

The difficulty in detecting brain damage is due to the fact that there is no sure-fire method of determining whether axonal damage has occurred. Despite the lack of a certified method for identifying brain damage, there is a process that could be used to determine who is most at risk for developing CTE. Since not all football players suffer from CTE, this suggests that there is a critical time period when repeated hits to the head may amplify existing damage or slow down recovery. Another hit during this time period would exacerbate the immune response, possibly leading to permanent brain damage. One test that could be used to detect brain damage is a blood test of players’ blood for the molecule S100B. S100B is a molecule released by astrocytes that are activated to repair axons (Tanaka and Wells). High presence of this protein in a player’s blood would indicate that the person has sustained some degree of axonal tearing and therefore brain damage. The identification of brain damage is only one part of the puzzle when it comes to treating CTE. Preventative measures such as heads-up tackling, neck-strengthening exercises, and helmet sensors are another key factor to treating CTE. Heads-up tackling involves the defensive player maintaining an upright torso with their head up while performing a tackle. Neck-strengthening exercises are done as a stronger neck would help reduce head rotation and brain trauma after a hit. Helmet sensors allow coaches and trainers to monitor the intensity and number of hits a player endures. This data can then tell a coach whether he should pull a player out of the game. In the end, there is no way to completely eliminate the possibility of brain trauma, however, methods such as heads-up tackling and neck exercises are great starts for mitigating the brain damage players may endure. While I don’t believe contact sports should be banned, I do think that players should be tested for concussion symptoms after every game. This belief was reinforced after speaking with my friend, Cole Infinito, a UNC student who played as quarterback for his high school. Cole has sustained 3 concussions, 2 diagnosed and 1 undiagnosed. One of Cole’s stories that truly struck me was about the time he received his 2nd concussion. It was during the last game of the season; Cole was rushing forward to get the 1st down and was slammed into the sidelines by a 250 lb lineman. For a split second after hitting the ground, his vision went dark and he said “it felt like a bell tower had just rung inside my head”. Despite these effects, Cole got back up and played through the rest of the game, not telling his coaches or trainer about what he had just experienced. He felt fine on the weekend however, when he returned to class on Monday, he felt a “splitting headache” and rushed to see his trainer. The trainer then diagnosed him with a concussion. At this point, Cole was taken out of school for a month and apart from not being able to practice, he could no longer partake in the things he enjoyed as his “trainer told me that I couldn’t play videogames, look at any screens, or even read”. After listening to Cole’s story, I completely changed my view on contact sports. His first concussion, he said, was not nearly as severe, yet the coaching staff pulled him out of the game since they had watched the hit take place. On the other hand, no one saw the hit that caused his second concussion or asked him if he was ok after the game. Yet, the second concussion caused him a lot more pain and would have never been detected had Cole himself not reached out to his trainer. What I would tell to any person considering playing football is to take all of their training staff’s advice and consider the risks associated with it and whether they’re prepared to put their bodies and livelihood on the line for the game.

Bibliography

Infinito, Cole. Personal Interview. 24 November 2019.

Tanaka, Jacqueline C, and Gregg B Wells. “How Football Destroys the Brain.” *Scientific American*, Jan. 2014, www.scientificamerican.com/article/how-football-destroys-the-brain/.