

# Match of the decade: risk management of concussion versus high-speed collisions in the football codes

Do we need to change the way body-contact sports are played and administered?

Australians like to boast, as many nations do, that we are one of the most sports-obsessed societies in the world. To justify our belief, we can emphasise our sporting contributions to the world's modern entertainment culture. One can draw the analogy that Australia is to the football codes what Switzerland is to language. The mastery of German, French, Italian and, for the most part English, by the citizens of Switzerland is lauded for the achievement that it is. In Australia, we could argue a similar cultural achievement in hosting very well attended high-quality games of Australian football (Australian Football League [AFL]), rugby league (National Rugby League [NRL]), rugby union and soccer (football). We should perhaps celebrate more the biography of Tom Wills by Sydney psychiatrist Greg de Moore as an Australian history work of international interest that explores the development of some of the sports that dominate modern culture.<sup>1</sup>

Undoubtedly the world's predominant sport is soccer football and, on the world stage, Australia is a small player in this game. Yet the other football codes popular here can all claim to thrive in their smaller patches, not because of world dominance but because of particular excitements such as higher scoring and regular intense collisions between players.

At the extreme of the football codes, boasting the greatest number and most violent of collisions, is American football (National Football League [NFL]). Because of unlimited substitutions, heavy protective equipment and an enormous numbers of stoppages and of players on the interchange bench, American football has done away with any meaningful need for endurance, allowing players to completely focus on strength and speed. This has not hurt its popularity at all; the NFL is the best attended (by average attendance) of all sports leagues in the world. However, the rate of high-speed collisions has meant that the NFL has entered what is being dubbed the "concussion crisis" era. Neurodegenerative disease associated with the sport of boxing was described as long ago as the 1920s.<sup>2</sup> There is increasing concern among retired American footballers that head impact exposure and recurrent concussions contribute to long-term neurological sequelae including chronic traumatic encephalopathy and chronic neurocognitive impairment (CNI),<sup>3-5</sup> although the surmised cause-and-effect



Neale Cousland / Shutterstock.com

*"how much should rules and guidelines be changed to prevent head collisions and players who possibly have concussion continuing to play?"*

**John W Orchard**  
MD, PhD, FACS

University of Sydney,  
Sydney, NSW.

doi: [10.5694/mja15.00533](https://doi.org/10.5694/mja15.00533)

Online first 28/09/15

relationship with concussion is controversial.<sup>6</sup> The NFL has settled a lawsuit with retired players of close to US\$1 billion as compensation for these conditions.<sup>7</sup> On the field, the NFL have instituted measures such as a concussion rule, meaning that players must leave the game on being diagnosed with concussion, and that independent doctors oversee the diagnostic process (and, in particular, check that team doctors are not getting overruled by coaching staff).

Aside from sport, it is fair to say that Australia also prides itself on the quality of its doctors and medical system. The ripple effect of the NFL concussion crisis is already being felt strongly in the Australian football codes,<sup>8,9</sup> which now generally have measures in place to follow the Zurich concussion consensus guidelines.<sup>10</sup> Within the sports, some conflict has developed between traditionalists (many of the fans, players and coaches) who treasure the excitement of high-speed collisions, and what could be termed the public health lobby (many doctors, lawyers, risk-management experts and some parents choosing which sports to let their children play). In sports that have not yet documented any cases of chronic traumatic encephalopathy or increased risks of post-career CNI, how much should rules and guidelines be changed to prevent head collisions and players who possibly have concussion continuing to play? The football codes in Australia have now instituted concussion rules (that players must be removed from play if they show signs of or are diagnosed with concussion). In addition, rugby union and rugby league have banned shoulder charges and lifting/tip tackles because of the high risk of injury, and the AFL has introduced a wide range of rule

changes to improve player safety.<sup>11</sup> In Australia, as in other countries, there are limited publications to date on the average state of retired professional footballers in each of the codes, even though we do have some of the world's most recognised researchers of concussion in sport.<sup>12</sup> It is expected that any extent of post-career CNI in the other football codes would be probably be lower than that observed in American football, because these codes have more of an endurance athlete base and generate fewer high-speed collisions. However, without a full documentation of the problem, it is hard to know how much of a public health imperative there is to change the nature of the various games.

A paradoxical problem that the other football codes have compared with the NFL is the various substitution rules.<sup>13</sup> Unlimited substitution in the NFL has fed the beast of massive player size and greater momentum in collisions. However, it does allow unlimited removal of players from the match and immediate replacement with a like-for-like positional specialist. In all of the other football codes, substitution is a limited resource and can deplete a team's chance of winning when used up. The limits on the numbers of players on the bench mean that a like-for-like positional specialist may not even be available to replace a concussed player who needs to be substituted. The problem is compounded by both player reluctance to "let the team down" in acquiescing to being replaced when concussed, and the reality that history has shown that some concussed players can actually maintain a high level of motor performance despite clearly having sustained a concussion.

The issues in amateur sport are slightly different. It is easier to accept an attitude of the "player's long-term health" being more important than "win at all costs" at amateur level, but the practicality of making a concussion diagnosis is more difficult. A player with concussion may not have the mental capacity to make the sensible decision to exclude him or herself from further play on that day, but

at amateur level when there may be no medical staff present, who takes responsibility for this decision?

The new environment of professional football has led to some disagreements within the sports medicine profession. There are some team doctors who take great affront at the suggestion that their medical decision making could ever be compromised by the game context and insist that they can maintain control over the decisions of exclusion or return to play during a game. Other team doctors, perhaps having been in the situation of being subjected to extreme pressure by the coaching staff or even having their medical decisions overruled, feel that concussion-management decisions should now be made by independent doctors. The professional sporting team environment (of being in a somewhat subordinate role to coaching staff or management) is an unfamiliar one for many doctors who are used to a position at the top of a workplace hierarchy. Along similar lines, some team doctors feel that the numbers of replacement players need to be increased to reduce the potential penalty to a team of excluding a concussed player. Others are concerned that increases in the size of the replacement pool of players are unnecessary and may herald a trend in the NFL direction of breeding bigger athletes, making the potential for high-speed collisions even greater.

If it is a cliché that every medical journal opinion piece ends with a call for more research to be done, this one can end with the observation that Australia is a country where much extra research can be done on concussion in sport. The permutations of player size, speed, number of collisions, substitutions allowed and amount of game time are greatest here in the country that hosts the greatest number of football matches with unique rules.

**Competing interests:** I provide injury surveillance consultancy services to the AFL and was the club doctor for the Sydney Roosters NRL team from 1998 to 2013.

**Provenance:** Commissioned; externally peer reviewed. ■

© 2015 AMPCo Pty Ltd. Produced with Elsevier B.V. All rights reserved.

References are available online at [www.mja.com.au](http://www.mja.com.au).

- 1 de Moore G. Tom Wills: first wild man of Australian sport. Sydney: Allen & Unwin, 2008.
- 2 Martland H. Punch drunk. *JAMA* 1928; 91: 1103-1110.
- 3 Hart JJ, Kraut M, Womack K, et al. Neuroimaging of cognitive dysfunction and depression in aging retired National Football League players: a cross-sectional study. *JAMA Neurol* 2013; 70: 326-335.
- 4 Harmon K, Drezner J, Gammons M, et al. American Medical Society for Sports Medicine position statement: concussion in sport. *Br J Sports Med* 2013; 47: 15-26.
- 5 Maroon J, Winkelman R, Bost J, et al. Chronic traumatic encephalopathy in contact sports: a systematic review of all reported pathological cases. *PLoS One* 2015; 10: e0117338.
- 6 Davis G, Castellani R, McCrory P. Neurodegeneration and sport. *Neurosurgery* 2015; 76: 643-656.
- 7 Korngold C, Farrell H, Fozdar M. The National Football League and chronic traumatic encephalopathy: legal implications. *J Am Acad Psychiatry Law* 2013; 41: 430-436.
- 8 Gilbert F, Partridge B. The need to tackle concussion in Australian football codes. *Med J Aust* 2012; 196: 561-563.
- 9 <https://www.mja.com.au/journal/2012/196/9/need-tackle-concussion-australian-football-codes>
- 9 Kaye A, McCrory P. Does football cause brain damage? *Med J Aust* 2012; 196: 547-549. <https://www.mja.com.au/journal/2012/196/9/does-football-cause-brain-damage>
- 10 McCrory P, Meeuwisse W, Aubry M, et al. Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. *Br J Sports Med* 2013; 47: 250-258.
- 11 Orchard J, McCrory P, Makdissi M, et al. Use of rule changes to reduce injury in the Australian Football League. *Minerva Ortop Traumatol* 2014; 65: 355-364.
- 12 Makdissi M, McCrory P, Ugoni A, et al. A prospective study of postconcussive outcomes after return to play in Australian football. *Am J Sports Med* 2009; 37: 877-883.
- 13 Orchard J. More research is needed into the effects on injury of substitute and interchange rules in team sports. *Br J Sports Med* 2012; 46: 694-695. ■