

Young athletes with history of concussions may have more changes to their brains

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A new study suggests athletes with a history of concussion may show more brain injury from a later concussion, particularly in middle regions of the brain that are more susceptible to damage, when compared to

athletes with no history of concussion. The research is published in the August 25, 2021, online issue of *Neurology*. The athletes participated in sports like football, volleyball and soccer.

"We know concussions may have [long-term effects](#) on the brain that last beyond getting a doctor's clearance to return to play," said study author Tom A. Schweizer, Ph.D., of St. Michael's Hospital in Toronto, Canada. "It is unclear, however, to what extent the effects of repeated [concussion](#) can be detected among young, otherwise healthy adults. We found even though there was no difference in symptoms or the amount of recovery time, athletes with a history of concussion showed subtle and chronic changes in their brains."

This study focused on changes within two areas in the middle of the brain that are especially vulnerable to concussion. Researchers focused on [blood flow](#) in the cingulate cortex and white matter microstructure in the corpus callosum. Changes in blood flow and microstructure that show up on brain scans can indicate underlying [brain injury](#). The [cingulate cortex](#) is a layer of gray matter that coordinates sensory and motor skills. Below it is the corpus callosum, a broad band of nerve fibers linking the two hemispheres of the brain.

The study looked at 228 athletes with an average age of 20. This included 61 with a recent concussion and 167 without. Within the first group, 36 had a history of concussion. Within the second group, 73 had a history of concussion.

Researchers took up to five brain scans of each recently concussed [athlete](#), from time of injury to one year after returning to play.

Researchers found that one year after a recent concussion, athletes with a history of concussion had sharper declines in blood flow within one area of the cingulate compared to those without a history of concussions.

Those with a history of concussion had an average cerebral blood flow of 40 milliliters (mL) per minute, per 100 grams (g) of [brain tissue](#). Those without a history of concussion had an average cerebral blood flow of 53 mL per minute, per 100g of brain tissue.

In athletes with a history of concussion, in the weeks after a new concussion, researchers also found microstructural changes in a region of the brain called the splenium, which is part of the [corpus callosum](#).

"Our findings suggest that an athlete with a history of concussion should be watched closely, as these subtle brain changes may be worsened by repeated injury," said Schweizer. "Additionally, our results should raise concern about the cumulative effects of repeated head injuries later in life."

A limitation of the study is that athletes reported their own histories of concussion and could be inaccurate. Further research is needed that would follow athletes over time.

Provided by American Academy of Neurology

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