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ARTICLE

‘The highest confidence that repetitive head collisions causes chronic traumatic encephalopathy’? Analysing the scientific knowledge in the Rugby Union concussion litigation of England and Wales

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Abstract

295 rugby players have begun legal proceedings against World Rugby, the Rugby Football Union and the Welsh Rugby Union. The claimants report they are suffering from chronic traumatic encephalopathy. Among the allegations against the defendants is that the player safety regulations (i.e. the Pitch Side Concussion Assessment and Return to Play protocols) in place at the time of injury were done without proper medical foresight and increased the risks of concussion to players. World Rugby’s safety regulations are informed by the work of the Concussion in Sport Group which maintains that the link between collisions and concussion is unclear. However, recent studies report an unprecedented confidence that sports-related concussion causes brain disease. In 2022, the Concussion in Sport Groups lead author resigned due to 10 counts of plagiarism. This saga risks damaging public respect for both the safety regulations and the science underpinning it. This article examines the state of the scientific literature and considers the challenges in proving (1) the governing bodies breached their duty of care and; (2) the causal link between collisions and brain injury. This article argues that 2022 marked the year that defendants can no longer deny the dangers of sports-related concussion, however, defining the moment when the risks ought to be known remains onerous. On causation, this article examines the principles of material contribution, doubling of the risk, and the material increase in risk. The article concludes with policy considerations inviting an extension of the material increase in risk principle to sports settings.

Keywords Sports governing bodies · Brain injury · Duty of care · Causation · Sports litigation · Sports policy

1 Introduction

Sports governing bodies (“SGBs”) are under increasing pressure to manage the epidemic of sports-related concussion (“SRC”).[1] July 2011 marked a pivotal moment when former National Football League (“NFL”) players filed a wave of claims against the NFL and its clubs. The allegations were that the NFL had negligently mishandled information surrounding the risks of SRC. The wider scientific community criticised the NFLs Mild Traumatic Brain Injury (“mTBI”) Committee for downplaying the risks of concussions and the relationship between playing in the NFL and neurodegenerative brain diseases, namely, chronic traumatic encephalopathy (“CTE”).[2] The parties settled in January 2014.[3]

[1] Marshall and Spencer (2001); Malcom (2021).

[2] Deubert and Cohen (2016), pp. 209–211.

[3] *Re National Football League Players’ Concussion Injury Litigation*, 307 FRD 422 [ED pa 2015].

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Although the settlement has no monetary cap, it has so far cost the NFL approximately $1.18 billion. Litigious proceedings have since been brought before other SGBs including the National Hockey League ("NHL"),[4] National Collegiate Athletic Association ("NCAA"),[5] and Australian Football League ("AFL").[6]

In the UK, approximately 295 professional and amateur rugby players have begun legal proceedings against World Rugby, the Rugby Football Union ("RFU") and Welsh Rugby Union ("WRU").[7] The claimants report that they are suffering from neurological injuries including early onset of dementia, CTE and motor neuron disease in their 40s. The accusations share many parallels with those against the NFL.[8] Since 2002, World Rugby has funded the Concussion in Sport Group ("CISG"), whose findings guide the safety regulations. In 2010, World Rugby relied on the CISGs findings to reduce the concussion stand-down period from three weeks to six days. The Pitch Side Concussion Assessment ("PSCA") was also introduced, which allows medical professionals to remove a concussed player from play. The claimants maintain these recommendations were done without proper medical foresight and increased the risks of SRC exposure to players. Among the dissenters is Dr Barry O'Driscoll, a member of the International Rugby Board ("IRB") Medical Committee, who resigned in 2012 due to concerns over player welfare. In March 2022, the CISGs lead author, Dr Paul McCrory, resigned due to 10 counts of plagiarism. This development compromises the integrity of the CISGs findings which downplay the risks of concussion. In an interesting development, World Rugby has since extended the stand-down period to 12 days in July 2022—moving in line with other sports.[9] However, lobbying groups would prefer a return to the three week protocol which had been in place since 1978. Taken together, this saga risks damaging public respect for the regulations.

This article focuses on the rugby union players claim in general negligence against World Rugby, the RFU and WRU for a breach of their duty of care in imposing effective regulation which ignores the risks of concussion. Though it should be acknowledged that the medico-legal arguments herein will have some carry over to the concussion litigation brought by 125 former rugby league players on similar grounds against the Rugby Football League ("RFL"), International Rugby League ("IRL") and British Amateur Rugby League Association ("BARLA"). All analysis in this article is framed under the common law system of England and Wales which establishes legal authority from passing legislation through Parliament or by case law. Given the magnitude of the medical matters in the rugby claim, the state of scientific knowledge is imperative at every stage of the legal analysis.[10] Scientific discussion is therefore required to determine, first, the available knowledge at the time of injury and second, the causal link between collisions and injury. From the outset, there are intrinsic difficulties in determining these issues. After all, "concussion is a complicated disease of the most complex organ in the body".[11]

1.1 The medical issue

Rugby union is a high-intensity collision team sport played in over 120 countries by over 9 million people.[12] The audit of the 2020–2021 English Premiership season showed that for the tenth season running concussion was the most reported injury, accounting for 28% of all injuries.[13] The 2020–2021 season also had the highest incidence of concussion since records began in 2002. A recent meta-analysis of the men's game confirms that the rate of concussion is among the highest of all team sports, and the single largest contributor to concussive injuries is the tackle.[14] The 6th

[4] Henry Goldschmidt, 'The NHL Concussion Litigation—A Second Class Settlement?' (LawInSport, 31 December 2018) <https://www.lawinsport.com/topics/item/the-nhl-concussion-litigation-a-second-class-settlement> accessed 17 May 2022.

[5] In *re National Collegiate Athletic Association Student-Athlete Concussion Injury Litigation* (2014 WL 7237208, 1 [N.D. Ill. Dec 17, 2014].

[6] The Guardian, 'Landmark class action chases up to $1bn compensation for alleged long-term concussion damage to AFL players' (London, 14 March 2023) <https://www.theguardian.com/sport/2023/mar/14/landmark-class-action-chases-compensation-for-alleged-long-term-concussion-damage-to-afl-players> accessed 11 October 2023.

[7] Coles, 'Rugby Told to "Change or Die": Amid Fears About Concussion Crisis Suicides' The Telegraph (London, 25 July 2022) <https://www.telegraph.co.uk/rugby-union/2022/07/25/ryan-jones-joins-legal-action-against-governing-bodies-dementia/> accessed 25 July 2022.

[8] James, 'The Full List of Accusations Rugby Players Are Making Against the WRU and World Rugby' The Guardian (London, 25 July 2022) <https://www.walesonline.co.uk/sport/rugby/rugby-news/full-list-accusations-rugby-players-24579869> accessed 25 July 2022.

[9] Kitson, 'World Rugby to extend concussion stand-down period by five days' The Guardian (London, 17 June 2022) <https://www.theguardian.com/sport/2022/jun/17/world-rugby-concussion-regulations-change> accessed 26 June 2022.

[10] Norris, Tavares (2022) 'Acquired Brain Injury and Civil Litigation'. In: van den Broek and Sembi (eds), *Brain Injury Claims* (2nd edn, Sweet & Maxwell 2022) chapter 1, part 1, para 2.

[11] Satarasinghe et al. (2019), p. 7.

[12] World Rugby, *Global Participation Map* (2018) <https://resources.world.rugby/worldrugby/document/2020/07/28/212ed9cf-cd61-4fa3-b9d4-9f0d5fb61116/P56-57-Participation-Map_v3.pdf.> accessed 24 July 2022.

[13] England Rugby, *English Professional Rugby Injury Surveillance Project 2020-21*, p. 2 <https://keepyourbootson.co.uk/wp-content/uploads/2023/01/PRISP-2020-21.pdf> accessed 26 August 2022.

[14] Williams et al. (2022), p. 1133.

consensus statement from the CISG defines concussion as follows:

> "Sport-related concussion is a traumatic brain injury caused by a direct blow to the head, neck or body resulting in an impulsive force being transmitted to the brain that occurs in sports and exercise-related activities. This initiates a neurotransmitter and metabolic cascade, with possible axonal injury, blood flow change and inflammation affecting the brain. Symptoms and signs may present immediately, or evolve over minutes or hours, and commonly resolve within days, but may be prolonged. No abnormality is seen on standard structural neuroimaging studies (computed tomography or magnetic resonance imaging T1- and T2-weighted images), but in the research setting, abnormalities may be present on functional, blood flow or metabolic imaging studies. Sport-related concussion results in a range of clinical symptoms and signs that may or may not involve loss of consciousness. The clinical symptoms and signs of concussion cannot be explained solely by (but may occur concomitantly with) drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction) or other comorbidities (such as psychological factors or coexisting medical conditions)."[15]

The above definition is not a diagnostic criteria of mTBI, which itself has been a topic of controversy over the years. In 2023, the American Congress of Rehabilitation Medicine updated its diagnostic criteria of mTBI for the first time since 1993 owing to improved scientific understanding of mTBI.[16] Notably, one need not lose consciousness to be considered concussed, these are known as sub-concussive events. SRC is considered a form of mTBI and the terminology is often used interchangeably.[17] Therefore, athletes can suffer mTBI without ever being 'knocked out' per se. On an impact to the head, the force imposed accelerates the brain to move within the skull leading to brain tissue deformation.[18] Rotational forces on the brain do not cause localised areas of damage, but rather, result in shear-induced damage.[19] This rotational motion is the primary contributor to SRC events,[20] which in turn is a risk factor for CTE.

CTE is characterised by the accumulation of phosphorylated tau (p-tau) protein within the brain's blood vessels.[21] This obstructs blood flow and disrupts neural pathways within the cerebral cortex and frontal cortex before spreading to other regions. Consequently, reductions in the brain's volume of white matter occurs before the age of 40.[22] CTE is the only neurodegenerative disease occurring almost exclusively in individuals with prior repetitive head trauma exposure.[23] It is also argued that CTE is a precursor to the onset of dementia, depression, and parkinsonism.[24] CTE can, however, only be diagnosed definitively by autopsy which is why any living claimants are described as having 'probable CTE'. In 2017, a study retrospectively diagnosed CTE in the brains of 110 out of 111 deceased NFL players.[25] More recently, the early stages of CTE were detected in 63 out of 152 young brain donors aged under 30 who played a range of sports including rugby.[26] It is against this background that the claimants bring their claim in negligence against the SGBs.

1.2 The sports governing bodies

World Rugby is the international sports federation ("ISF") of rugby union. They provide the regulatory framework under which the national governing bodies ("NGBs") must adhere to. Despite providing the pseudo-public function of sporting events, all of the defendants (collectively referred to as SGBs) are privately run organisations and their authority is not derived from statute. The SGBs authority is sourced from a contractual agreement between its members to be bound by its rules and regulations.[27] The Court of Appeal decision in *R v Disciplinary Committee of the Jockey Club, ex p Aga Khan* holds that individuals who are affected by the decisions of an SGB under a private agreement are unable to invoke the judicial review mechanisms in the same manner in which public bodies are challenged.[28] Though it should be acknowledged that the growing concern of concussion as a public health issue, as shown by the Department for Digital, Culture, Media and Sport's ("DCMS") 'Concussion in Sport' report in 2021 may open the door for future SGBs to be amenable to judicial review. This line of argument is informed by Ben Cisneros in his essay.[29] Indeed, the UK governments introduction of an independent regulator for English football clubs, complete with provisions to appeal some of the regulator's decisions on judicial review

15 Patricios et al. (2023), p. 697.

16 Silverberg et al. (2023), pp. 1348–1349.

17 McKeithan et al. (2019), p. 2.

18 Gennarelli et al. (1982); Holbourn (1943).

19 Kleiven (2013), p. 1.

20 Rowson et al. (2016); Tierney (2021).

21 Alvia et al. (2022), p. 2.

22 Graham and Sharp (2019).

23 Asken and Rabinovici (2021); Lepage et al. (2019); Lesman-Segev et al. 2019; Strain et al. (2015); Goswami et al. (2016).

24 Manley et al. (2017); Slobounov et al. (2017); Guth et al. (2018).

25 Mez et al. (2017).

26 McKee et al. (2023).

27 *International Rugby Board v Troy & ARU*, CAS 2008/A/1664, para 38.

28 [1993] 1 WLR 909 (CA).

29 Cisneros (2020).

principles marks a significant step in this direction.[30] Nevertheless, in the absence of any provision for arbitration beyond anti-doping violations from the defendant SGBs,[31] this article focuses on the ongoing private law cause of action.

2 Duty of care

From the first reported case of player-on-player negligence in *Condon v Basi*,[32] to the more recent case of *Czernuszka v King*,[33] the courts have upheld the principles of tort law are applied to sport settings with a view to the specific circumstances in which the athlete's injury occurred. The rugby litigation presents a wide range of potential defendants, from medical professionals to clubs and SGBs. These are addressed in turn.

It is incontestable that all pitch side medical professionals owe a duty of care to their patients once they have accepted them for treatment.[34] Medical professionals (i.e. doctors, physiotherapists, sport scientists, strength and conditioning coaches) which mishandle pitch side inspections or rehabilitation protocols may face claims under the tort of medical negligence. Collectively, the process of concussion identification and return to play is a difficult one and prone to human error. It is, therefore, essential that all multidisciplinary teams maintain clear, concise, and unambiguous communication when medically assessing an athlete.[35] The clubs, as employers, can be vicariously liable for any negligence committed during employment, which opens the door for players to sue the clubs for breach of contract.[36] In *Vowles v Evans*,[37] for instance, the WRU was vicariously liable for the actions of a referee who failed to take reasonable care for the safety of players during his refereeing duties which resulted in the claimant's injury. The least explored area of liability in the case law is that of a SGB to sports participants.[38] A small body of case law does, however, pave the way for sports participants to sue SGBs for inadequate safety provisions.[39]

In 2001, *Watson v BBBC* established that NGBs have a duty to take reasonable care to ensure the safety of sports participants by means of effective and timely ringside medical care.[40] In *Watson*, the BBBC was liable for a catastrophic brain injury which the claimant suffered in the aftermath of a world championship professional boxing bout. Specifically, the liability stemmed from a preventable failure to contain the damage sustained during the event. It was held to be fair and just to impose a duty,[41] applying the test in *Caparo Industries PLC v Dickman.*[42] Richard Bunworth's article further supports the possibility of World Rugby as a defendant in negligence proceedings.[43] *Inter alia*, the fact that World Rugby funds concussion research projects,[44] promotes educational awareness of concussion,[45] and draws up regulations to manage concussion, all indicate that they have assumed responsibility over player safety.

Contrastingly, in the non-binding yet persuasive case of *Agar v Hyde*, the Australian High Court reasoned that the IRB (now World Rugby) did not owe a duty to take reasonable care in amending the rules of rugby to avoid the risk of unnecessary harm to thousands of amateur rugby players.[46] *Agar* was, however, dismissed on procedural grounds and the merits were not discussed. Another point of difference is that *Agar* dealt with the rules of the game in an amateur setting, while *Watson* concerned the BBBCs medical provisions towards a small group of licensed boxers who were held to

[30] DCMS, *A Sustainable Future: Reforming Football Club Governance*, Part 4: Regulation in Practice, para 11.8 – 11.20 <https://www.gov.uk/government/publications/a-sustainable-future-reforming-club-football-governance>.

[31] World Rugby, *Bye law 15(b)* <https://www.world.rugby/organisation/governance/bye-laws/bye-law-15> accessed 24 May 2022; RFU Rules and Regulations, *Rule 19 – Discipline* 19.15.3, 324 <https://www.englandrugby.com/dxdam/aa/aa6c359d-2ae0-42f8-873f-8e8c66488904/RFUHandbook2018-19_English.pdf> accessed 24 May 2022; United Kingdom Anti-Doping Code, *Article 16: Challenges to a Decision or These Rules* 16.1.1-16.1.4, 62 <https://www.ukad.org.uk/sites/default/files/2020-11/2021%20UK%20Anti-Doping%20Rules%20v1.0%20FINAL.pdf> accessed 4 August 2022; *Adamu v FIFA*, CAS 2011/1/2426, para 65; See also *Thomas Curry (WRU) v United Kingdom Anti-Doping (Appeal)*, Sport Resolutions arb award (September 26, 2018) <https://www.sportresolutions.com/decisions/view/thomas-curry-wru-v-ukad-appeal> accessed 24 May 2022.

[32] [1985] 1 WR 866 (CA).

[33] [2023] EWHC 380 (KB).

[34] *Cassidy v Ministry of Health* [1951] 2 KB 343 (CA).

[35] *Hamed v Mills and Tottenham FC and Athletic Ltd* [2015] EWHC 298.

[36] *Wilson & Clyde Coal Co Ltd v English* [1937] 3 All ER 628, [1938] AC 57.

[37] [2003] EWCA Civ 318, [2003] 1 WLR 1607.

[38] Mark James, 'Civil Liability Arising out of Participation in Sport'. In Adam Lewis and Jonathan Taylor (eds), *Sport: Law and Practice* (4th edn, Bloomsbury Professional 2021) pt G ch 1 para G1.66.

[39] *Agar v Hyde* (2000) 201 CLR 552, [2000] HCA 41, 173 ALR 665; *Watson v BBBC* [2001] QB 1134 (CA); *National Football League Players' Concussion Injury Litigation (No 2)*, Re (12-md-02323 [ED Pa 2018]).

[40] [2001] QB 1134 (CA).

[41] *ibid* at paras 35–36 75 and 86–89.

[42] [1990] UKHL 2, [1990] 1 ALL ER 568, [1990] 2 AC 605.

[43] Bunworth (2016), pp. 88–89.

[44] Stokes et al. (2021); Gallo et al. (2022).

[45] LawInSport, World Rugby Recognise and Remove Concussion Education Completed by Record Numbers (LawInSport, 2 February 2016) <https://www.lawinsport.com/news/item/world-rugby-recognise-and-remove-concussion-education-completed-by-record-numbers> accessed 10 July 2022.

[46] (2000) 201 CLR 552, [2000] HCA 41, 173 ALR 665, para 67 (Gleeson CJ).

be in a relationship akin to a contract.[47] In this regard, these authorities are not strictly at odds with each other. That is to say, the Australian High Court simply upheld the principle that amateur participants submit to the inherent risks of a given sport.

The thinking in *Agar* is supported in English common law. For instance, in *Anderson v Lyotier, Lyotier and Portejoie*[48] it was held the decision to run a risk is a collaborative one that is taken by the athlete, the coach, match official, and the rule making body. However, Hayden Opie points out that operational matters such as medical provision, playing equipment, and venues are not considered part of the inherent risks of a sport.[49] While there are inherent risks in the participation of any sport, this does not negate an SGBs requirement to review its safety regulations, particularly in response to new risks or persuasive evidence which suggests certain risks should no longer be tolerated.[50] It is submitted it is not sensible that an SGB should relinquish its responsibility for athlete's brain health merely by stating that a given sport has an inherent risk of injury. *Smolden v Whitworth* is one such case where the court acknowledged that the risk of spinal cord injury from playing in the front row did not equate to an acceptable risk.[51] The emergence of CTE presents health risks that go beyond that of traditional musculoskeletal injuries that would typically fall within the meaning of 'inherent risks'. It is doubtful, for instance, whether rugby players would embark on their careers while accepting the inherent risk of forgetting the names of their family members, as has regrettably happened.

While *Watson* shows SGBs are vulnerable, the threshold of liability remains high. In *Wall v British Canoe Union*,[52] the deceased's family unsuccessfully sued the British Canoe Union under the proposition that the NGB had failed to take reasonable care in warning users of the risks of canoeing by distributing a guidebook containing incorrect navigation guidance on rivers and weirs. The claim was dismissed on the grounds that if guidebook writers were in fact to have a duty of care, then their liability would be unrestricted and would therefore be untenable. This can be distinguished from the rugby claim as liability is seeking to be attributed not to a guidebook, but to the governing safety regulations which were informed by potentially plagiarised and biased medical opinion which may have misrepresented the dangers of concussion.

In 2004, *Wattleworth v Goodwood Road Racing Company Ltd and others* examined the situations in which the duty of care could be extended to ISFs.[53] The defendants were the event organiser, the Royal Automobile Club ("RAC" [NGB]), and the Fédération Internationale de l'Automobile ("FIA" [ISF]). The court held that the duty of the NGB was to ensure that the track licensed for racing was reasonably safe. The NGB had not breached this duty on two grounds. First, the track safety advice was provided by reasonable and competent experts in race-day safety. Second, the attendant safety features were sufficient to ensure the event was reasonably safe. Importantly, it was held that the FIA had no duty to the claimant. Although the FIA had guidelines on safe circuit design, their practical application (including track safety inspections) had been legitimately delegated to the RAC for the event at which Mr Wattleworth was injured.

Accordingly, *Wattleworth* demonstrates that in situations where an ISF clearly delegates safety regulations onto an NGB, it is the NGB that assumes the duty of care. This is relevant to the rugby claim as World Rugby disseminates guidelines on concussion "to help Unions share best practice with stakeholders, and Unions may adapt the advice in the guidelines to meet their needs".[54] Afterall, the Unions should be afforded some flexibility to adapt guidance because it is at club level where athletes are most likely to sustain a head injury, as attested to by the English Premiership Rugby's injury surveillance data. Adding further complexity to the rugby claim is the possibility that World Rugby, its Unions, and clubs, may all have a share in the duty of care. It is worth noting for example that the RFUs Regulations on elite player safety reference the need to have due regard to World Rugby's safety guidance.[55] While not a candid case of delegation, this at least demonstrates the potential overlap of responsibility between the SGBs. That aside, there are many important matters relating to the professional game which the Unions are unable to alter. The laws of the game, for instance, are drawn up by World Rugby and impose upon the Unions requirements on substitutions, tackle height, and the need for Head Injury Assessment ("HIA") protocols, among other things.[56] World Rugby also has procedures in place to enforce compliance with these requirements, including

[47] [2001] QB 1134 (CA) at paras 49 and 79-80 (Lord Phillips).

[48] *Anderson v Lyotier, Lyotier and Portejoie* [2008] EWHC 2790 (QB).

[49] Opie (2002), p. 68.

[50] *Woods v Multi-Sport Holdings Pty Ltd* (2002) 208 CLR 460.

[51] [1997] PIQR P133.

[52] [2015] WLUK 983 (CC).

[53] [2004] EWHC 140 (QB), [2004] PIQR P25.

[54] World Rugby, Concussion Guidance for non-medical professionals <https://www.world.rugby/the-game/player-welfare/medical/concussion/concussion-guidelines> accessed 18 August 2023.

[55] RFU Regulation 9—Player Safety <https://www.englandrugby.com/governance/rules-and-regulations/regulations> accessed 18 August 2023.

[56] World Rugby Laws of the Game (2023). See Law 3 Team, Law 14 Tackle <https://resources.world.rugby/worldrugby/document/2023/01/20/9f77a933-29a2-4b04-80c0-892111d8a85f/WorldRugby_Laws_2023_en.pdf> accessed 18 August 2023.

medical and concussion-related regulations in the elite context.[57] It is for these reasons this article contends that World Rugby's position shares more parallels with the BBBCs role in *Watson* than to the FIAs role in *Wattleworth*.

In the round, it is arguable there may be an overlapping duty of care shared between World Rugby, the Unions, and clubs to take reasonable care to ensure the safety of sports participants by means of appropriate safety regulations, delivered by competent experts. To what extent these overlapping duties may be resolved will be dealt with at the breach of duty stage.

3 Standard of care

There are two stages in determining whether the SGBs have breached their duty of care. First, the standard of care to be expected of SGBs, and second, examining whether the defendants have fallen below that standard of care. This section deals with the former. Under English law, the starting point is that the defendant must behave as a reasonable person would in the same circumstances to avoid being liable for negligence. The oft cited description of negligence was given by Alderson B in *Blyth v Birmingham*:

> "Negligence is the omission to do something which a reasonable man, guided upon those considerations which ordinarily regulate the conduct of human affairs, would do, or doing something which a prudent and reasonable man would not do."[58]

World Rugby retains and engages with a broad range of experts within and outside of rugby on the

issue of player welfare and concussion. World Rugby employs a Chief Medical Officer, research staff and expert consultants, whose roles include the management and monitoring of welfare programmes, research and dissemination of that research to stakeholders, and making evidence-based law and regulation changes with a view to improving player welfare.[59] World Rugby is also an active member of the CISG, the only multi-disciplinary and multi-national group reviewing current evidence related to concussion in a systematic way to develop recommendations. This arrangement bares similar fashion to *Watson*, where the BBBCs board had a responsibility to devise medical protocols considering any developing knowledge on safety matters. Accordingly, the relevant standard of care expected is that of a reasonably competent governing body.

As stated by Bunworth, the SGBs response to the concussion saga will be judged based on their management of concussed players through medical protocols, and whether the relevant regulations and playing rules were updated in a timely and reasonable manner.[60] The safety regulations will have to be defensible; something achieved by the RAC in *Wattleworth* but not by the BBBC in *Watson*.

3.1 Breach of duty

The claimants must establish that the SGBs ought reasonably, based on the standards of knowledge available at the relevant time that concussion posed a serious risk of injury. If it can be demonstrated that brain injury was poorly understood and a competent sporting organisation or club would not reasonably have been expected to warn against such risks then liability will not be established. Conversely, negligence will be established if it can be shown that a SGB failed to keep their safety regulations up to date. The issue here is 'who knew what about mTBI and when?', with a view to determining the exact moment when the risks of CTE ought to have been recognised.[61] In the NFL claim, the principal allegation was that the NFL had knowledge about the effects of mTBI and its links with CTE but had taken steps to cover it up. Such a cover up has not been argued publicly by the rugby claimants, although the plagiarism saga in its current form arouses some suspicion as to the trustworthiness of the CISG.

Professional practice tends to change overtime so that what was once accepted as commonplace either evolves or is wholesale replaced. The issue arises in assessing the exact moment that a risk has become generally known. The long-term effects of head injuries were first noted in 1927.[62] Harrison Martland's observations of the peculiar "punch drunk"[63] state of boxers was soon accompanied by the identification of scattered lesions on the brains of those exposed to repeat concussions.[64] Another important paper was released by Augustus Thorndike in 1952 which is relevant to the plagiarism saga and is expanded upon later in this article. In 1994, the Royal College of Physicians of

[57] Cisneros, Concussion Litigation in Rugby—Part 1: Duty of Care (Rugby and the Law, February 2021) <https://rugbyandthelaw.com/2021/02/09/concussion-litigation-rugby-union-part-i-duty-of-care-negligence-world-rugby-rfu-wru/> accessed August 18 2023.

[58] (1856) 11 Exch 781

[59] World Rugby Response to Digital, Culture, Media and Sport Committee Inquiry into Concussion in Sport (March 2021) <https://committees.parliament.uk/writtenevidence/25349/pdf/> accessed 12 August 2023.

[60] Bunworth (2016), p. 90.

[61] Cuthbert and Rawlinson KC, CTE and Causation: The Key Medico-Legal Issues in Rugby Union's Concussion Litigation (LawInSport, 9 July 2021) <https://www.lawinsport.com/topics/item/cte-and-causation-the-key-medico-legal-issues-in-rugby-union-s-concussion-litigation> accessed 1 June 2022.

[62] Osnato and Giliberti (1927).

[63] Martland (1928).

[64] Parker (1937).

Australia stated in the National Health and Medical Research Council's report that:

> "There is overwhelming evidence that the cumulative effects of repeated cerebral injuries observed in boxers can eventually lead to a syndrome of progressive intellectual impairment and motor system failure … This condition has been observed and described clinically so frequently that it is part of standard texts of neurology, neurosurgery and medicine."[65]

The above report was rescinded in 2004, but it demonstrates an important timestamp along the timeline of developing knowledge. It is accepted that the link between neurodegenerative disease and concussion gathered momentum during the early 21st century.[66] In 2002, the autopsy of Jeff Astle, the England Striker who had died with dementia aged 59, had revealed trauma to the brain which was alike to that experienced by boxers.[67] This was followed by the first study linking SRC and CTE in NFL players in 2005.[68] In the same year, the Industrial Injuries Advisory Council ("IIAC"), on behalf of the UK government, reviewed head injuries in footballers, boxers and jockeys and found insufficient evidence to acknowledge dementia caused by SRC as an industrial disease.[69] A further statement from IIAC in 2016 found that there was insufficient evidence to conceptualise Parkinson's disease and motor neurone disease as occupational disorders in professional sportspersons.[70]

In 2001, the first International Conference on Concussion in Sport was hosted in Vienna. There have so far been six regular gatherings with a view to agreeing on best practice and future directions of concussion management and prevention in sport. The Vienna (2001) consensus gives acknowledgement, albeit briefly, to the development of CTE in boxers.[71] Interestingly, the Zürich (2008) consensus statement acknowledges a potential link between repeated SRC and later-life onset of CTE, citing a range of studies from 1996 to 2006.[72] This is of relevance as Professor Mick Molloy, then Chief Medical Officer of the IRB (now World Rugby) was one of the lead authors and is indicative of what World Rugby ought to have known at the time. By comparison, the Zürich (2012) and Berlin (2016) statements maintain a more cautious stance: that a "cause and effect relationship has not yet been demonstrated between CTE and concussions or exposure to contact sports".[73] Following McCrory's resignation from the CISG, the 6th statement from 2023 offers a reworded stance to similar effect:

> "The studies, to date, are methodologically limited because most were not able to examine, or adjust for, many factors that can be associated with the mental health and neurological outcomes of interest…To establish a clear causal association between sports participation early in life and cognitive impairment or dementia late in life or to quantify that association, future well-designed case–control and cohort studies, that include as many individual risk-modifying and confounding factors as possible, are needed…It is reasonable to consider extensive exposure to repetitive head impacts, such as that experienced by some professional athletes, as potentially associated with the development of the specific neuropathology described as CTE-NC."[74]

Some stakeholders have made public statements voicing their concerns that the latest statement has changed little in the face of new research demonstrating the risks of CTE.[75] This is not the first time the CISGs statements have been criticised. The UK Parliament's DCMS select committee identified the CISG represented "an ultra-conservative perspective emanating from a group of researchers significantly funded by sports governing bodies".[76] The dissenting voice within the scientific community is surmised well in the article 'Toward complete, candid, and unbiased International Consensus Statements on concussion in sport':

> "Over the last twenty years, the consensus statements that emerged from these conferences have been dominated by individuals with close relationships to

[65] National Health and Medical Research Council, Boxing Injuries (1994), p. 7, 26 <https://webarchive.nla.gov.au/awa/20170819040839/https://www.nhmrc.gov.au/guidelines-publications/si1> accessed 4 January 2023.

[66] Agrawal, 'Neuropsychiatric Aspects of Brain Injury' In: van den Broek and Sembi (eds), *Brain Injury Claims*, (2nd edn, Sweet & Maxwell 2022) chapter 6, part 1, para 1.

[67] McHenry and Turton, 'Personal Injury' In: de Marco KC (ed), *Football and the Law*, (2nd edn. Bloomsbury Professional) chapter 18, p. 416, para 18.76.

[68] Omalu et al. (2005).

[69] Industrial Injuries Advisory Council, 'Sporting injuries: IIAC Position Paper 15' (2005) <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/328593/iiac-pp15.pdf> accessed 10 July 2022.

[70] Industrial Injuries Advisory Council, Neurodegenerative diseases in professional sportspersons: IIAC information note, at paras 21-24 <https://www.gov.uk/government/publications/neurodegenerative-diseases-in-professional-sportspersons-iiac-information-note> accessed 19 September 2023.

[71] Aubry et al. (2002), p. 8.

[72] McCrory et al. (2009), p. 439.

[73] McCrory et al. (2013), p. 94; McCrory et al. (2017), p. 844.

[74] Patricios et al. (2023), p. 705.

[75] Concussion In Sport Group Statement (Headway the brain injury association 19 July 2023) <https://www.headway.org.uk/news-and-campaigns/news/2023/concussion-in-sport-group-statement/> accessed 12 December 2023.

[76] DCMS, *Concussion in Sport: Third Report of Session*, (HC 2021-2022, 46), para 67 <https://committees.parliament.uk/work/977/concussion-in-sport/publications/> accessed 5 July 2022.

professional and amateur sports organizations. The documents have promoted sports-friendly viewpoints that could be construed to pronounce concussions and repeated subconcussive impacts more benign, recoverable, transient, and reversible injuries than we consider reasonable. In so doing, the guidelines have arguably compromised informed consent. We would suggest, too, that these guidelines have almost certainly avoided the complete candor required for informed consent to be complete and frank… As a rule, most people do not like to contemplate their risks. No harm can be done by telling readers there are reasons for interpreting and implementing guidelines in a more precautionary way than the center of gravity of a consensus process unduly weighted by industries with a vested economic interest in the outcome might prefer."[77]

In September 2023, the findings from the Australian Parliamentary Inquiry into 'Concussions and Repeated Head Trauma in Contact Sports' were published. This report is the most recent assimilation of expert knowledge from experts not wholly involved with the CISG. In contrast to the CISG, the committee agreed "there is clear evidence of a causal link between repeated head trauma and concussions and subsequent neurodegenerative diseases such as CTE."[78] This conclusion was reached on the understanding that while the link between SRC and CTE is "imperfect but undeniable",[79] there is the "highest confidence that RHI [repetitive head collisions] causes CTE".[80] The implications of these recent studies, including notably the work of Chris Nowinski and colleagues, are picked up again in the causation section.

Aside from acknowledging the risks of CTE, liability may also be attached to the suitability of the measures in place to manage the risks of concussion, balanced against the available knowledge at the time. Areas under scrutiny will include the PSCA or HIA, return to play protocols, and the playing rules of rugby. Given there are two thorough examinations of these areas,[81] this article offers minor additions.

The introduction of the PSCA in mid-2012 allowed players to return within 5 min of a head injury if they passed an examination involving answering questions and a physical balancing test. Later versions of the test were developed following IRB funded research, which extended the assessment process to 10 min. In 2015, the PSCA was replaced by the HIA which allows for a temporary substitute to be made during an assessment when it is unclear if a player has suffered a concussion. Joanne Kirby maintains the original PSCA was not fit for purpose because some symptoms of concussion do not materialise for hours, which makes a 10 min assessment window both arbitrary and redundant.[82] Bunworth emphasises that any amendments to the PSCA should be construed as an attempt by World Rugby to amend these inadequacies. Contrarily, it could simply be evidence that World Rugby is keeping abreast with developments.

All versions of the PSCA or HIA rely on the Sport Concussion Assessment Tool ("SCAT"). The SCAT first appeared at the Prague (2004) consensus and is a standardised tool for evaluating a suspected concussion. The latest iteration, the SCAT6, is designed to monitor and manage concussive symptoms within 72 h and up to one-week post-concussion.[83] But it is important to note the SCAT protocol as proposed at the Prague consensus was largely influenced by several measures pre-dating the SCAT, including New Zealand's 'Rugby Smart' initiative. Other measures pre-dating World Rugby's inclusion of the SCAT card in 2011 include 'Smart Rugby' (Australia) and 'BokSmart' (South Africa). This raises an interesting question as to whether World Rugby erred in taking too long to introduce pitch side assessments in response to the risks of concussion, given that other SGBs were more proactive in trying to mitigate the risks of concussion. The remainder of this article focuses on the potential liability surrounding the adequacy of the return to play protocols.

In discussing the NFLs concussion litigation, Daniel Goldberg highlights prevalent ethico-legal issues perpetuating the USA's tobacco litigation. That is, the tobacco industry relied on the "manufacture of doubt" rather than an outright denial of the possible magnitude of harm.[84] Indeed, it is easier to debate around the science at a tectonic pace than to admit a wrong to a class of individuals. By extension, it is not implausible to suggest that the plagiarism saga invites some suspicion as to whether the CISG and the SGBs have been complicit in generating doubt surrounding concussion. In 2021 a network analysis identified more than 6130 peer-reviewed suitable SRC articles between 2010 and 2019,[85] many of which are omitted from the consensus including work from leading CTE-sport specialists such as Ann Mckee who heads up the Boston Brain Bank. Among McKee's extensive work are seminal studies published between 2009 and 2013 which were influential in the NFL litigation

[77] Casper et al. (2021), pp. 373–375.

[78] The Senate (Commonwealth of Australia), Community Affairs References Committee, *Concussions and Repeated Head Trauma in Contact Sports, Chapter 3 – Long term impacts and ensuring the integrity of research*, para 3.123 <https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Headtraumainsport/Report/Chapter_3_-_Long-term_impacts_and_ensuring_the_integrity_of_research#_ftn7> accessed 20 October 2023.

[79] *ibid*, Chapter 3 para 3.10.

[80] *ibid*, Chapter 3 para 3.11.

[81] Bunworth (2016); Kirby (2015).

[82] Kirby (2015), para 82.

[83] Patricios et al. (2023), p. 699.

[84] Goldberg (2013).

[85] Eagle et al. (2021).

proceedings.[86] The CISG, however, maintains the outputs from these brain banks are not cohort studies and therefore cannot quantify risk or examine causation.[87] While there can be little doubt that the dangers of CTE are obvious as of 2022, determining the watershed moment where the risks ought to have been known remain onerous. The claimants will face difficulties in trying to argue that World Rugby has been negligent in keeping abreast with scientific developments. That said, there is substantially more evidence available in recent years than during the NFL litigation, which involved fewer studies investigating only 200 brains.[88]

A key development in March 2022 was the resignation of the consensus statement's lead author, McCrory, due to 10 counts of historic plagiarism allegations that he purposely misrepresented the work of others.[89] SGBs including the NFL, Formula 1 Racing, International Olympic Committee, and Fédération Internationale de Football Association ("FIFA") welcomed his respected views which minimised the impact of CTE on their operations. It is also worth stating that McCrory was one of the experts consulted with by IIAC as part of the position paper on SRC and dementia in 2005. To date the allegations only concern papers in which McCrory was sole author. There remains, however, a legitimate concern that McCrory, in his capacity as the first named author of four consensus statements (Prague 2004, Zürich 2008, Zürich 2012, and Berlin 2016), may have placed undue influence on the CISGs approach to concussion. The British Journal of Sports Medicine's investigation into McCrory's conduct is still ongoing;[90] however, it is agreed that McCrory skewed the conversation on concussion from as early as 2001 by inaccurately misrepresenting the position of Thorndike from a 1952 publication to support his own argument.

McCrory misquoted Thorndike and claimed that after experiencing "three concussions, which involved loss of consciousness for any period of time, the athlete should be removed from contact sports *for the remainder of the season*."[91] When in fact, Thorndike wrote: "Patients with cerebral concussion that has recurred more than three times or with more than momentary loss of consciousness at any one time *should not be exposed to further body-contact trauma*."[92] An editorial gives further commentary on the matter,[93] but the allegations are immensely damaging and risk tainting the trustworthiness of the medical literature that has underpinned the safety regulations of many well-known SGBs.[94] This would not be the first time the rugby community has downplayed the risks of rugby. Following a challenge from sports policy experts in 2017,[95] England Rugby retracted their entire Rugby Safe booklet for falsely stating that "there is no evidence to show that rugby poses a specifically greater risk than other sports",[96] despite the SGB having funded research which in fact reported the opposite.[97] Be that as it may, the 2023 'UK Concussion Guidelines for Non-Elite (Grassroots) Sport' are a marked improvement in many ways, particularly in relation to the 21 day stand-down period for children suspected of suffering a concussion.[98] This approach is informed by the growing evidence base demonstrating that children's brains are more vulnerable than adult's brains to the effects of concussion,[99] and the fact that CTE has been diagnosed in deceased adolescents as young as 17.[100] This article asserts the grassroots return to play protocol is more sensible than World Rugby's 12 day stand-down period for elite players because the reduction on accumulative SRC exposure would be enhanced with a longer minimum stand-down period. A study from Monash University supports a further extension to the stand-down period after discovering that the brains of adult Australian Football players were still recovering 12 days after concussion.[101] While no single study is likely to instigate change, given the growing knowledge of the risks of SRC, a return to the 21 day stand-down period would be a sensible precautionary measure and in keeping with the medical principle *Primum non nocere* (i.e. first, do no harm). World Rugby remains wedded to their approach and seeks to bolster its effectiveness using enhanced real-time monitoring of concussion via smart mouthguard technology,[102] as recommended by World Rugby's independent Concussion Working Group—a supplementary advisory group which interestingly has consulted with Ann Mckee and Chris

[86] McKee et al. (2009); Gavett et al. (2011).

[87] Patricios et al. (2023), p. 705.

[88] *Re National Football League Players' Concussion Injury Litigation*, 307 FRD 422 [ED pa 2015], para 398.

[89] Bailey, 'How a Plagiarism Scandal Could Change the World of Sports Concussions' *Plagiarism Today* (London, 24 March 2022) <https://www.plagiarismtoday.com/2022/03/24/how-a-plagiarism-scandal-could-change-the-world-of-sports-concussions/.

[90] Macdonald et al. (2022).

[91] McCrory (2001).

[92] Thorndike (1952).

[93] Casper and Finkel (2022).

[94] Freckelton (2010).

[95] Piggin and Bairner (2019).

[96] England Rugby, *Rugby Safe* (22 September 2015) <http://www.englandrugby.com/mm/Document/governance/gameSupport/01/31/44/99/Rugby_Safe__bookletFinAL_English.pdf> accessed 6 June 2022.

[97] Fuller (2008).

[98] UK Government, *If in Doubt Sit Them Out: UK Concussion Guidelines for Non-Elite (Grassroots) Sport (April 2023),* p. 4 < https://www.sportandrecreation.org.uk/policy/research-publications/concussion-guidelines> accessed 1 September.

[99] Daneshvar et al. (2011); Dufour et al. (2020).

[100] McKee et al. (2013).

[101] Wright et al. (2021), p. 4414, 4418.

[102] Jones et al. (2022); Tierney et al. (2021); Tierney (2021).

Nowinski.[103] As a point of reference, the RFL is facing its own concussion lawsuit and is also making efforts to keep abreast with developments. The RFL Board, following recommendations from the Brain-Health Sub-Committee, have introduced a range of reforms to reduce player load and SRC exposure.[104] Amongst the reforms made by the RFL is a 14 day stand-down period for concussed players, thereby demonstrating a more precautionary stance (however marginal) when compared against World Rugby's measures. The reforms from both codes of rugby signify positive progress in tackling the issue of concussion, but time will tell as to the suitability of these measures in practice when assessed against the available knowledge at the time.

De Freitas v O'Brien states a defendant's position must be supported by a body of professional opinion.[105] As a general rule, the fact that a SGB has acted in accordance with the common practice of the CISG is strong evidence that they have not been negligent.[106] Even if it emerges that McCrory has behaved unethically this does not negate the value of the CISG entirely. Samuel Cuthbert and Michael Rawlinson KC recognise that the 2012 and 2016 statements listed 54 contributors and 46 contributors respectively, which is far from a minority school of thought.[107] Moreover, Spencer Turner rightly points out that the CISG statements require an 80% majority from the panel members to reach a consensus on specific issues.[108] There remains, however, some valid criticisms of the CISGs methodology and transparency throughout the process of reaching a consensus. Of the 36 expert panel members involved in the 2016 CISG statement, 32 members had "significant known interests of conflict".[109] The 2016 statement also demonstrates a lack of transparency in failing to publish the views of dissent or minority opinion from its own expert panel members, including that of Dr Robert Cantu and Dr Charles Tator, who have both criticised the 2016 statement.[110] With this backdrop, the court is still within its powers to declare a commonly held practice (i.e. the six day stand-down period) as negligent.[111] The fact that the six day stand-down only lasted between 2011 and 2022 does, *prima facie*, suggest a backwards step on the part of World Rugby.

The courts are highly unlikely to hold a defendant liable for not reading and acting on every article appearing in the medical press.[112] However, the court may declare a universally accepted practice as negligent on the basis that the hypothetical reasonable medical professional would not have adopted a given course of action.[113] In the House of Lords, Lord Browne-Wilkinson agreed that the court was not bound to absolve a doctor from liability in negligence purely on the basis that a medical practice can be justified with expert evidence. The court would have to be satisfied that the opinion had a logical basis.[114] It was said *obiter* that it is ostensibly for the court to condemn a commonly accepted practice as negligent. A declaration of unreasonableness against a body of genuinely held and competent medical opinion will only occur where the risks involved were or should have been obvious to the defendant.

Where risks are present, it follows that greater the risk of harm the greater the precautions that must be taken.[115] Lobbying groups have long maintained that greater precautions should have been taken in light of research showing that Australian football players brains were still recovering 12 days after a concussion.[116] Following *Paris v Stepney*

[103] World Rugby, World Rugby integrates smart mouthguard technology to the Head Injury Assessment as part of new phase of global player welfare measures, <https://www.world.rugby/news/875212/world-rugby-integrates-smart-mouthguard-technology-to-the-head-injury-assessment-as-part-of-new-phase-of-global-player-welfare-measures> accessed October 10 2023.

[104] Rugby League, *New for 2024: significant changes to be introduced at all levels* <https://www.rugby-league.com/new-for-2024> accessed 9 December 2023.

[105] [1995] PIQR P281 (CA).

[106] *Morton v William Dixon Ltd* [1909] SC 807, 809; *Morris v West Hartlepool Stream Navigation Co Ltd* [1956] AC 552 (HL), 579.

[107] Cuthbert and Rawlinson KC, CTE and Causation: The Key Medico-Legal Issues in Rugby Union's Concussion Litigation (LawInSport, 9 July 2021) <https://www.lawinsport.com/topics/item/cte-and-causation-the-key-medico-legal-issues-in-rugby-union-s-concussion-litigation> accessed 1 June 2022.

[108] Turner, The 6th Consensus Statement on Concussion in Sport: What's New? (LawInSport, 20 September 2023) <https://www.lawinsport.com/topics/item/the-6th-consensus-statement-on-concussion-in-sport-whats-new?highlight=WyJjb25jdXNzaW9uIl0=#references> accessed 10 October 2023.

[109] The Senate (Commonwealth of Australia), Community Affairs References Committee, Concussions and Repeated Head Trauma

Footnote 109 (Continued)

in Contact Sports, Chapter 3 – Long term impacts and ensuring the integrity of research, para 3.110 <https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Headtraumainsport/Report/Chapter_3_-_Long-term_impacts_and_ensuring_the_integrity_of_research#_ftn7> accessed 20 October 2023.

[110] *ibid*, para 3.110.

[111] *Lloyds Bank Ltd v EB Savory & Co* [1933] AC 201 (HL); *Cavanaugh v Ulster Weaving Co Ltd* [1960] AC 145 (HL); *General Cleaning Contractors v Christmas* [1953] AC 180 (HL), para 193 (Lord Reid); *Roberge v Bolduc* (1991) 78 DLR (4th) 666, 710 (SCC) .

[112] *Crawford v Board of Governors of Charing Cross Hospital* [1953] 12 WLUK 23 (CA); *Dwan v Farquhar* [1988] 1 Qd R 234.

[113] *Sidaway v Bethlem Royal Hospital Governors* [1983] 1 ALL ER 1018 (CA), 1028 (Sir John Donaldson MR) .

[114] *Bolitho v City of Hackney Health Authority* [1998] AC 232, [1997] 4 All ER 77.

[115] *Read v J Lyons & Co Ltd* [1947] AC 156 (HL), para 173 (Lord Macmillan) .

[116] Progressive Rugby, 'Crumbling Credibility of Rugby Union's Elite Concussion Protocols Hanging by a Thread' (28 April 2022),

Borough Council, this could be construed as an "obvious folly".[117] Conversely, the SGBs will not be in breach if they can demonstrate that they kept reasonably abreast of developments and were not too slow to apply changes. This overriding principle is laid out by Swanwick J in *Stoke v Guest, Keen and Nettleford (Bolts and Nuts) ltd*:

> "From these authorities I deduce the principles, that the overall test is still the conduct of the reasonable and prudent employer, taking positive thought for the safety of his workers in the light of what he knows or ought to know; where there is a recognised and general practice which has been followed for a substantial period in similar circumstances without mishap, he is entitled to follow it, unless in the light of common sense or newer knowledge it is clearly bad; but, where there is developing knowledge, he must keep reasonably abreast of it and not be too slow to apply it; and where he has in fact greater than average knowledge of the risks, he may be thereby obliged to take more than the average or standard precautions. He must weigh up the risk in terms of the likelihood of injury occurring and the potential consequences if it does; and he must balance against this the probable effectiveness of the precautions that can be taken to meet it and the expense and inconvenience they involve. If he is found to have fallen below the standard to be properly expected of a reasonable and prudent employer in these respects, he is negligent."[118]

In light of the above, acknowledgement must be given to the SGBs for implementing safety measures in the first place and any court must be slow before apportioning blame on the suitability of such measures,[119] particularly in such a fast-developing area of the law. But blame may still be apportioned if the court accepts that the sport sponsored CISG guidelines ignored a wide range of respected studies from dedicated research groups and brain banks relying on over 1,000 brains, MRI, DNA blood bio-markers, saliva, and kinematic modelling. If the defendants do fall below the required standard of care, a causation analysis follows.

4 Causation

On the balance of probabilities, the claimants will have to prove in fact and in law that their CTE was caused by repeated SRC.[120] This will hinge on the quality of the epidemiological evidence. In *Hotson v East Berkshire AHA*, Lord Bridge comments that in "medical negligence cases, causation may be so shrouded in mystery that the courts can only measure statistical chances".[121] In similar vein, McCombe LJ states that "proof of causation is almost inevitably about burden of persuasion and sometimes statistics can be highly persuasive".[122] In brain injury cases, Sir Bradford Hill's criteria can be used to evaluate the evidence in relation to (1) strength of association; (2) consistency; (3) specificity; (4) temporality, and; (5) biological gradient.[123] While a discussion of each criterion is beyond the scope of this article, a recent landmark study by Nowinski and colleagues applied these criteria to the existing literature and found there is "the highest confidence in the conclusion that RHI causes CTE".[124] Nonetheless, studies claiming a cause-effect relationship remain contestable due to evidentiary gaps stemming from, firstly, a lack of consistent findings and, secondly, a failure in accounting for confounding variables.[125] For instance, the Drake Foundation conducted a rigorous cross-sectional study using a sample of 143 elite rugby players aged over 50 and found an increased risk in older adults aged 75 years who reported three or more concussions. Regrettably, the findings of studies with supportive findings have been questioned due to the interference of alcohol use.[126]

Another common criticism of the sport-CTE literature is the small quantity of studies specifically examining the effect of SRC on rugby players. Most of the research has investigated NFL players. Professional rugby players, much like their NFL counterparts, represent a highly selected subgroup of the general population. Where there are evidentiary gaps, it is not unreasonable that comparisons be drawn from other collision sports.[127] Findings from American football suggest that symptomatic former players may have reduced brain volumes than age-matched healthy controls without head trauma.[128] Conversely, some studies of former professional athletes showed no brain volume differences compared to

Footnote 116 (Continued)

<https://www.progressiverugby.com/media/crumbling-credibility-of-rugby-union-concussion-protocols-hanging-by-a-thread> accessed 20 May 2022.

[117] [1951] AC 367 (HL), 382 (Lord Normand).

[118] [1986] 1 WLR 1776 [1783].

[119] *Thompson v Smith Ship repairers (North Shields) Ltd* [1984] 1 ALL ER 881 (QB), 894 (Mustill LJ).

[120] *Pickford v Imperial Chemical Industries plc* [1998] 1 WLR 1189 (HL).

[121] [1987] AC 750 (HL), 782.

[122] *Schembri v Marshall* [2020] EWCA Civ 358 (CA), para 46.

[123] Bradford Hill (1965).

[124] Nowinski et al. (2022), p. 14.

[125] Brand and Finkel (2020).

[126] Wojtowicz et al. (2018); Owens et al. (2021).

[127] Benson et al. (2009); Gammons (2013); Bonfield et al. (2015).

[128] Lepage et al. (2019).

controls.[129] Taken together, it is clear that suggestions of a link between concussion and CTE have yet to be replicated across different research groups. This will present a difficulty for the claimants in proving consistency of findings. Such evidential gaps will not be filled swiftly either, as devising longitudinal studies to monitor the onset of later-life neurodegenerative diseases are wholly impractical.[130] This is attributable to the significant probability of harm to at least some of the study cohort over a period of decades, making it unethical to do so.[131] Be that as it may, the Bradford Hill Criteria are simply a guide rather than a formal checklist. Not all the criteria need to be satisfied to logically deduce a causal relationship.[132]

Clearly, the unresolved questions of science will be inherited by the courts. As Lord Thankerton observed in *Watt v Thomas*,[133] exceptional cases requiring the assessment of disputed medical evidence place the judiciary in the unenviable position of ruling which side of the argument is the more plausible. Exceptional cases include "subtle brain injury cases",[134] and by extension CTE would likely fit under this umbrella term. On the assessment of subtle brain injury cases, "the credibility of the claimant is inextricably entangled with medical opinion provided to the court".[135] Of particular interest is the recent judgement in *Mathieu v Hinds & Anor (Rev1).* Upon hearing expert evidence deduced from a series of recently published meta-analyses Hill J states:

> "Accordingly, I do not consider, on the current state of the science, that the Claimant can show, to the balance of probabilities standard, the existence of a more than fanciful chance that the TBI will lead to him developing dementia."[136]

The judgement in *Mathieu* provides the first clear judicial decision on whether the courts should be making awards of provisional damages to allow claims to be re-opened if the claimant should subsequently develop dementia. The case is relevant because Hill J was unconvinced that TBI induced dementia from a single accident is clearly diagnosable. It was agreed that there are over 100 different types of dementia and Richard Geraghty notes that different dementias can have many causes and effects.[137] In practical terms therefore, any rugby claimant with a diagnosis of dementia faces the steep burden of distinguishing SRC-related dementia from other types of dementia.

In rebuttal, David Thorpe maintains that CTE is a distinct disease.[138] Not only has the progression of CTE been characterised into four separate stages by McKee,[139] but these criteria were among the tools used blindly by neuropathologists in the USA to assess 25 cases of various tauopathies from predeceased patients (including CTE, Alzheimer's disease, progressive supranuclear palsy, argyrophilic grain disease, corticobasal degeneration, primary age-related tauopathy, and Parkinsonism dementia complex of Guam).[140] Using McKee's criteria, "of the 10 cases submitted with the presumptive diagnosis of CTE, 64 (91.4%) of the 70 reviewer's responses indicated CTE as the diagnosis."[141] Similar supportive findings have also been reported.[142] However, while diagnosis of CTE from autopsy are less controversial, the same cannot be said for diagnosing patients living with 'probable CTE'. On this issue, a letter to the Lancet in 2019 highlights the dangers of misdiagnosing CTE:

> "Contrary to common perception, the clinical syndrome of CTE has not been fully defined, its prevalence is unknown, and the neuropathological diagnostic criteria are no more than preliminary…Too often an inaccurate impression is portrayed…This distorted reporting on CTE might have dire consequences. Specifically, individuals with potentially treatable conditions, such as depression or post-traumatic stress disorder, might make decisions on their future on the basis of a misplaced belief that their symptoms inevitably herald an untreatable, degenerative brain disease culminating in dementia."[143]

4.1 Factual causation

4.1.1 Material contribution test

It is accepted that the "but for" test is unsuitable in situations where there are multiple causal factors and the true cause of injury cannot be established on the balance of probabilities. The medical experts may therefore be required to separate

[129] Zivadinov et al. (2018).

[130] Casper et al. (2021), p. 376.

[131] Finkel and Bieniek (2019).

[132] Nowinski et al. (2022), p. 3.

[133] [1947] AC 484, 1947 SC (HL) 45, para 487.

[134] *Siegel v Pummell* [2014] EWHC 4309 (QB).

[135] [2018] EWHC 1787 (QB), para 11 (Saggerson J).

[136] [2022] EWHC 924 (QB), para 341.

[137] Geraghty (2022); see also Carone and Bush, 'Dementia Pugilistica and Chronic Traumatic Encephalopathy'. In: Raymond Dean and Chad Noggle (eds), *The Neuropsychology of Cortical Dementias* (1st edn, Springer 2014), p. 303–326.

[138] Thorpe (2022), p. 67–69.

[139] McKee et al. (2013), p. 43.

[140] McKee et al. (2016), p. 75.

[141] *ibid,* p. 78

[142] Pierre et al. (2021), p. 2; Bieniek et al. (2021), p. 216.

[143] Stewart et al. (2019), p. 231–233.

tortious and non-tortious causes unless the case is truly one of "indivisible injury". Indeed, the defendants will not be liable for head injuries incurred outside of sport. Within the sport itself, some inherent risks are to be expected, as discussed previously. The outcome would be different if the disease is divisible because the defendant's negligence would have caused only part of the injury.[144] In *Bailey v Ministry of Defence and another*,[145] the claimant's brain damage was categorised as an indivisible disease. In *Bailey*, however, the causal process was still a "cumulative" one in that the brain damage was a result of the claimant's weakened state and this weakness had been caused by a number of factors.

Where a disease is caused by a cumulative effect which is partially attributable to the defendant's breach of duty (i.e. tortious) and partially to causes not stemming from the breach (i.e. non-tortious), the defendant will be liable on the ground that their breach of duty made a "material contribution" to the disease. In *Bonnington Castings Ltd v Wardlaw*,[146] the claimant succeeded in persuading the court to make an inference from the facts that the tortious asbestos dust had made a material contribution to the claimant's injury during their employment. As per Lord Reid, the cause must be more than *de minimis* (i.e. minimal). Where the factors are cumulative, following *Bonnington*, the court has the option to find the defendant liable.

In the context of Australian civil liability, Thorpe relies on *Bonnington* to reason that the repetitive trauma accumulated by rugby players through their careers at various playing levels and clubs is "indivisible" and therefore, the SGBs could be liable for making a material contribution to the harm suffered.[147] While this will likely be the mainstream approach for a large number of claimants, where the injury could have been caused by any number of distinct factors, the material contribution principle will not fall in the claimant's favour. In *Wilsher v Essex Area Health Authority*[148] the defendant's breach was only one of the five separate and distinct causes of the baby's retrolental fibroplasia. It was therefore impossible to ascertain whether the breach was the sole cause of the baby's condition. On application to the rugby claim, Asken and colleagues highlights that the ageing process, disordered sleep, neurodevelopmental disorders (i.e. ADHD), drug/alcohol abuse, and exposure to multiple surgeries/anaesthesia have all been connected to late-life cognitive impairment including CTE.[149] The SGBs will no doubt argue, in addition to CTE being one of over 100 different types of dementia, there are multiple factors which cause CTE. It follows that if several non-tortious causal factors of CTE can be successfully argued, it would make it unsound to argue the defendants breach made a material contribution to the onset of disease to the balance of probabilities standard.

4.1.2 The doubling of the risk test

As above, where multiple agents operate cumulatively and simultaneously in causing the onset of a disease, the court will apply the material contribution test. Some cases have alternatively referred to the "doubling the risk" test, as a means of establishing factual causation in situations involving multiple possible causes and tortfeasors.[150] For this reason, the test has been relied on in cases where both smoking and asbestos exposure are presented as alternative potential sources of cancer.

In *Novartis Grimsby v Cookson*,[151] causation was held to be established owing to epidemiological evidence that negligent exposure to carcinogens had more than doubled the risk of the claimant developing bladder cancer. As the court held, in such circumstances, "it must, as a matter of logic, be probable that the disease was caused by the former"[152] and causation could therefore be inferred on the balance of probabilities. In 2022, a post-mortem analysis of 290 American Football players brains revealed that university-level and professional football players had 2.38 and 2.47 times the risk of being diagnosed with CTE in comparison to high-school-level players.[153] While other studies are more descriptive than determinative, an analysis of 5800 rugby participants from 185 cohort or cross-sectional studies of 20 sports found that for collision sports, being male, being older, and playing in a game, all contributed to being exposed to more SRC events.[154] However, caution must be exercised when inferring proof of causation from the doubling of a small relative risk—particularly when using unreliable or incomplete epidemiological data,[155] as appears to be the case in the rugby claim. The need for careful consideration of the evidence is echoed by other decisions.[156]

The Court of Appeal in *Heneghan v Manchester Dry Docks Ltd*[157] approved a two-stage test which asks: what were the causative agents of the disease? And which of the defendants is responsible for these agents? The first limb

[144] *Holtby v Brighton & Cowan* [2000] 3 ALL ER 421 (CA).

[145] [2008] EWCA Civ 883, [2009] 1 WLR 1052.

[146] [1956] AC 613 (HL).

[147] Thorpe (2022), p. 78.

[148] [1988] AC 1074, [1988] 2 WLR 557.

[149] Asken et al. (2016).

[150] *Sienkiewicz v Grief (UK) Ltd* [2011] UKSC 10, para 93 (Lord Phillips).

[151] [2007] EWCA Civ 1261 (CA).

[152] *ibid,* para 74.

[153] LeClair et al. (2022).

[154] Flao et al. (2021).

[155] *Sienkiewicz* (n 150), para 83 (Lord Phillips).

[156] *Williams v Bermuda Hospitals Board* [2016] UKPC 4, [2016] AC 88, para 48 (Lord Toulson).

[157] [2016] EWCA Civ 86, [2016] 1 WLR 2036.

asks whether the evidence proves that the breach of duty has more than doubled the "relative risk". The effect is to establish causation on the conventional "but for" principles.[158] The second limb asks, 'who caused the disease?'. Lord Dyson notes the second limb is where the approach used in *Fairchild v Glenhaven Funeral Services Ltd* applies.[159] Namely, where there are multiple tortfeasors which have not equally doubled the risk by their respective contributions, each tortfeasor is only liable to the extent that they contributed to the risk of the disease.

4.1.3 Material increase in risk test

Where the "but for" test and material contribution test cannot prove causation, the material increase in risk test used in *McGhee v National Coal Board* is relevant where a claimant wishes to establish that the defendant's negligence contributed to the risk of damage.[160] Lord Wilberforce accepted the approach in *McGhee* on the ground that, given the evidential uncertainty, "as a matter of policy or justice … it is the creator of the risk who … must be taken to have foreseen the possibility of damage, who should bear its consequences".[161] The 2021 'Concussion in Sport' report by the DCMS lays out a prominent policy failing and injustice towards elite sports participants:

> "The protections afforded by the state to workers apply as much to footballers and jockeys as they do to miners and construction workers. The Health and Safety at Work Act 1974 was a landmark piece of legislation to protect the health of workers and, along with subsequent Regulations, places a duty of care on employers. The extent of that duty has been established through numerous court cases in many other sectors. We are astounded that sport should be left by the Health and Safety Executive to mark its own homework."[162]

The *McGhee* test was affirmed by the law lords in *Fairchild.* In *Fairchild*, the claimants had developed mesothelioma during their years of employment with successive employers. Evidence showed that mesothelioma (an indivisible disease) was caused by exposure to asbestos dust but it was not known whether it was caused by a single fibre or whether multiple fibres affected the probability of developing cancer. In the absence of conclusive scientific evidence, the House of Lords unanimously held that each of the employers was liable for the damage caused to the claimants. It was also held to be appropriate to depart from the "but for" test of causation in exceptional and specific circumstances.[163] These criteria were met in *Fairchild*, as the injustice of leaving the employees without compensation outweighed the injustice of holding an employer responsible for injury.[164]

Mountford v Newlands School is a rare example of the material increase in risk test in a sports setting.[165] The claimant fractured his elbow during a rugby match after being tackled by a much larger boy who had been negligently permitted to play in his age group. The Court of Appeal affirmed the approach stated in *Chester v Afshar (*citing McHugh J in *Chappel v Hart):*

> "Before the defendant will be held responsible for the plaintiff's injury, the plaintiff must prove that the defendant's conduct materially contributed to the plaintiff suffering that injury. In the absence of a statute or undertaking to the contrary, therefore, it would seem logical to hold a person causally liable for a wrongful act or omission only when it increases the risk of injury to another person. If a wrongful act or omission results in an increased risk of injury to the plaintiff and that risk eventuates, the defendant's conduct has materially contributed to the injury that the plaintiff suffers, whether or not other factors also contributed to that injury occurring. If, however, the defendant's conduct does not increase the risk of injury to the plaintiff, the defendant cannot be said to have materially contributed to the injury suffered by the plaintiff. That being so, whether the claim is in contract or tort, the fact that the risk eventuated at a particular time or place by reason of the conduct of the defendant does not itself materially contribute to the plaintiff's injury unless the fact of that particular time or place increased the risk of the injury occurring."[166]

Together, Waller LJ, Rix LJ and LJ Hooper unanimously agreed in holding that the material risk of injury increased due to the larger boy's maturity and physicality which were in contravention of England Rugby's Junior Guidelines and the appeal was accordingly dismissed. As in *Fairchild*, the application of *Chester* in *Mountford* signifies a departure from the orthodox approach to causation; the common thread being a desire from the judiciary to assist a deserving plaintiff facing a steep evidential burden. Therefore,

[158] *Jones v Metal Box Ltd* (County Court, 11 January 2007), para 53.

[159] [2002] UKHL 22.

[160] *McGhee v National Coal Board* [1973] 1 WLR 1, 1973 SC (HL) 37.

[161] [1973] 1 WLR 1 [6].

[162] DCMS, *Concussion in Sport: Third Report of Session*, (HC 2021-2022, 46), para 60. <https://committees.parliament.uk/work/977/concussion-in-sport/publications/> accessed 5 July 2022.

[163] [2002] UKHL 22, para 2 (Lord Bingham), para 61 (Lord Hoffman), para 43 (Lord Nicholls), para 108 (Lord Hutton).

[164] *ibid* 22, para 33 (Lord Bingham).

[165] [2007] EWCA Civ 21.

[166] [2004] UKHL 41, [2005] 1 AC 134, para 95.

the door seems ajar to argue that reducing the stand-down period from three weeks to six days materially increased the risks of concussion and ensuing brain disease to the athletes involved. In fairness, it is acknowledged the use of the material increase in risk test beyond mesothelioma cases is ill advised.[167] Afterall, drawing an inference from evidentiary gaps may place SGBs in a near impossible position of being unable to disprove an inference. The House of Lords in *Gregg v Scott* refused to follow *Fairchild*,[168] opting instead for legal certainty rather than developing special tests of causation to perceived injustices which could threaten the coherence of the English common law system.[169] Contrastingly, until the *Fairchild* exception is limited by the Supreme Court or Parliament, it remains applicable to new diseases including CTE.

Another argument is that *Chester* was a "special case" to prevent an injustice to the claimant which required a modest yet rare departure from traditional causation principles.[170] Lord Steyn justified this departure by saying that it was "in accord with one of the most basic aspirations of the law, namely to right wrongs. Moreover, the decision…reflects the reasonable expectations of the public in contemporary society".[171] *Fairchild* further demonstrates "that where justice and policy demand it a modification of causation principles is not beyond the wit of a modern court".[172] Having previously established that mTBI claims are "exceptional cases",[173] the rugby claim may also warrant *Chester's* "special case" label and invite an incremental modification of causation principles. Surely, the injustice of leaving the rugby claimants without compensation would outweigh the injustice of holding an SGB responsible for the onset of neurodegenerative diseases. Encouragingly, the RFU believes that they can afford the insurance pay-outs to those affected.[174]

Ultimately, the issue of conceptualising concussion as an industrial disease acquired during work-related activities is decided by the IIAC. The IIAC is an advisory non-departmental public body which makes recommendations to update the list of occupational diseases which are covered by the Industrial Injuries Disablement Benefit scheme (such as payments to miners for pneumoconiosis). As previously mentioned, the 2005 report did not classify SRC as an industrial disease. At the time of writing, the IIAC has resurrected its inquiry into neurodegenerative brain disease in ex-footballers and is in the early phases of re-examining the evidence. As stated earlier, the IIAC is separate to government and impartial in its approach, but it cannot be denied that it will be doing its investigation in a climate of enormous political pressure.

The reports of the 2002 DCMS Working Group and the 2017 Baroness Grey-Thompson report proposed ways to address the issue of concussion in sport.[175] In 2014, Chris Bryant MP (Labour) contended in the House of Commons that "the Rugby Football Union, the Welsh Rugby Union, the Football Association, the premiership …are in complete denial about the danger that [concussion] posed to many of their players."[176] Fast-forward to 2023, and the backbencher's debate on 'Football and Dementia' in the commons clearly demonstrates cross-party support not only for IIAC to conceptualise CTE as an industrial disease, but for IIAC to reach that decision expeditiously.[177] The Minister for Sport, Stuart Andrew MP (Conservative), seeks to remind us that "There is a lot of information and research for the advisory council to consider, and it is right that it does so properly, so that it can come up with the right conclusion."[178] In short, only when IIAC has finalised its report may the Department for Work and Pensions be in a position to consider any recommendations. It is highly likely therefore that the 2022 study by Nowinski and colleagues claiming a causative link between SRC and CTE will be among the research evaluated by IIAC.

[167] [2008] EWCA Civ 1211, para 34 (Smith LJ), Sienkiewicz (n 147), para 188 (Lord Brown); *International Energy Group Ltd v Zurich Insurance Plc UK* [2015] UKSC 33, para 39 (Lord Mance), para 129 (Lord Sumption).

[168] [2005] UKHL 2.

[169] *ibid*, para 172 (Lord Phillips).

[170] Khoury (2005); Meakin (2013).

[171] *Chester v Afshar* [2004] UKHL 41, [2005] 1 AC 134, para 25.

[172] *ibid* para 23, (Lord Steyn).

[173] *Watt v Thomas*, para 487 (Lord Thankerton).

[174] Kitson, 'RFU Says it Can Cover Dementia Payouts and Rugby is Safe for Children to Play' *The Guardian* (London, 11 December 2020) <https://www.theguardian.com/sport/2020/dec/11/rfu-says-it-can-fund-dementia-payouts-from-insurance-if-necessary> accessed 26 April 2022.

[175] DCMS, *Concussion in Sport: Third Report of Session*, (HC 2021-2022, 46), para 82 <https://committees.parliament.uk/work/977/concussion-in-sport/publications/> accessed 5 July 2022.

[176] UK Parliament (Hansard), *Business of the House, Volume 577: 13 March 2014*, Chris Bryant MP (Labour) at column 426 <https://hansard.parliament.uk/commons/2014-03-13/debates/14031364000001/BusinessOfTheHouse> accessed 30 September 2023.

[177] UK Parliament (Hansard), *Football and Dementia, Volume 737: 14 September 2023*, Grahame Morris MP (Labour) at column 1044, Ian Blackford MP (SNP) at column 1060 <https://hansard.parliament.uk/commons/2023-09-14/debates/30291932-D17D-4F50-82F6-A6B94071F071/FootballAndDementia> accessed 29 September 2023.

[178] *ibid*, Stuart Andrew MP (Conservative) at Column 1059.

5 Conclusions

With rugby in the spotlights, concussion is clearly an existential crisis facing world sport. Prior to the rugby claim, no sport-CTE case has made it to trial.[179] The rugby defendants would likely favour an out of court settlement, thereby avoiding the disclosure of documents and expert witness evidence against them. For the NFL, the settlement sum agreed in 2013 for $765 million made up a relatively small fraction of the NFLs annual revenue in 2013, which amounted to $9.5 billion.[180] The claimants meanwhile will undoubtedly be conscious that previous concussion settlements, namely the NHL litigation, provided a markedly lower pay-out.[181] If neither parties can budge from their respective positions, then a settlement becomes impossible, as was demonstrated in *Ali v Caton*.[182]

The case law points to the possibility that all three defendants have a duty of care to maintain effective and up to date safety regulations. The biggest hurdles will be in proving the SGBs breached their duty of care and proving the doctrine of causation to the court's satisfaction.[183] The combination of the exponential rise in SRC knowledge, the narrow scope of the CISGs consensus statement recommendations, and the backstep of the stand-down period following the plagiarism saga may prove persuasive in showing that the SGBs breached their duty of care. From a causative standpoint, there is unprecedented confidence that repetitive collisions cause CTE. The analogies drawn from brain injury, asbestos, and sports litigation demonstrate that causation gives rise to some of the most contentious issues in the whole of the common law.[184] While the evidential burden facing the claimants is fierce, the most appropriate method to discharge these obligations remains controversial. If the state of scientific knowledge is considered reliable by the courts, both the material contribution test and the doubling of the risk test may have their merits. If the evidentiary gaps prevent causation being proven on conventional principles, then an incremental extension to the *Fairchild* exception may be carefully considered. It remains to be seen to what extent policy considerations may influence the courts decision to discharge evidential obligations.

Mainstream media speculates that the claimants have a "less than 50/50 chance" of succeeding.[185] However, it is uncertain as to what extent the plagiarism allegations against McCrory or the development of knowledge may affect proceedings. The stage appears set for a battle of medical opinion. At a minimum, the ever-mounting advancements in the scientific literature should aid any future claims in establishing knowledge of risks, the causal link between SRC and CTE, or re-igniting efforts to conceptualise SRC as an industrial disease.

There is an undeniably strong desire among interest groups to bring about positive changes to player welfare. Despite the recent reforms from SGBs, the pace of change has been lethargic due to the regulatory autonomy enjoyed by such organisations.[186] While SGBs must undoubtedly follow the law, the courts generally avoid interfering with the suitability of an SGBs actions. As maintained earlier, it is anticipated that the regulations concerning the stand-down period and pitch side assessments, rather than the playing rules of the game, would face the greatest scrutiny. Litigation could play an important yet painful role in publicly examining the practices of SGB and governmental actors that have an enormous impact on player welfare.[187] If the courts do intervene, they "should exercise great caution before interfering with the decision of a specialist sporting body on a matter where the expertise and experience of that body is relevant".[188]

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[179] Cooper, 'NCAA Settles With Wife of Deceased Texas Player in CTE Lawsuit' *Yahoo* (16 June 2018) <https://sports.yahoo.com/ncaa-settles-wife-deceased-texas-player-cte-lawsuit-170435518.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAL2F6zHP_zqs51CkcP5BRoGKAuhjn3Rwbzql0wgCbdxHX0cwDB0GCJwoYttmczif5xWkrDrZon6_Q3X5T65rXxNZ4s-3DwtvCVb-c8anH2K0bzT9B8QGKdBk6yevqZEAC-7YTz-MI6h6Mc6Pc4gwa9YP5UUaiq2gVsKAjXd7ZiAu> accessed 21 July 2022.

[180] Ipek 2022.

[181] Henry Goldschmidt, 'The NHL Concussion Litigation – A Second Class Settlement?' (LawInSport, 31 December 2018) <https://www.lawinsport.com/topics/item/the-nhl-concussion-litigation-a-second-class-settlement> accessed 17 May 2022.

[182] [2013] EWHC 1730, [2013] 7 WLUK 151.

[183] Cuthbert and Rawlinson KC, 'CTE and Causation: The Key Medico-Legal Issues in Rugby Union's Concussion Litigation' (LawInSport, 9 July 2021) <https://www.lawinsport.com/topics/item/cte-and-causation-the-key-medico-legal-issues-in-rugby-union-s-concussion-litigation> accessed 1 June 2022.

[184] Aliyah Akram, 'Causation', Harry Steinberg, Michael Rawlinson, and James Beeton (eds), *Asbestos: Law & Litigation* (2nd edn, Sweet & Maxwell 2022), ch 11 sec1 para 2.

[185] Sean Ingle, 'Rugby Players' Claim for Brain Injury Has "Less Than 50/50 Chance", Say Experts' *The Guardian* (London, 13 December 2020) <https://www.theguardian.com/sport/2020/dec/13/rugby-union-players-claim-for-brain-injury-dementia-world-rugby> accessed 26 April 2022.

[186] Jonathan Taylor, Adam Lewis, Charles Flint 'Drafting Effective Regulations—the Legal Framework', Adam Lewis and Jonathan Taylor (eds), *Sport: Law and Practice* (4th edn, Bloomsbury Professional 2021) pt B Ch 1 para B1.6; Houben (2023).

[187] Goldberg (2013).

[188] *Bedene & LTA v ITF*, Sport Resolutions arb award dated 2 March 2017, para 74 (Charles Hollander KC) <https://www.sportresolutions.com/decisions/view/aljazh-bedene-the-lawn-tennis-association-vs-international-tennis-federation> accessed 20 July 2022.

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