
RSNA15: Acute Concussion After Effects Seen with MRI



The effects of acute concussion continue even after clinical recovery, according to a study to be presented today at the Radiological Society of North America (RSNA) meeting in Chicago. Concussed athletes are usually cleared to return to play based on symptoms and cognitive and neurological test results. However, there is increasing evidence that brain abnormalities persist beyond the point of clinical recovery after injury. Researchers from the Medical College of Wisconsin in Milwaukee studied concussed American football players with arterial spin labelling, an advanced MRI method that detects blood flow in the brain. They found that some athletes who experience sports-related concussions have reduced blood flow in parts of their brains even after clinical recovery. The results suggest a role for MRI in determining when to allow concussed athletes to return to competition.

In their study [Yang Wang](#), MD, PhD, associate professor of radiology at the Medical College of Wisconsin and colleagues evaluated 18 concussed players and 19 non-concussed players. They obtained MRI of the concussed players within 24 hours of the injury and a follow-up MRI eight days after the injury and compared results with those of the non-concussed players. Clinical assessments were obtained for both groups at each time point, as well as at the baseline before the football season. Dr. Wang explained that the advantage of arterial spin labelling is that it measures blood flow noninvasively, with no exposure to radiation. Said Wang, "We use arterial blood water as a contrast tracer to measure blood flow change, which is highly associated with brain function."

The concussed players demonstrated significant impairment on clinical assessment at 24 hours post-injury, but returned to baseline levels at eight days. In contrast to clinical manifestation, the concussed players demonstrated a significant blood flow decrease at eight days relative to 24 hours post-injury, while the non-concussed players had no change in cerebral blood flow between the two time points.

"In eight days, the concussed athletes showed clinical recovery," Dr. Wang said. "However, MRI showed that even those in clinical recovery still had neurophysiological abnormalities. Neurons under such a state of physiologic stress function abnormally and may become more susceptible to second injury."

While the reasons for reduced cerebral blood flow in concussed athletes are still under investigation, the findings may have important implications for decisions on when athletes are ready to return to play after head injuries, according to the study's principal investigator, Michael McCrea, PhD, professor of neurosurgery and neurology and director of brain injury research the Medical College of Wisconsin.

"For years, we've relied on what athletes are telling us," Dr. McCrea said. "We need something more objective, and this technology may provide a greater measurement of recovery."

See Also: [Older Patients Recover More Slowly From Concussion](#)

The Medical College of Wisconsin scientists are continuing their research as one of the Phase II winners of the Head Health Challenge, an initiative from the National Football League and General Electric to develop ways to speed diagnosis and improve treatment for concussion. Dr. McCrea and his team are also co-chairing the [Concussion Assessment, Research and Education Consortium \(CARE\)](#) project, a major national effort that will enroll more than 30,000 college athletes, making it the largest study of concussions to date.

"The nature of this research allows us to study the mechanisms of injury and recovery directly in humans rather than in animal models," Dr. McCrea said. "Our ultimate aim is to better understand the time course of neurobiological recovery after concussion."

Other co-authors on the study are Lindsay D. Nelson, PhD, Ashley A. LaRoche, Adam Y. Pfaller, BS, Andrew S. Nencka, PhD, and Kevin M. Koch, PhD.

When and Where

Dr. Wang will present "Reduced Cerebral Blood Flow Detected after Clinical Recovery in Acute Sports-related Concussion" on Monday 30 November, 10.40-10.50 during the session on Neuroradiology (Traumatic Brain Injury), 10.30-12, N226, North Building, Level 2

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