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Short Communication

Concussion: "From the Red-Crested Woodpecker to the Human Being"

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Abstract

The term concussion was initially described by the Nigerian physician, later declared an American citizen, Bennet Ifeakandu Omalu. A forensic pathologist and neuropathologist who was the first to discover and publish, along with two other American researchers, neuroaptologic findings on chronic traumatic encephalopathy (CTE) in American football players.The problem arose after Junior Seau - considered one of the greatest defenders of all time - committed suicide in 2012, aged 43. A post-mortem study of his brain showed that he suffered from ETC.

Keywords: ETC; CTC; neuroanatomical framework; Campephilus melanoleucos

Introduction

Renowned researchers examined the brains of football players postmortem and identified, through autopsies, that 99% showed signs of degenerative disease, probably caused by repeated blows to the head. Evidence of concussion was stained and stained in 110 of the 111 brains donated from National Football League (NFL) players. In addition to NFL players, the research group also examined the brains of individuals who played in high school, college, semi-pro and the Canadian Football League. 87% of the 202 players examined in the above sample, whose average age was 66, showed signs of ETC.

Undoubtedly, human beings lack a neuroanatomical framework for repeated and violent trauma. The central nervous system of human beings is protected against physical trauma by a strong skullcap and cerebrospinal fluid (a liquid that serves to attenuate low-intensity impact forces). However, as in other animals, we do not have an "ideal" cushioning system against head trauma. Such placement is well exemplified in American football, boxing, soccer and rugby players. High-impact and repeated trauma causes irreversible damage to the brain. It is believed, for example, that an American football player is hit more than 70,000 times during his athletic career.

The term cerebral concussion can be classified as a traumatic brain injury that alters its functioning. Commonly, patients have severe headaches, vertigo, fatigue, concentration problems, mnestic deficits, behavioral changes and sleep disturbances. In primary injury there is immediate mechanical damage to brain tissue, damage to blood vessels (hemorrhage) and axonal shear, in which the axons of neurons are damaged. Secondary injury occurs hours to months after the primary, resulting in metabolic, cellular, and molecular events that ultimately lead to permanent tissue damage, atrophy, and loss of function.

American buffalo have horns that are huge in males, reaching up to 1.6 meters, with an outline that forms a type of shield under the forehead. In females they are shorter and thinner, in addition to having a larger trim. Males, mainly, use them in confrontations with animals of the same species or in situations that put them at risk. The horns have an enormous capacity to protect the central nervous system of these animals in terms of direct trauma, compounded by force and speed. The adult female reaches 1.60 meters in height and weighs about 600 kg. The adult male is even bigger, reaching about 1.80 meters in height and 900 kg. If such animals did not have

such a cushioning system, they would die during the first impact. Wild sheep also have the same protection mechanism as buffaloes.

Seagull is the name given to different species of seabirds that are part of the Laridae family. The name “seabird” is given to birds that feed from the low tide line to the open sea and are largely dependent on the marine environment for their survival. Seabirds are classified into oceanic and coastal. Although there are different species of seagulls, some characteristics can be considered common to these animals. Seagulls stand out for being robust birds, with long, narrow wings, short feet with swimming membranes, a short tail and a strong beak. These birds have a central and peripheral nervous system with twelve pairs of cranial nerves. The brain has a well-developed cerebellum, as they need a lot of balance to fly. They have well-developed vision. Diving birds, when reaching the surface of the sea, descend like a kind of missile, but they have a complex protection system for the brain. In addition, the shortened peak and wingspan of the wings and thorx features cushion head trauma.

The red-crested woodpecker (scientific name Campephilus melanoleucos) is considered one of the most representative species of the taxonomic family. This animal can dampen a force of G-thousand\s². It is believed to pierce tree trunks with its vigorous beak 12-13 thousand times a day, accounting for over 80 million times in a lifetime. And why don't they die from brain concussion? Because the animal's tongue protrudes from the back of the mouth to the nostrils, protecting the brain like an anatomical seat belt. Cerebral concussion frames are designed and tested in animal models, seeking to produce a relatively homogeneous type of injury, matched for age, sex, genetic background and well-controlled injury parameters. It is a fact that any animal model may not be able to completely recapitulate all aspects of the development of secondary injuries that are observed in human concussion, mainly because their defense system and neuroanatomy is different.

What happens to humans during repeated and voracious trauma to the brain? We have no neuroanatomic defense at the height, consequently we suffer from injuries, which over time add up and cause chronic traumatic encephalopathy. About 4 million traumatic brain injuries occur in the United States, affecting mostly teenagers and young adults. Mild lesions may not be visualized in the neuroimaging diagnosis or other objective diagnostic tests - but the clinical picture emerges later. Concussions share acute pathophysiological damage identical to the more severe Chronic Traumatic Emcephalopathies: there is a rapid release of neurotransmitters with ionic imbalance in neuronal cell membranes. Restoration of ionic homeostasis increases metabolic demand, causing dynamic changes in glucose uptake. The proportion and duration of these are related to severity, with milder injuries showing faster normalization or more severe injuries lasting longer. We must thoroughly understand the pathophysiology and clinical presentation of concussion, aiming at research and breaking management paradigms in daily life or sport that minimize the risk of prolonged recovery and repeated injuries.

Conclusion

It is believed that the "Guardian Cap", helmet used in the NFL, reduces the force of contact by 10% if a player is using it, and by 20% if the two athletes involved in the collision use the material. However, in terms of trauma, what is the meaning of 10-20% protection depending on external physical force imposed plus speed? Studies suggests GCs are not effective in reducing the magnitude of head impacts experienced by NCAA Division I American football players. We believe that the moment for creating a "true" ETC|ETA protection equipment has already surpassed the barriers of the terms "inadmissible" and "inconsequential".

References

1. Mullally WJ. Concussion. Am J Med. 2017 Aug;130(8):885-892.
2. Giza C, Greco T, Prins ML.(2018). Concussion: pathophysiology and clinical translation. Handb Clin Neurol,158:51-61.
3. Bolouri H, Zetterberg H.(2015). Animal Models for Concussion: Molecular and Cognitive Assessments—Relevance to Sport and Military Concussions. In: Kobeissy FH, editor. Brain Neurotrauma: Molecular, Neuropsychological, and Rehabilitation Aspects. Boca Raton (FL): CRC Press/Taylor & Francis; Chapter 46.
4. DePalma RG. (2015).Combat TBI: History, Epidemiology, and Injury Modes. In: Kobeissy FH, editor. Brain Neurotrauma: Molecular, Neuropsychological, and Rehabilitation Aspects. Boca Raton (FL): CRC Press/Taylor & Francis; Chapter 2.
5. Nelson, NW Davenport ND, Sponheim SR, Anderson CR.(2015). Blast-Related Mild Traumatic Brain Injury: Neuropsychological Evaluation and Findings. In: Kobeissy FH, editor. Brain Neurotrauma: Molecular, Neuropsychological, and Rehabilitation Aspects. Boca Raton (FL): CRC Press/Taylor & Francis; Chapter 32.
6. Mez J, Daneshvar DH, Kiernan PT, Abdolmohammadi B, Alvarez VE, Huber BR, Alosco ML, Solomon TM, Nowinski CJ, McHale L, Cormier KA, Kubilus CA, Martin BM, Murphy L, Baugh CM, Montenigro PH, Chaisson CE, Tripodis Y, Kowall NW, Weuve J, McClean MD, Cantu RC, Goldstein LE, Katz DI, Stern RA, Stein TD, McKee AC.(2017). Clinicopathological Evaluation of Chronic Traumatic Encephalopathy in Players of American Football. JAMA, 25;318(4):360-370.
7. Quigley KG, Hopfe D, Taylor MR, Pavilionis P, Owusu-Amankonah V, Islas A, Murray NG. (2023). Preliminary Examination of Guardian Cap Head Impact Data Using Instrumented Mouthguards. ArXiv [Preprint].

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