

Researchers identify protein that predicts post-concussion severity in professional athletes

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New Penn Medicine research has found that elevated levels in the blood of the brain-enriched protein calpain-cleaved β -II-spectrin N-terminal fragment, known as SNTF, shortly after sports-related concussion can predict the severity of post-concussion symptoms in professional athletes. The complete findings were released today in the *Journal of Neurotrauma*.

This new study builds on previous research from this group showing that elevated [blood](#) levels of SNTF on the day of a mild [traumatic brain injury](#) treated in the emergency room predicted those patients who would go on to suffer diffuse axonal injury and long-term cognitive dysfunction.

"We extended this biomarker research to the domain of professional sports to test its merit as an objective and rapid way to determine [players'](#) severity of [brain injury](#)," says lead author, Robert Siman, PhD, Research Professor of Neurosurgery at Penn. "This blood test may aid neurobiologically-informed decisions on suitability for return to play following a sports-related [concussion](#)."

The study, conducted in collaboration with Henrik Zetterberg, MD, PhD and Kai Blennow, MD, PhD, of the Sahlgrenska Academy at University of Gothenburg, Sweden, and their colleagues, enrolled 288 players in the top Swedish professional ice hockey league. Each of the 28 players who suffered a concussion during the first half of the 2012-2013 season received serial blood draws and was evaluated daily for symptom resolution using the latest guidelines for treatment of sports concussions. Eight of the concussed players were symptom-free within a few days of their injury, but 20 of the players had persistent post-concussion symptoms requiring they be withheld from play six days or longer. An additional 45 players were evaluated during the preseason,

17 of whom were also tested before and after a concussion-free training game.

Compared to those players who were not concussed, or whose concussion symptoms resolved rapidly, the researchers found an increase in the blood SNTF concentration from one hour up to 144 hours post-concussion in those players experiencing persisting post-concussion symptoms. SNTF is a protein that is present at undetectable levels in healthy human brains, but is produced under conditions where nerve cells are traumatized and begin to die. Concussions that lead to lasting brain dysfunction cause SNTF to accumulate in vulnerable long axon tracts of the brain, and its blood elevation is a measure of this diffuse axonal injury.

"These results show that SNTF has promise as a blood biomarker for sports-related concussion and beyond. High blood levels of SNTF appear to identify acute brain damage that corresponds with persisting symptoms after concussion. These observations lend further support to the growing awareness that concussion is not trivial, since it can induce permanent brain damage in some individuals," agree Siman and senior author, Douglas H. Smith, MD, professor of Neurosurgery and director of the Center for Brain Injury and Repair at Penn.

Provided by University of Pennsylvania School of Medicine

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