

Study with female rugby players shows a regular season of play results in changes in the brain

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Credit: University of Western Ontario

Researchers at Western University have shown that a regular season of play can cause changes in the brain that are similar to changes caused by

concussion, though less severe. Using sophisticated Magnetic Resonance Spectroscopy the researchers looked at metabolite levels in the brains of female varsity rugby players at the beginning of their season, after suffering a concussion, and again at the end of the season.

"What we found is that the players that had suffered a [concussion](#) during the season had a large reduction in the level of a [metabolite](#) called glutamine," said Robert Bartha, PhD, professor at Western's Schulich School of Medicine & Dentistry and Scientist at Western's Robarts Research Institute. "We also showed that players that didn't have a concussion had a similar but smaller reduction of this metabolite called glutamine, when we looked at their baseline measures compared to their after-season measures."

Glutamine is an important part of the glutamate neurotransmission cycle in the brain and a reduction in glutamine suggests there may be a shift in this glutamate-glutamine cycle. "Glutamine is a very interesting metabolite because it is involved in a number of different processes in the brain," said Bartha. "Glutamine is also a byproduct of glucose metabolism, so lower glutamine could be the result of lower glucose metabolism. Under some conditions it can also be used as an energy substrate, so if the brain needs a lot of energy, it can use some of the [glutamine](#) to power the cells."

The other finding was that these metabolite changes persisted even after the clinical scores for concussion had returned to normal and the athletes were cleared to return to play. The study authors suggest that these metrics may be more sensitive to brain injury and could aid in assessing recovery of [brain](#) injury from concussion.

By studying the athletes at baseline before the [season](#) began, Bartha, and PhD candidate Amy Schranz were able to compare the subjects to themselves instead of to a control group, allowing them to see very subtle

changes.

"We studied the female varsity rugby team here at Western University and that team was chosen in particular because females are underreported in the literature," said Schranz. "We followed this team for five seasons and that allowed us to collect data on over 50 individuals, which included over 20 concussions across 15 individual players."

More information: Amy L. Schranz et al, Reduced brain glutamine in female varsity rugby athletes after concussion and in non-concussed athletes after a season of play, *Human Brain Mapping* (2017). [DOI: 10.1002/hbm.23919](https://doi.org/10.1002/hbm.23919)

Provided by University of Western Ontario

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