

# Study evaluates effect of heading a ball in soccer

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Credit: AI-generated image ([disclaimer](#))

The soccer ball is racing at a speed of 80 km/hr when the player uses their head to redirect it and score. Their team wins the game—but at what cost? UBC Okanagan research suggests the price is high.

The study shows that repetitive impacts of a [soccer](#) ball on a player's

head could cause damage to the cells of the nervous system. These findings, published recently in the *BMJ Open Sport and Exercise Medicine*, have implications for the more than 270 million soccer players worldwide.

"Soccer is unique in that playing the ball with the head is encouraged, yet players don't wear protective headgear," said Paul van Donkelaar, UBC Okanagan neuroscientist and senior author of the study. "Although there are a growing number of studies evaluating the wisdom of this, ours is the first to measure blood biomarkers of cell injury."

Van Donkelaar, along with his research team, evaluated the impact of 40 headers. Specifically, they measured the blood levels of two nerve cell enriched proteins, tau and light neurofilament (NF-L). Participants were also asked to record any concussion symptoms.

The numbers were compared to an alternate day when participants did not contact the [soccer ball](#) with their head. On the day that participants headed, NF-L levels were higher at one hour and 22 days later when compared to the day that they did not contact the ball with their head. The higher NF-L levels correlated with a higher number of concussion-like symptoms such as headaches, dizziness and confusion. There was no difference in the tau levels between the groups.

"We believe this is the first study to measure [blood levels](#) of NF-L and tau prior to, immediately after, and 22 days following a series of soccer headings," said van Donkelaar, a professor at UBC Okanagan's School of Health and Exercise Sciences. "These findings suggest that repetitive impacts in the form of soccer headers can cause damage to the nerve cells as measured by elevated NF-L levels and increased concussion-related symptoms."

Colin Wallace, recent UBC Okanagan doctoral graduate student and

study co-author, adds that NF-L has previously been noted as a promising biomarker for the detection of head injury as elevated levels are associated with acute concussion in athletes.

"We suggest that heading in soccer should not be overlooked as a potential way to inflict damage to [nerve cells](#)," said Wallace. "Perhaps our findings are game changers. As in hockey and other contact sports, changes in conduct and equipment should be considered."

"Sport-related concussion is becoming a major concern for athletes, parents, coaches and sport associations," added van Donkelaar. "Finding ways to improve the safety of contact sports is one key approach to mitigating the risks."

## Background

- Soccer is the most popular sport for Canadian children; 42 per cent play the game, according to a study by Heritage Canada, compared to 22 per cent for hockey.
- In terms of the rates of concussions in North American team sports, soccer ranks third behind football and hockey.
- In 2015, the U.S. Soccer Federation banned headers for players 10 and under.

**More information:** Colin Wallace et al. Heading in soccer increases serum neurofilament light protein and SCAT3 symptom metrics, *BMJ Open Sport & Exercise Medicine* (2018). [DOI: 10.1136/bmjsem-2018-000433](https://doi.org/10.1136/bmjsem-2018-000433)

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