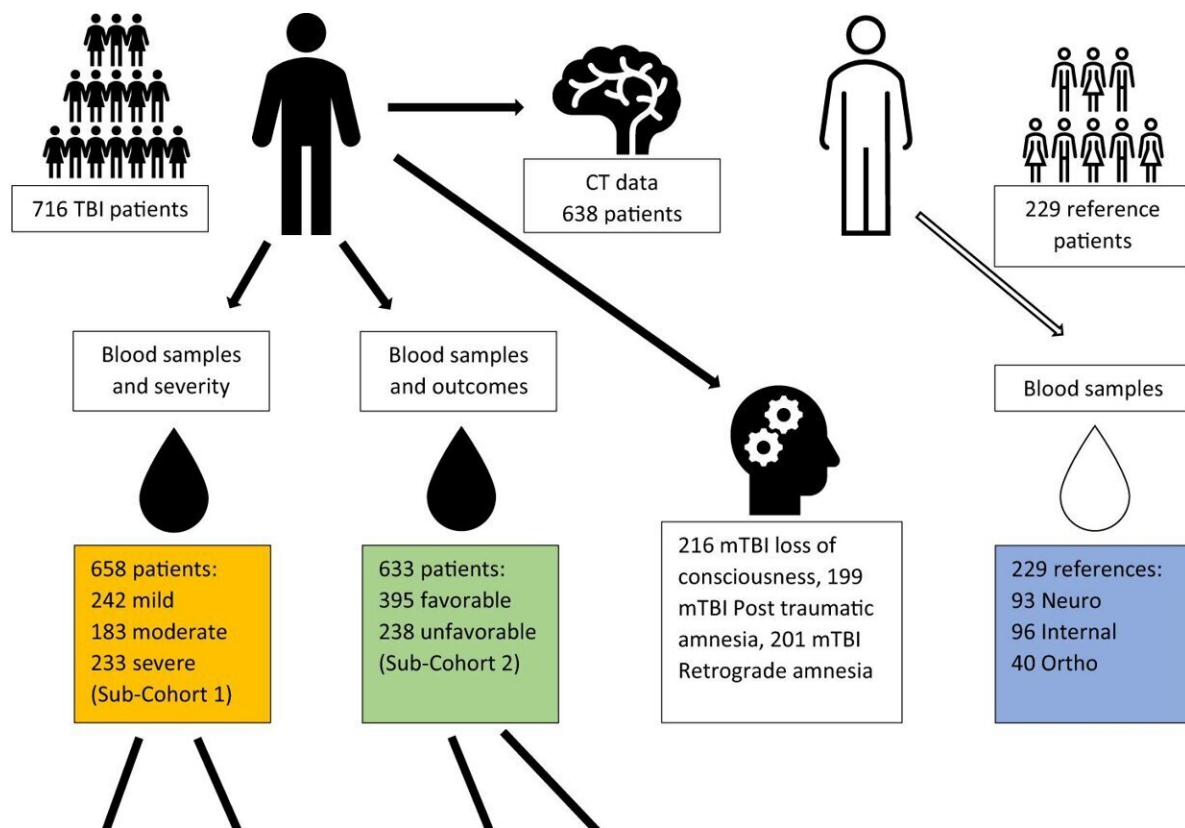


# A simple blood sample indicates how serious a head trauma is

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The study setting. Black color denotes TBI patients and white color denotes reference patients. The TBI patients were from all three severity groups (mild, moderate, severe) and the reference patients were from three injury types: internal medicine, orthopedic, and neurological (blue box). The main analysis for severity discrimination was on patients for whom GCS scores were available (sub-cohort 1, yellow box) at baseline evaluation and the main analysis for outcome discrimination was on patients that had GOSe available (sub-cohort 2, green box). Most patients belong in both sub-cohorts. For the TBI-reference

patient discrimination analysis data from sub-cohort 1 and the control patients were analyzed (yellow box plus blue box). Further sub-populations were examined from sub-cohorts 1 and 2, based on availability of more refined data (extra-cranial injury, propofol administration, protein biomarkers, and variables necessary for the evaluation of the CRASH model). For the full TBI cohort associations between the metabolomic/lipid levels and CT findings were made. Abbreviations: Neuro, patients with acute stroke or other neurological conditions; Internal, acute internal medicine illnesses (e.g., infections, cardiac symptoms, GI-symptoms) (Internal); Ortho, patients with acute orthopedic or other non-brain traumas; mTBI, mild TBI. Credit: *Nature Communications* (2022). DOI: 10.1038/s41467-022-30227-5

A simple blood sample to diagnose patients with traumatic brain injury is an innovation enabled by researchers at Örebro University. In a new study, reported in *Nature Communications*, they have identified biomarkers in the blood that indicate how serious a head trauma is.

A fall, a [road traffic accident](#) or assault. Those are the most common causes of traumatic brain injury. Over 140 million people around the world are living with symptoms of head trauma. Those affected are primarily under the age of 40.

"Having an accident early in life can have major consequences. Better and safer diagnosis is therefore vital," says Matej Orešič, professor of medicine at Örebro University.

In Örebro, researchers have worked on a method that does not require a surgical procedure. They have used [blood samples](#) collected by researchers, all part of an EU project, in 20 European countries—the largest study of its kind.

With the help of metabolomics—a way of using [chemical analysis](#) to

extract information about thousands of [small molecules](#)—the Örebro researchers have identified biomarkers that can be linked to traumatic brain injury.

"As a result, we're able to categorize the injuries more clearly. It's cost-effective, not to mention simpler and safer for the patient," says András Büki, professor of medicine at Örebro University.

Today, [traumatic brain injury](#) is divided into three categories, from mild to severe, and there are no reliable methods to rule out acute brain injury.

"To us, the acute phase is the most critical, and with the help of these biomarkers, we can assess how severe the injury is—and what's more, we can arrive at a prognosis of the outcome for the patient going forward," says András Büki, previously responsible for organizing neurosurgical care for patients in the Pecs region, with a population of one million, in Hungary.

"It may be that in some cases, even a milder concussion can cause long-term and serious trauma. And we'll be able to see that by taking a [blood sample](#)," says Matej Orešič.

People sustaining milder brain injury often experience tiredness, [memory loss](#) and problems with their balance even long after the accident. This applies not least to athletes who often sustain repeated concussions, and these may have major consequences.

"Currently, we have no tools for a straightforward assessment of when an athlete can go back to training or competing following a concussion. Not everyone can get an MRI scan—but a blood sample would enable us to increase testing capacity," says András Büki.

"If we look at heart patients, there are significantly more tools available with which to assess them. We hope that we're now on a path towards better treatment—and research—also for neuro patients," says András Büki.

**More information:** Ilias Thomas et al, Serum metabolome associated with severity of acute traumatic brain injury, *Nature Communications* (2022). DOI: [10.1038/s41467-022-30227-5](https://doi.org/10.1038/s41467-022-30227-5).  
[www.nature.com/articles/s41467-022-30227-5](https://www.nature.com/articles/s41467-022-30227-5)

Provided by Örebro Universitet

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