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*Can we Prevent Concussions in Sports and Chronic Traumatic Encephalopathy in Later Life?*

Research was conducted to determine the effectiveness of anti-concussion headbands in preventing either concussions or Chronic Traumatic Encephalopathy (CTE) in soccer. Phase one of this project explored the effectiveness of anti-concussion headgear. While there is no accepted concussion threshold, 50-95g's of brain acceleration is commonly used in research. After completion of the first phase, numerous studies were published on CTE's in athletes, particularly soccer players, as a result of cumulative sub-concussive impacts. During phase two, the 1,300 pages of data collected in 40 impacts in phase one were reexamined and additional best/worst case calculations performed for CTE prevention. As in vivo accelerometers cost thousands of dollars, in vitro research was conducted using equipment supplied by the CSU Department of Physics.

Heading Simulation for CTE Prevention: 1. A competitive soccer player kicks a soccer ball at a force plate multiple times as the control. 2. Measurements were repeated with an anti-concussion headband attached to the force plate as the variable.

Head to Head Simulation for Concussion Prevention: 1. Two soccer players strike force plates together at game speed as the control. 2. Collisions were repeated with one and two anti-concussion headbands as variables. Impulse and momentum calculations indicate heading with a headband would reduce brain acceleration between 6.35 and 29%, depending upon worst and best case assumptions. In neither case would the headband prevent CTE's or concussions. While significant in moderate collisions, headbands would not prevent concussions in extreme collisions.