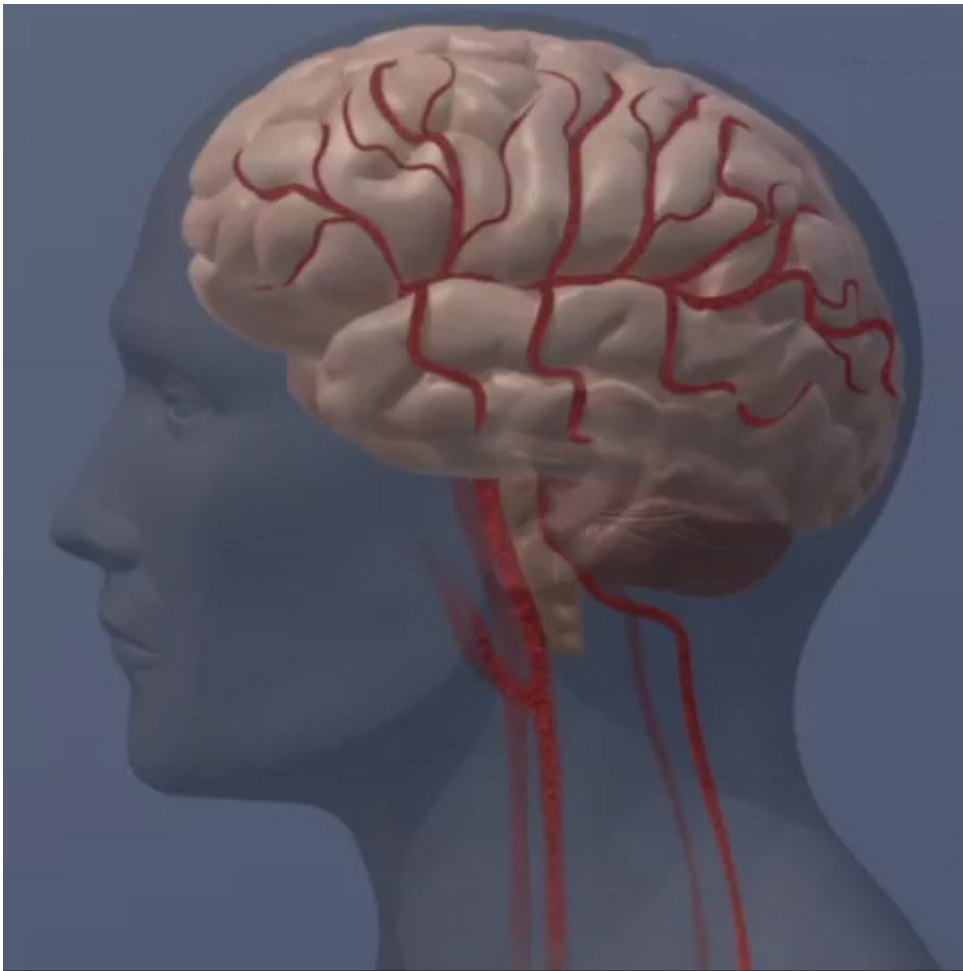


Researchers hope new biomarkers will lead to sports pitch-side test for brain injury

July 10 2017



Credit: copyright American Heart Association

Researchers at the University of Birmingham have identified

inflammatory biomarkers which indicate whether the brain has suffered injury. The team, led by Professor Antonio Belli, at the University's College of Medical and Dental Sciences, now hopes to use these new biomarkers to develop a test which can be used on the side of a sports pitch or by paramedics to detect brain injury at the scene of an incident.

Dr Lisa Hill, of the Institute of Inflammation and Ageing at the University of Birmingham, said: "Traumatic [brain injury](#) (TBI) is the leading cause of death and disability among young adults and, according to the World Health Organization, by 2020 TBI will become the world's leading cause of neurological disability across all age groups.

"Early and correct diagnosis of [traumatic brain injury](#) is one of the most challenging aspects facing clinicians. "Being able to detect compounds in the blood which help to determine how severe a brain [injury](#) is would be of great benefit to [patients](#) and aid in their treatment.

"Currently, no reliable biomarkers exist to help diagnose the severity of TBI to identify patients who are at risk of developing secondary injuries that impair function, damage other brain structures and promote further cell death.

"Thus, the discovery of reliable biomarkers for the management of TBI would improve clinical interventions."

Inflammatory markers are particularly suited for [biomarker](#) discovery as TBI leads to very early alterations in inflammatory proteins.

In this novel study published today in *Scientific Reports*, blood samples were taken from 30 injured patients within the first hour of injury prior to the patient arriving at hospital.

Subsequent blood samples were taken at intervals of four hours, 12 hours

and 72 hours after injury. These blood samples were then screened for inflammatory biomarkers which correlated with the severity of the injury using protein detection methods.

In the laboratory, the team used a panel of 92 inflammation-associated human proteins when analysing the [blood samples](#), which were screened simultaneously.

The serum biomarkers were analysed from patients with mild TBI with extracranial injury, severe TBI with extracranial injury and extracranial injury only and all groups were compared to a control group of healthy volunteer patients.

The results identified three inflammatory biomarkers, known as CST5, AXIN1 and TRAIL, as novel early biomarkers of TBI.

CST5 identified patients with severe TBI from all other cohorts and, importantly, was able to do so within the first hour of injury. AXIN1 and TRAIL were able to discriminate between TBI and uninjured patient controls in under an hour.

Dr Valentina Di Pietro, also of the Institute of Inflammation and Ageing at the University of Birmingham, said: "Early and objective pre-hospital detection of TBI would support clinical decision making and the correct triage of major trauma.

"Moreover, the correct diagnosis of TBI, which is one of hardest diagnosis to make in medicine, would allow clinicians to implement strategies to reduce secondary brain injury at early stage, for example, by optimising blood and oxygen delivery to the brain and avoiding manoeuvres that could potentially increase intracranial pressure.

"In addition, this has potential implications for drug development, as

novel compounds could be given immediately after injury and potentially commenced at the roadside, if there was sufficient confidence in the diagnosis of TBI.

"We conclude that CST5, AXIN1 and TRAIL are worthy of further study in the context of a pre-hospital or pitch-side test to detect [brain injury](#)."Ends

More information: *Scientific Reports* (2017).
www.nature.com/articles/s41598-017-04722-5

Provided by University of Birmingham

Citation: Researchers hope new biomarkers will lead to sports pitch-side test for brain injury (2017, July 10) retrieved 18 April 2024 from
<https://medicalxpress.com/news/2017-07-biomarkers-sports-pitch-side-brain-injury.html>

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