Medical Xpress

New blood test could improve concussion diagnosis: Study

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A global blood test for concussion could be a step closer after a Monash University-led study discovered specific proteins or biomarkers that can help diagnose concussions relatively quickly and accurately.

Once approved, a blood test identifying these biomarkers could improve the diagnostic process of concussion following accidents, sport-related collisions, or other injuries, aiding management and recovery. It would be used alongside, rather than replace existing diagnostic measures such as physical signs and symptom self-reporting, to improve accuracy.

There is no blood test approved globally for concussion, also known as mild traumatic brain injury. While a CT scan can be used to detect a brain bleed after concussion, most concussions do not result in brain hemorrhage. Published in *Neurology*, the new study looked at four protein biomarkers.

The collaborative study between Monash University researchers and The Alfred Emergency Department (ED) clinicians discovered that blood levels of three proteins, each reflecting different aspects of the biology of brain trauma, provided precision in classifying concussion for patients under the age of 50 who present to an ED within six hours of injury.

When the inflammatory biomarker, interleukin 6 or IL-6, was measured alongside glial fibrillary acidic protein (GFAP) and ubiquitin C-terminal hydrolase L1 (UCH-L1), two proteins exclusive to the brain, this combination showed incredible sensitivity and specificity in distinguishing individuals with concussion from those without.

Study lead and Monash Trauma Group Principal Investigator Dr. Stuart McDonald said accurate diagnosis of concussion was often difficult as clinicians rely on symptoms, often self-reported, or tools like imaging that lacked sensitivity to this form of brain injury.

"Concussion diagnosis is notoriously challenging in many cases because clinicians rely on subjective observations of physical signs and self-reported symptoms, neither of which are specific to concussion and often exhibit subtlety and rapid evolution," Dr. McDonald said.

"Consequently, even in the ED, individuals can be discharged without a definitive diagnosis. Our findings showed that the panel of biomarkers we assessed performed really well even in patients that lacked the more overt signs of concussion, such as loss of consciousness or post-traumatic amnesia."

Co-study lead and Monash University Professor Biswadev Mitra, who is Director of Emergency Medicine Research at The Alfred, said if further research validated these results and biomarkers were granted regulatory approval in Australia, they could increase diagnosis certainty not just for clinicians but for patients too, enabling earlier management.

"Within the ED, we believe the test might prove useful in providing certainty in difficult-to-assess cases, especially when a patient may be unwilling or unable to communicate their symptoms," Professor Mitra said.

"One example could be in cases of domestic violence, where the test might reveal a mild brain injury that could otherwise go unnoticed."

Dr. McDonald said the test had great potential to help manage sports concussion.

"While at this stage it may not be feasible to conduct a test that alters decisions within a match, players with a potential or suspected concussion that are removed from play could feasibly be tested soon after the match, with a more definitive diagnosis helping with many aspects of the player's recovery and return to play process," he said.

"Given concussion remains a clinical diagnosis, the best clinical assessments and patient care are likely in the ED setting. Nevertheless, there is potential for this test to be applied beyond the hospital setting in the near future."

The project also identified another biomarker that could help in diagnosis much later after a concussion.

In the same patients studied a week after their concussion, the researchers found another brain specific biomarker, neurofilament light (NfL), was elevated in blood and had comparable diagnostic properties as the acute markers.

Dr. McDonald said this suggested NfL could be particularly suited for assisting concussion diagnosis in cases of delayed assessments.

"Beyond the ED, measures of blood NfL may be most beneficial when individuals consult a GP multiple days after an impact, especially in situations where diagnostic certainty is crucial for making safe return-to-work or return-to-play decisions, such as in military or sports settings," Dr. McDonald said.

More information: Jonathan Reyes et al, Utility of Acute and Subacute Blood Biomarkers to Assist Diagnosis in CT Negative Isolated Mild Traumatic Brain Injury, *Neurology* (2023). DOI: 10.1212/WNL.0000000000207881. n.neurology.org/content/early/ … WNL.0000000000207881

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