Birmingham researchers look to give sports clubs a heads-up on concussion dangers

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A study looking into what happens to the brains of sportspeople in the aftermath of a concussion – and what could happen if they suffered a subsequent head injury - has been launched by researchers at the University of Birmingham.

Dr Michael J Grey (http://www.birmingham.ac.uk/schools/sport-exercise/staff/profile.aspx?ReferenceId=9921&Name=dr-michael-j.-grey), Reader in Motor Neuroscience in the School Sport, Exercise and Rehabilitation Sciences, and Mr **Tony Belli, (http://www.birmingham.ac.uk/staff/profiles/cem/NN/belli-tony.aspx)** Reader in Neurotrauma in the School of Clinical and Experimental Medicine, and a consultant neurosurgeon at the Queen Elizabeth Hospital, want to discover new ways to identify how vulnerable the brain is in the minutes, hours and days following an initial concussion.

They are particularly interested in the condition known as second impact syndrome – which occurs when a player who has sustained one concussion receives a second bang to the head. The cumulative effect of this second knock, even if slight, can be as severe as injuries sustained in a car crash – because the brain has not sufficiently recovered from the first injury.

Mr Belli's research to date has found that concussion causes an alteration of the brain metabolism associated with neuronal dysfunction and detectable by a special brain scan, MR spectroscopy (MRS).

These alterations are more significant when an individual has suffered a multiple head injuries, and they may correlate with the risk of neurodegenerative conditions such as Alzheimer's and Parkinson's.

The new three-year study will include biomarkers for concussion sufferers which have not yet been considered.

The researchers hope that it could eventually lead to a completely objective test for sportspeople suspected of suffering a concussion which would aid in the very difficult return to play decision.

Dr Grey and Mr Belli will take sportspeople within 48 hours of sustaining a concussion and, using a variety of techniques, scan their brain to look for physiological changes as a result of the concussion. The scans will then be repeated in the days and weeks following the injury to monitor how the brain heals.

They will use transcranial magnetic stimulation (TMS), which measures the function of cortical connections after brain injury, and is quick, semi-portable, inexpensive, safe and repeatable. If successful, they believe TMS could be applied in sports clinics as an alternative to MRS to monitor brain recovery and guide the timing for safe return to play.

Current guidance suggests that a player suffering concussion should rest with a graduated return to play – but current tests to determine if an athlete should play on are relatively subjective – and, crucially, possible for the player to 'cheat' by recording a deliberately low baseline test.

Dr Grey said: "The tests at the moment are based on neuropsychological tests – which rely heavily on player compliance. Our ultimate aim is to deliver a pitchside test which will categorically show whether a player can or cannot carry on.

"There are good guidelines at the moment with regards to removing players from the field of play and resting them but there are also some highly publicised instances which show that these guidelines are not always been adhered to – and players who should have been taken off are continuing to play and putting themselves at risk of even more serious injury."

Mr Belli said: "If we had a test, or a range of tests which were objective, based on changes to the brain and biomarkers that we can measure, there would be no argument – it would simply be a case of taking the player off.

"The issue of second impact syndrome is not that well-known but the brain can suffer very serious damage – and the fact people are not heeding that is very worrying."

The researchers are working with sports clubs at the University of Birmingham who will notify them of any concussions sustained by their players, but they are also interested in hearing from any other clubs or coaches who would like to be involved. For more information on participating, contact them at **m.j.grey@bham.ac.uk (mailto:m.j.grey@bham.ac.uk)** or **a.belli@bham.ac.uk (mailto:a.belli@bham.ac.uk)**.

The study is funded by the British Medical Association and is part of the **NIHR Surgical Reconstruction and Microbiology Research Centre (http://www.srmrc.nihr.ac.uk/)** - a national centre for trauma research which takes discoveries from the military frontline to improve outcomes for all patients in the UK.

Notes to editors

Dr Grey and Mr Belli are available for interview – please contact **Kara Bradley (mailto:k.j.bradley@bham.ac.uk)** in the University of Birmingham press office on +44 (0)121 414 5134 or +44 (0)7789 921163 to arrange.

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