

Scientists say blood protein could help detect delayed concussion recovery in children

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Researchers have discovered a blood protein that could help detect which children will experience ongoing concussion symptoms more than two weeks after an injury.

The research, led by Murdoch Children's Research Institute (MCRI) and published in the [*Journal of Neurotrauma*](#), found the protein was a potential biomarker for delayed recovery from [concussion](#) in children.

For the study, blood samples were collected from children, aged 5-18 years, who presented to the [emergency department](#) at The Royal Children's Hospital less than 48 hours after a concussion.

Levels of the protein alpha-1-antichymotrypsin (alpha-1-ACT) were significantly lower in children with a delayed recovery.

MCRI researcher Ella Swaney said with concussion being a growing public health concern, there was an increasing need to develop a tool that could contribute to identifying those at risk of delays to recovery.

Of the four million children who experience a concussion each year, 25-30% will have long-term symptoms and about half will never seek out medical care. Symptoms including headaches, difficulty remembering and sensitivity to light can last for months while mental health conditions can persist for several years.

"Delayed recovery from concussion spans emotional, behavioral, physical and cognitive symptoms, which can affect the well-being of the child, delaying their return to school and sport," Ms Swaney said.

"Early detection of children at risk of delayed recovery is crucial to ensure effective treatment and targeted follow-up."

MCRI Professor Vicki Anderson said this small study, involving 80 children, was the first in human trial to identify that alpha-1-ACT could contribute to the early detection of those who will experience a delayed recovery from concussion.

"If the finding holds up in larger studies, the discovery could contribute to acute clinical management by providing clinicians with an acute marker to guide more timely and targeted treatments to children most likely to experience long-term problems," she said.

Mackenzie, 16, suffered a concussion during a netball match 15 months ago. She was hit in the face by an opposing player's upper arm, knocking her out, and causing her to smack her head on the indoor court.

Out cold for a minute and suffering a nosebleed and swollen left eye, Mackenzie was taken to hospital where she was diagnosed with a concussion.

"I was knocked out while jumping mid-air, the force spinning me 180 degrees, and then I landed on my head for a second blow," she said.

"When I woke up, I couldn't see out of my eye and I was lying in a pool of my own blood. I felt dizzy, confused and everything became a blur."

In the weeks that followed, as well as the dizziness and confusion, Mackenzie was nauseous, sensitive to bright lights, had [memory loss](#), headaches and muscle soreness and poor mental health. She also missed weeks of school due to the ongoing concussion symptoms.

To help her recover, Mackenzie was enrolled in MCRI's Concussion Essentials Plus program for children with chronic persisting concussion symptoms. It involved weekly physiotherapy and psychology treatments spanning months and education around return to exercise, school and sports.

"It was a slow recovery process, but the intervention helped me return to my normal self again," she said. "All I wanted was to be back on the netball court. I didn't understand at the time how much of a long-term

impact concussion can have."

Mackenzie returned to netball five months after the injury.

"I'm more hesitant and cautious on the court now but I would never give up playing netball, I love the sport too much," she said.

Mackenzie's mum Karen Payne, who will never forget the image of her daughter lying unconscious on the court, said the latest MCRI research would come as a welcome to relief to families.

"If clinicians can easily find out which [children](#) will have long term concussion symptoms then they can receive targeted and early intervention," she said. Recovery from concussion can be a long process, like our daughter's, and anything that can help speed up the process would make a world of difference."

In 2023, [a vast body of international research](#), with major contributions from MCRI researchers, took a deep dive into all aspects of concussion management.

The updated consensus findings aimed to change how concussion was viewed across sporting codes, recreational sport and within medical clinics and emergency departments by overhauling exercise and rehabilitation methods and upgrading return-to school and return-to-sport protocols.

Another concussion management tool, the [HeadCheck App](#), designed by child concussion experts at MCRI in collaboration with The Royal Children's Hospital and the Australian Football League (AFL), also helps recognize concussion early and manage [recovery](#).

Researchers from the University of Melbourne, Macquarie University's

Australian Proteome Analysis Facility, Austin and Cabrini Hospitals, Johns Hopkins All Children's Institute for Clinical and Translational Research and Hopkins University also contributed to the study findings.

More information: Discovery of alpha-1-antichymotrypsin as a marker of delayed recovery from concussion in children, *Journal of Neurotrauma* (2024). [DOI: 10.1089/neu.2023.0503](https://doi.org/10.1089/neu.2023.0503)

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