Soccer and the Risk of Head Injury

| published July 6, 2014 |

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Football and boxing have been causing long-term brain damage for generations, and the evidence of the connection between head injuries and brain damage has only grown stronger in the last decade. But doctors and concerned observers have now turned their eyes toward soccer, according to the *Arizona Republic*, *Scientific American* and Dr. C.J. Abraham, who studies sports and brain injuries.

Until recently, boxers and football players would “get their bell wrung,” and almost immediately return to the fray, but critics say many soccer players also take almost no rest following horrific collisions.

An incident during a recent World Cup match between Uruguay and England is a prime example of Neanderthal thinking when it comes to dealing with head injuries. Uruguay's Alvaro Periera was going in for a tackle when he took a knee to the head and was knocked out, at which point he was laid on the pitch for more than a minute. When Periera began to emerge from a fog, he refused medical attention and insisted on returning to the game 30 seconds later. FIFA (Fédération Internationale de Football Association), soccer's international governing body, allowed this to occur—a scenario that often plays out on a massive scale worldwide.

"This one is a no-brainer—no pun intended—but he should have been kept out," said Dr. Javier Cardenas, a neurologist and concussion expert at St. Joseph's Medical Center in Phoenix. "The message it sends to all athletes regardless of their age is the wrong message."

The National Football League recently agreed to uncap a settlement concerning a multi-million dollar lawsuit brought by former players over concussions and painkillers. After recently joining the NFL's concussion committee, Cardenas noted the game will almost certainly change in the near future because of those injuries.

"I think you'll see less hits—you're definitely going to see less violent hits," he said. "The object of the game in football is to get to the other end of the field."

Concussions are often overlooked in soccer on the adult level, but doctors and administrators are taking a harder look at youngsters. All 50 states have rules concerning when children may re-enter games following concussions.

In Arizona, a player must pass a doctor screening before returning to a game if it's suspected he's suffered a head injury.

"As a coach you want them to go back in, as a player you want to go back in, but you know we have to take a step back and not think about ourselves," said Lindsay Johnson, director of coaching for the Arizona Soccer Club.

She said doctors or World Cup referees should have been more vigilant and not allowed Periera to return so quickly. Also, the rules are a primary reason top-level soccer players rarely leave a game for any reason. Each World Cup team is entitled to three substitutions per match, and after that the club must play short-handed.

On the other hand, soccer players are famous for performing theatrics while angling for a penalty. The National Basketball Association is the only other major sport rife with bad actors attempting to draw fouls.

Scientific evidence suggests excessively heading a soccer ball can cause serious brain injuries, according to Robert Cantu, professor of neurosurgery at Boston University School of Medicine.

"Our findings and the findings of other researchers show that heading a soccer ball can contribute to neurodegenerative problems, such as chronic traumatic encephalopathy," Cantu said. Researchers who’ve

followed soccer players have seen a close relationship between the amount of heading that a player does and brain abnormalities.

"There've also been studies where researchers compared soccer players to swimmers," Cantu said, "and swimmers' brains look perfectly normal while the soccer players' brains had abnormalities in their white matter fiber tracts. Nerve cells transmit their messages to other nerve cells by way of their fiber tracts, or axons, and if the brain is violently shaken enough, a person can have disruption of their fiber tracts." Cantu and his researchers are discovering damning evidence that shows the awful effects these brain abnormalities are causing.

"Excessive shaking of the brain—excessive sub-concussive and concussive trauma—can lead to cognitive symptoms, including memory problems as well as behavior and mood problems such as anxiety and depression," he said. "Other symptoms include trouble with sleep, light-headedness and headaches...We haven't yet followed these abnormalities over years. Those studies are ongoing. Do those abnormalities clear up over time or do they not? We don't know the answer yet. It's probably some of both."

And there are numerous reasons that it's taken an extended period of time for researchers to understand the effects of concussive and sub-concussive impacts on the brain.

"It's a very complex issue—you have biomechanical forces that can be measured, like the linear and rotational acceleration," Cantu said. "But we're dealing with a human, not an inert object in a laboratory. There are a lot of biological factors that influence whether that human being has a concussion: how many concussions that person has had before, how severe those concussions were and how close together they occurred."

Professional players including Brandi Chastain, a star of the 1999 FIFA Women's World Cup, are using this year's tournament to help call attention to the dangers and health risks associated with younger players.

However, documentation in European research publications stretching back two or three decades clearly shows that heading and sub-concussive impacts can result in brain damage to soccer players heading the ball, according to Dr. C.J. Abraham.

"I referenced a number of those peer reviewed publications in my paper titled *Your Body is Nothing Without a Brain*," Abraham said. "The additional is subconcussive brain injuries that are asymptomatic and cumulative. They are especially dangerous in young children with developing brains.

"The child, their coach and their parents have no idea that their brains are damaged. Young women are more prone to sub-concussive and concussive brain injuries than males. Their neck, back and shoulder muscles are not as developed as their male counterparts."

Abraham says CAT scans only measure structural changes, so more extensive tests are needed when examining younger children who may have received sub-concussive brain injuries.

"Young people are allowed back into the game and then wind up, after a few more sub-concussive hits, staying home with their parents taking care of them for months, years or until they are fully functional," Abraham said. "There is headgear available that can significantly reduce the effective impact to the brain when the players head the soccer ball."

Better protective gear is extremely important if we hope to stem the tide of permanent injuries to young people, according to Abraham. Organizers have been slow to get on the bandwagon when it comes to requiring headgear for youngsters playing soccer. He attributes this inaction to valuing machismo over a child's future and quality of life.

"We have medical specialists advising soccer teams in schools and leagues that know very little about impact forces and very few have had any training in the area of concussions in medical school," he said. "Why is the shin guard required and not headgear in soccer? Are the shins more important to the young children than their brains?"

"During my presentations at conventions there are parents and coaches that volunteer their experiences of raising their children 16 and 17 years and, because of a brain injury playing soccer, their children are home full time not able to go back to school, they can't remember, they can't read or communicate, they are depressed, and the parents have to take care of them until there may be improvement. Some of them had been taking care of their concussed child for a number of years without any improvement."

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