

# Citation Review

## A Late Hit for Pro Football Players

Miller, Greg, **Science 325**: p 670-672, 2009.



The citation reviewed in this issue is a news focus review written by a Science staffer, rather than the usual research reports written by a scientist. It was chosen for its topical importance. Impact Neurotrauma is an increasingly urgent area of study.

The Department of Defense is investing money into Neurotrauma research especially in defense against IED's, improvised explosive devices. Impact Neurotrauma has long been a major cause of child and infant long term morbidity. And now the data is saying that sporting events are more long term damaging than had been thought. Brain damage is commonly disabling, disruptive, and long term.

Studies from the 1920's have documented the high risk of dementia and neuro-degeneration in boxers, this effect is well enough known to have been given the name, "dementia pugilistica", a name now changed to "Chronic Traumatic Encephalopathy" or CTE, to acknowledge that very similar brain damage is found prematurely in the brains of other impact subjects.

CTE is characterized originally by behavior changes (mild cognitive impairment, emotional outbursts, depression), and recently, in microscopic autopsy studies, by tau protein tangles about blood vessels in certain parts of the brain. This pathology is rare in normal subjects, some is present in Alzheimer's patients, but in different areas. Since beginning careful studies to look at microscopic brain abnormalities, 11 out of 12 former pro football players coming to autopsy have had tau tangles that should not be present.

A disturbing case was an 18 year old high school football player who had tau tangles. An 18 year old brain should not have any such abnormalities. At what age do such impacts begin to have significant effect? What about young children in sports?

The research to determine if multiple mild impacts has any result, if area of impact is important, or if only severe concussive injury produces these tau tangles has yet to be done. The mechanism by which the tau tangles may influence behavior are not determined. Methods to diagnose the presence of tau tangles short of autopsy have not been developed.

Research funded by NINDS/NIH through an SBIR grant has led to development of a novel impact device that can be mounted on a stereotaxic instrument, and take advantage of that instruments precise positioning and angle capabilities. This device is offered commercially by Leica Biosystems, St. Louis at the following link: [Impact One](#)