

Better testing needed to monitor brain health after sports concussion

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More thorough testing is needed to decide when football players are fit to return to the field after suffering a concussion, according to Deakin University research.

Dr Alan Pearce, a neuroscientist with Deakin's School of Psychology, used a range of assessment methods to chart the recovery of Australian-rules football players following a concussion.

He found that, compared to uninjured players, those who had suffered a concussion showed abnormal motor control, mental ability and [brain activity](#). These injuries took various lengths of time to return to normal, with some still present 10 days after the concussion.

"This suggests that the underlying injury to the brain can take some time to mend and may still be present after the visible symptoms have passed," Dr Pearce said. "Current testing measures will not pick up the actual impact to the brain so there is a need to review the testing regime to ensure that concussed players do not return to the field before the brain has had time to fully recover."

With understanding and managing [sports concussion](#) in the spotlight again this week in the lead up to the NRL grand final, Dr Pearce's study is a timely reminder of how important it is to more accurately assess player recovery.

"It is pleasing to see NRL officials reminding clubs to adhere to the

league's concussion policy during the grand final, and these policies do go some way to ensuring player safety," Dr Pearce said.

"We now know that the brain can take up to 10 days or longer to recover from the impact of a concussion.

"From the grassroots through to the professional level, multiple modes of testing over more than five days are therefore needed to assess a player's recovery from sports related concussion.

"The brain simulation tests we used in this latest study are one addition that will provide a more reliable understanding of the impact on [brain function](#) and allow a better informed judgement of when a player is fit to return to play.

"While my study has focussed on AFL, ensuring the most accurate testing possible is essential to ensure long term brain health regardless of the sporting code."

Sports concussion is a form of mild traumatic injury, where a blow to the head causes loss of brain function that can result in symptoms including headaches, nausea, visual disturbances, disorientation or amnesia and loss of balance, with loss of consciousness only reported in between 10 and 20 per cent of cases. Dr Pearce's previous research found that sports concussion can cause long-term damage to the brain.

A number of tests are currently undertaken to assess if a concussed player is fit to return to play.

"At the elite level, medical doctors use the sports concussion assessment tool version 3 (SCAT3) followed up by computerised mental testing programs and/or graded exercise testing to see if the player develops symptoms of concussion," Dr Pearce explained

"With the graded testing, players who have had a concussion attend training after a day or two of rest and run around the ground at increasing intensities. If they do not develop a headache or dizziness during the increased exercise bout, they are considered fit enough to resume training and to compete.

"At the amateur level concussion monitoring is ad-hoc with some clubs enforcing a rest policy, but a majority of clubs allowing players to continue training and playing if they show no obvious symptoms."

For this latest study, Dr Pearce measured the motor control (fine movement skills), mental functioning (reaction time, memory and attention) and brain activity of 40 players from an amateur football club over one season. Eight players who had sustained concussions were tested 48 hours, 96 hours and 10 days after the injury. The other players were tested three times over two weeks at the end of the season.

For the concussed players, the tests showed a slower response and movement time that resolved within 48 hours. However at the 10 day mark, attention and brain activity had not fully recovered.

"What was novel about our testing approach was the use of transcranial magnetic stimulation (TMS), a safe and painless way of delivering electromagnetic pulses into select areas of the brain, to get a true measure of the changes in brain activity occurring," Dr Pearce explained.

"Using TMS enabled us to quantify the level of changes to [brain](#) activity more accurately than the desktop computer tests used."

The results of Dr Pearce's study, 'Acute motor, neurocognitive and neurophysiological change following [concussion](#) injury in Australian amateur football. A prospective multimodal investigation', will be

published in an upcoming edition of the *Journal of Science and Medicine in Sport*. It is currently available online (article in press).

More information: "Acute motor, neurocognitive and neurophysiological change following concussion injury in Australian amateur football. A prospective multimodal investigation." Pearce AJ, et al. *J Sci Med Sport*. 2014 Jul 24. pii: S1440-2440(14)00136-4. [DOI: 10.1016/j.jsams.2014.07.010](https://doi.org/10.1016/j.jsams.2014.07.010). [Epub ahead of print]

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