24 March 2023

Ms Pothida Youhorn
Committee Secretary
Inquiry into concussions and repeated head trauma in contact sports
Standing Committee on Community Affairs
The Senate
Parliament House Canberra ACT 2600
C/- community.affairs.sen@aph.gov.au

Dear Ms Youhorn

AFL response to the Terms of Reference of the Senate Inquiry into concussions and repeated head trauma in contact sports

I refer to your previous correspondence to the Australian Football League (**AFL**) in relation to the Senate Standing Committee on Community Affairs' Inquiry into concussions and repeated head trauma in contact sports (**Inquiry**). By that correspondence, you invited AFL to make a submission addressing some or all of the Inquiry's terms of reference (**ToR**).

By this letter, the AFL makes a submission in response to certain of the ToR. The relevant submissions are set out below under headings that reflect paragraphs a-k of the ToR.

In connection with that submission, please note the AFL is the governing body and National Sport Organisation for Australian Football which includes the direct administration of the elite men's (**AFL**) and women's (**AFLW**) competitions, as well as certain State League competitions including the VFL and VFLW, Talent Pathway Competitions (being competitions with a focus on the identification and development of players that may play in the elite competitions, such as the Coates Talent League) and community football (being all other Australian Football competitions played across Australia, including NAB AFL Auskick). However, please further note that many state and community football leagues nationally are affiliated with, but administered independently of, the AFL and in particular, Leagues in South Australia and Western Australia are governed by the South Australian National Football League and the West Australian Football Commission respectively.

The AFL is keen to assist the Committee in the conduct of the Inquiry into this extremely important matter. The health and safety of participants in our sport at all levels is of paramount importance to the AFL and the AFL has taken, and continues to take, significant steps in order to appropriately address the risk of injury, including traumatic brain injury, in our game. We have several full-time and part-time employees working on our concussion strategy along with our Chief Medical Officer, who is internationally renowned in this space. The AFL Commission has also approved funding of up

to $25 million over the next decade to support a longitudinal brain health initiative (i.e. the AFL Brain Health Initiative) that will track the brain health of players from the point of entry into our Talent Pathway Competitions through to post their AFL or AFLW career. It is vital that we continue to evolve our response as the science evolves and to that end, the AFL welcomes the learnings that will come from the Inquiry.

As a guide to participation in our sport, in 2022, there were more than 517,000 registered participants in Australian Football, from NAB AFL Auskick (our national introductory Australian Football program for children aged 5 to 12) through to junior and senior community football, modified formats and school programs. Our participants play in 232 Leagues and 2,583 Clubs that are the lifeblood of communities across Australia. On any measure, Australian Football is an incredibly popular participation and spectator sport.

The management of concussion and head trauma is multifaceted and complex, including for the participants in Australian Football. Reflecting this, the AFL has formulated a five-year ***Strategic Plan for Sport-Related Concussion in Australian Football (2022-2026)*** (**AFL Concussion Strategic Plan**) which outlines the AFL's evolving integrated framework for the prevention, management and research of concussion and repetitive head trauma.

Please see the below extract from the AFL Concussion Strategic Plan that provides a summary of the AFL Concussion Strategic Plan's Vision, Mission, Strategic Objectives, Principles and Enablers.

The AFL Concussion Strategic Plan is linked here.

The governance structure within the AFL charged with the responsibility to deliver on the AFL Concussion Strategic Plan prioritises consultation, transparency and accountability and is principally comprised of:

- ***AFL Concussion Steering Group***, consisting of persons from across the AFL industry with relevant expertise and responsibilities, to oversee the work of dedicated Concussion Working Groups in guiding the AFL's concussion management and research strategy and support its implementation through the development, management and review of the AFL Concussion Strategic Plan. The AFL Concussion Steering Group reports to the Audit & Risk Committee of the AFL Commission (i.e., the AFL's board of directors);

- ***AFL Concussion Working Groups*** with specific responsibility to formulate and execute key priorities under the AFL Concussion Strategic Plan. The current AFL Concussion Working Groups are the Innovation & Research Working Group, Medical Working Group, State & Community Football Working Group, Risk Insurance & Legal Working Group and Communications & Media Working Group;

- ***AFL Concussion Scientific Committee***, consisting of experts of various relevant specialisations (both internal and external to the AFL, the latter including international experts in relevant fields of concussion research and clinical management) which provides expert scientific advice, oversight and guidance on all aspects of the AFL's concussion and head trauma research strategy for all levels of Australian Football.

As mentioned above, the AFL is committed to ensuring the health and safety of all participants and remains keen to assist the Committee in the conduct of the Inquiry into this extremely important matter.

Please contact me if the AFL can provide further assistance.

Kind regards

Andrew Dillon
General Counsel / Executive General Manager Football Operations, Legal & Integrity

a. *the guidelines and practices contact sports associations and clubs follow in cases of player concussions and repeated head trauma, including practices undermining recovery periods and potential risk disclosure*

Concussion guidelines and practices – Elite Football (AFL and AFLW)

1) The principal guidelines for the management of concussion and head trauma in Australian Football are:

   a) For the elite football competitions (i.e. AFL and AFLW) the guidelines now known as the ***Guidelines for the Management of Sport-Related Concussion at AFL & AFLW Level*** (**AFL/AFLW Concussion Guidelines**). The current 17 page version of the AFL/AFLW Concussion Guidelines which were released in March 2023 in advance of the 2023 AFL season, is linked here. In relation to the AFL/AFLW Concussion Guidelines, please note:

      i. In following the AFL/AFLW Concussion Guidelines, the earliest that a player can return to play after a concussion is on the 12th day after the day on which the concussion was sustained and provided that the player has safely progressed through each stage of the 11-step return-to-play program;

      ii. The 11-step return-to-play program consists of three distinct stages – rest, recovery and graded return to training and play. The updated guidelines insist on a minimum period of 24 hours (or longer) for each step of the progression and, if any symptoms recur during the graded return to training and play stage, the player athlete must return to the previous symptom-free step;

      iii. The guidelines also insist on a more conservative approach in cases with "modifying" factors, including where the player is young, where there is a history of learning disorders or mood disturbance, or a history of multiple concussions, particularly those with prolonged recovery, and previous concussion/s in the same season and where there is a high symptom burden in the first few days after injury. In these cases, the graduated loading program should be conducted over a longer period of time (e.g. by extending the number of days between progressions, or increasing the number of days held at each Stage/Step of the graded return-to-play);

      iv. The player must have a medical assessment prior to being cleared to return to full contact training with the group and then a further medical assessment before being cleared to return to play; and

      v. The updated 17-page guidelines also make clear that there are computerised screening cognitive tests (e.g. Cognigram, ImPACT) that have been validated for use following sport-related concussion, which are readily available and are a practical method to assist with the assessment of cognitive recovery. The guidelines also insist that neuropsychological testing is only one component of

assessment and does not replace the need for a full history and clinical/neurological examination.

b) For all other levels of Australian Football competitions, the guidelines now known as *The Management of Sport-Related Concussion in Australian Football* (**Community Football Concussion Guidelines**). The current version of the Community Football Concussion Guidelines for 2021 is linked here, noting that it is planned that an updated version of those guidelines will be released in advance of the start of most community football competitions in April 2023.

c) Where appropriate below, the AFL/AFLW Concussion Guidelines and Community Football Concussion Guidelines are collectively referred to as the "Concussion Guidelines".

2) The Concussion Guidelines constitute a pragmatic translation of the Consensus Statements from the International Conference of the Concussion in Sport Group (**CISG**) for the management of concussion in Australian Football. The CISG International Conference is the peak congress of the world's leading sports-related concussion medical experts, the most recent of which took place in Amsterdam in late 2022. Researchers and clinicians with expertise in sport-related concussion are brought together to rigorously review, discuss and summarise the published literature and provide updated, evidence-informed recommendations regarding the evaluation and management of concussion. The CISG's Consensus Statements reflect the state of knowledge at the relevant time and are subsequently modified as new knowledge develops.

3) Amongst other content, the AFL/AFLW Concussion Guidelines (principally for use by AFL and AFLW Club doctors) contain sections on:

a) Acute management of concussion, noting the following relevant aspects:

i. Identification of concussion using the bespoke AFL Head Injury (**HIA**) form (a rapid sideline screening tool for a suspected concussion that has been developed to standardise the assessment and management of players following head trauma on match day) in conjunction with the Sport Concussion Assessment Tool 5th edition (**SCAT5**);

ii. Both the HIA and the SCAT5 are incorporated into a bespoke concussion management app for the AFL, known as CSX, which is mandated for all concussion assessments in the AFL and AFLW competitions;

iii. Extensive use of sideline video (including world leading Hawk-Eye video technology) to allow direct observation on match-day of the mechanisms of injury and identification of acute signs of concussion that may be brief and not obvious to the naked eye in real time. Sideline medical staff are also alerted to potential head trauma events by independent spotters (who are all practising

doctors) in the AFL Review Centre (**ARC**), being the AFL's centralised video review facility introduced in late 2019);

iv. Where there is a clear diagnosis of concussion on the basis of the conduct of the HIA, the player is immediately removed from the field and must not return to play in that match; and

v. Where concussion is suspected but not clearly diagnosed, the player is removed for further assessment, namely the SCAT5 which is undertaken in a quiet place in the changerooms (and in respect of which a mandatory minimum period of 15 minutes off the field applies).

b) Return to play, noting the following relevant aspects:

i. Recovery following concussion is variable, and management should be individualised;

ii. There are three stages for the return to play protocol, namely:

A. A brief period of **relative rest**;

B. A period to allow **recovery**, where a progressive increase in physical and cognitive activity is encouraged, as guided by symptoms. This period continues until the player has clinically recovered, meaning that they no longer have concussion-related symptoms at rest or with activity and they have returned to "normal" on their tests of balance and brain function;

C. A **graded return to full activity** with progressive addition of contact and monitoring for recurrence of symptoms under maximal physical and cognitive load/fatigue and confidence to return to play;

iii. Since 2021, the AFL/AFLW Concussion Guidelines prescribe ***minimum*** timeframes for the completion of each stage and mandated clearance points in between each stage (i.e., the requirements of a stage must be satisfied before the player can progress to the next one) which have the benefit of:

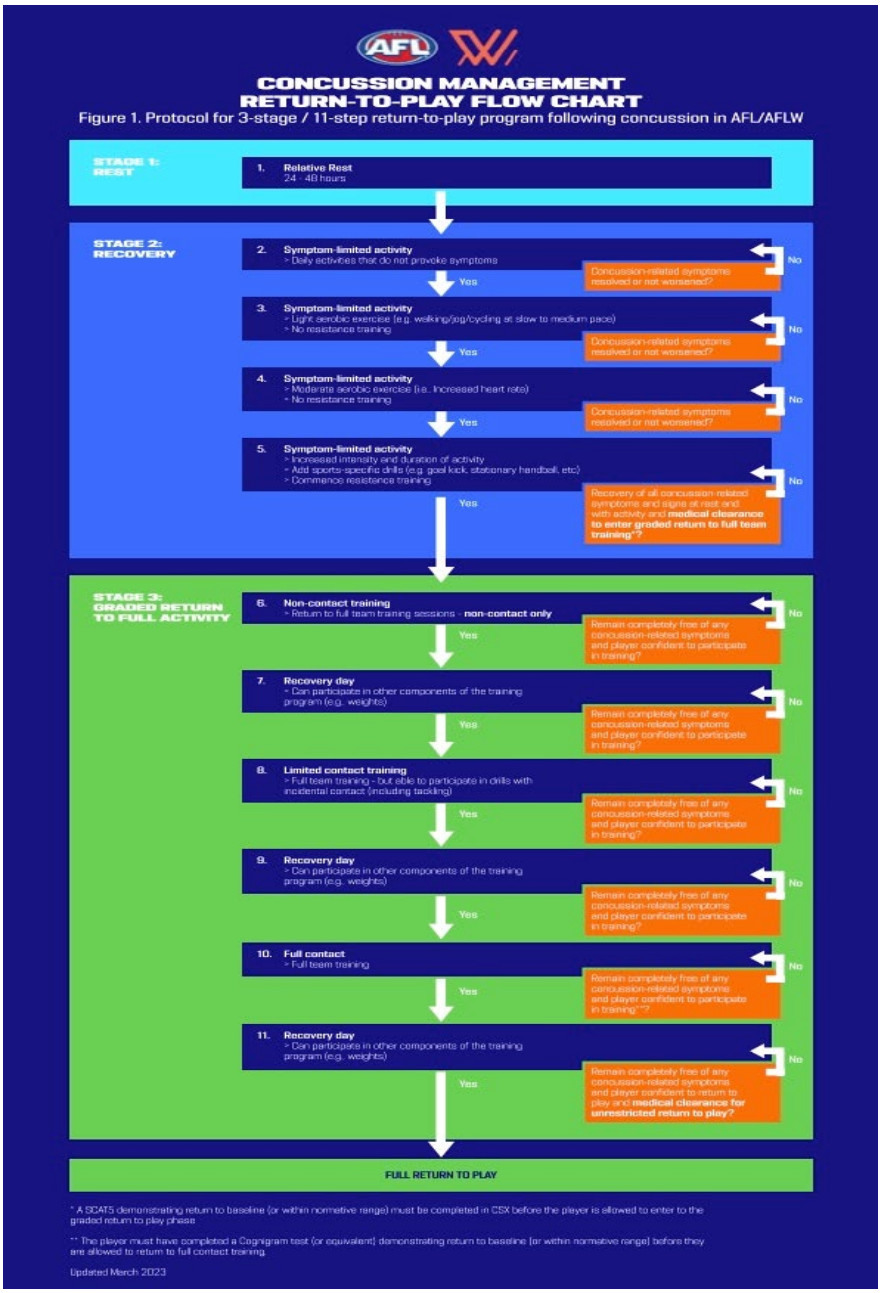
A. Establishing a more conservative buffer for recovery, with the Player only allowed to enter the "graded return to full activity" **after** they have clinically recovered;

B. Providing more time to assess players following their recovery (and may potentially accommodate the use of novel investigation techniques);

C. Removing the pressure to return to play in the following week;

iv. By operation of those minimum timeframes and clearance points, the earliest a player can return to play in a match following a diagnosed concussion is on the 12th day after the day on which the concussion was sustained. But again, it is important to stress, that is the minimum number of days and one in four players across the AFL and AFLW seasons in 2022 missed more than one game as a result of the conservative management of their concussion;

v. Set out below is Figure 1 of the 2023 AFL/AFLW Concussion Guidelines being a flow chart of the Return To Play protocol:



vi. Ultimately, the timing of return to play is dictated by the duration of the recovery phase, which is variable from injury to injury; and

vii. Furthermore, a more conservative approach is recommended in cases with additional "modifying" factors, including:

A. young players;

B. those with a history of learning disorders or mood disturbance;

C. those with a history of multiple concussions, particularly those with prolonged recovery; and

D. high symptom burden in the first few days after injury.

In these cases, the graded loading program should be conducted over a longer period of time (e.g. by extending the number days between progressions, or increasing the number of days held at each stage of the graded return to play).

c) Investigation and management of difficult or complicated cases, noting the following relevant aspects:

i. Guidance is provided as to imaging and other investigative techniques where there is concern regarding underlying structural head/brain injury;

ii. Where difficult and/or complicated cases arise, multi-disciplinary management with independent clinicians with expertise in concussion management is recommended to assist in management decisions including return to play;

iii. The AFL has established a network of experienced expert clinicians in the management of sports-related concussion to assist in such matters;

iv. The AFL has Concussion Panels (based on the Medical Panels approach of WorkSafe Victoria (formerly the Victorian Workcover Authority), Victoria's workplace health and safety regulator) to provide a mechanism for timely and efficient independent expert multidisciplinary assessment of complex cases of concussion. Cases referred to Concussion Panels include, but are not limited to:

A. Players with prolonged symptoms (i.e., >4 weeks);

B. Players with multiple concussions, especially with increasing symptom duration or symptom load;

C. Players with concussions occurring with diminishing impact force;

D. Where there are conflicting management proposals; and

E. Players considering retirement due to concussion.

4) The AFL/AFLW Concussion Guidelines, and their reliance on the CISG Consensus Statements, was the subject of close scrutiny in an independent review commissioned by the AFL in 2022, the report from which is linked here.

5) The report acknowledged (at paragraph 111) that there are several areas of ongoing uncertainty in the research and management of concussion which add layers of complexity to the management of player head and regulation of contact sports. It found (at paragraph 140) that many of the criticisms made of the CISG Consensus Statements (and by extension the AFL/AFLW Concussion Guidelines) were made without appropriately considering "the state of scientific knowledge at the relevant points in time at which the statements were published; [or] … the practical problems facing sporting bodies, athletes, sports doctors and sports rule-makers seeking to balance numerous conflicting considerations to reach an appropriate response to head injury risks in contact sports". Further, the report cautioned on the potential adverse consequences of taking of an overly precautious approach to concussion management by sporting organisations including as to exclusion periods for the potential cause problems including under-reporting of concussion symptoms.

Concussion guidelines and practices – Community Football

6) The Community Football Guidelines contain similar content to the AFL/AFLW Concussion Guidelines, albeit they have a much more expansive background section and are framed in more accessible language with amended processes reflecting their use by a range of healthcare providers and community volunteers at sub-elite level (where there are generally fewer resources available for match-day and follow up care compared to elite competitions). The Community Football Guidelines also have specific provisions for children and adolescents, importantly stating:

> *A more conservative approach is important in children or adolescent athletes as it is recognised that recovery from concussion tends to be slower in this group. A more conservative approach is likely to include longer timeframe for recovery of symptoms and entry into graded loading program and/or longer time spent at each step in the graded loading program.*

7) As noted above, the next iteration of the Community Football Guidelines is scheduled for release in April 2023.

8) At a community football level, modified rules have been adopted in a significant proportion of junior competitions that regulate contact consistent with a key focus on participation that creates an environment where young players learn, develop and improve their disposal skills by reducing congestion and allowing them to play in a safe

environment. Tackling and other related skills are subsequently taught and learned but in an appropriate sequence, as follows:

a) For under 8s:

   i) No tackling or holding of an opponent;

   ii) No pushing (fending off), bumping or barging another player;

   iii) No smothering, stealing the ball or knocking the ball from an opponent's hands;

   iv) No shepherding;

   v) No kicking off the ground;

b) For under 9s and 10s:

   i) Modified tackling (wrap tackle only) introduced; and

   ii) No other contact allowed as per Under 8s.

Prevention of concussion and non-concussive repeated head trauma

9) The AFL has made more than 30 rule changes to the AFL Regulations and Tribunal Guidelines since 2005 to assist in the deterrence of conduct causing or giving rise to the risk of concussion and other head trauma, and to both encourage and enforce change of behaviour on field. A list of those rule changes is set out below:

AFL LAWS/REGULATIONS CHANGES SINCE 2005 TO INCREASE PROTECTION OF THE HEAD

YEAR	***LAWS/REGULATION CHANGE***
2005	*Tribunal system revamped. A Match Review Panel (later the Match Review Officer (**MRO**)) appointed to observe incidents, recommend verdicts and allocate penalties. Players permitted to choose to accept or reject verdicts and related prescribed penalties. Contested verdicts dealt with by a Tribunal. "High contact" (head/neck) results in a larger penalty than "body contact", and the potential to cause a more serious injury for forceful front-on contact or high contact in marking/ruck contests/tackles is able to be considered to escalate sanctions. The Guidelines also state that "the AFL is determined to protect the health and welfare of Players by specifying strict sanctions for illegal, head-high contact".*
2007	*Introduction of a specific Free Kick and Reportable Offence for bumping a player front-on with his head down over the football.*

2007	*Introduction of a stricter stance against head-high bumps and a wider definition of a reportable bump. Any bump causing forceful contact to be made to an opponent's head or neck is reportable for rough conduct, unless the player did not have a realistic alternative to:* *a. Contest the ball;* *b. Tackle; or* *c. Shepherd in a manner which was reasonable in the circumstances.*
2010	*Dangerous tackle guidelines introduced under Rough Conduct due to their potential to cause a serious injury, where regard may be had to:* *- whether the tackle consists of more than one action, regardless of whether the player being tackled is in possession of the ball;* *- whether the tackle is of an inherently dangerous kind, such as a spear tackle;* *- whether an opponent is slung or driven into the ground with excessive force.*
2011	*Modification of the interchange arrangements by which the 3 interchange and 1 substitute bench structure was introduced to minimise (unattractive) congestion by increasing the effect of fatigue on the game, minimising the effects of game ending injuries (to improve fairness) and reducing injury collision potential by lowering average player speed (again by increased fatigue).*
2011	*Further tightening of the bumping provision introduced in 2007, whereby a player who elects to apply a bump in any situation becomes liable if he makes forceful contact with the opponent's head, unless the bumping player was contesting the ball and did not have a realistic alternative way to contest the ball or the contact was caused by circumstances outside the control of the bumping player which could not be reasonably foreseen.*
2011	*Emergency field umpire empowered to award prohibited contact free kicks from the interchange bench.*
2012	*Dangerous tackle guidelines strengthened further to allowing for increased Conduct gradings (and thus penalties) where a player is lifted off the ground or the tackle consists of more than one action.*
2012	*Striking guidelines strengthened, such that behind play strikes or those with a raised forearm or elbow are generally deemed conclusive of the strike being intentional with increased penalties resulting. Furthermore, strikes with a raised forearm or elbow generally not permitted to be graded Low Impact, and instead classified at a higher level commensurate with the nature and extent of the risk of serious injury involved.*
2013	*Introduction of the concussion substitute to allow Clubs to temporarily replace a player who is being assessed for concussion (and if the assessed player is found not to be concussed and returned to play the substitute could be activated again later in the match). This rule allowed Club doctors at least 15 minutes to assess potentially concussed players using the SCAT tool.*
2014	*The implementation of an interchange rotation cap of 120 (plus changes made at end of quarter breaks) to equalise Club interchange rotations (to improve fairness), but also reduce the average Player speed and therefore injury collision potential by increased player fatigue.*

2014	*Alteration of the interpretation of the high contact rule with play on called if a player ducks into a tackle with the aim of disincentivising players drawing high contact from an opponent.*
2014	*If a player has driven their head into a stationary or near stationary opponent, the player shall be regarded as having had prior opportunity (and liable to have a free kick paid against them for holding the ball), aimed at disincentivising players drawing high contact from an opponent.*
2014	*Strengthening of the high contact provisions whereby head clashes that result from a player electing to bump are deemed to be circumstances that can reasonably be foreseen with sanctioning consequences.*
2015	*Stricter application of the driving/leading with the head interpretation to further disincentivise players drawing high contact from an opponent.*
2016	*The interchange cap further reduced to 90 interchange rotations (plus changes made at end of quarter breaks) aimed at increasing the effect of fatigue in the game to reduce average Player speed and therefore injury collision potential.*
2016	*The guidelines relating to dangerous tackles amended to allow consideration of forceful rotating tackling actions or situations where the player being tackled is in a vulnerable position with little opportunity to protect himself.*
2016	*The list of circumstances relevant to the 'potential to cause serious injury' (which permit increased grading and penalties) expanded to allow consideration of intentional head high strikes and high bumps with significant head contact and/or player momentum.*
2016	*The appeal grounds for Tribunal decisions expanded to include manifestly inadequate classification or sanction thus facilitating appeals by the AFL from Tribunal decisions, in particular imposing a sanction not commensurate with the action and consequence, typically arising from illegal high contact.*
2017	*Further amendment of the high tackle rule interpretation such that play-on called where following a legal tackle, the ball carrier draws high contact from an opponent, aimed at disincentivising risky behaviour attempting to win a free kick.*
2017	*Selected "jumper punches" and strikes to the head that have insufficient force to constitute a Low Impact offence or warrant a suspension still discouraged by the imposition of a fixed financial sanction under Attempt to Strike.*
2019	*Stricter interpretation of prohibited contact (striking) free kicks to create a specific offence for strikes with negligible impact instead of utilising general misconduct, with the aim of discouraging and penalising low grade head contact.*
2019	*Implementation of strict liability for forceful head clashes where a player elects to bump (rather than tackle) an opponent with punitive consequences.*
2019	*Increased conservatism employed regarding adjudications of the "contesting the ball" exception to Rough Conduct (High Bumps) to limit reliance on such extenuation.*
2020	*Amendment to guidelines to allow the MRO to classify Impact one grade higher for intentional off-ball strikes.*
2020	*Amended guidelines to allow repeat offenders to be directly referred to the Tribunal.*

2020	*Amended guidelines to allow upgrading impact (with punitive consequences) based on the potential to cause serious injury, including when the victim player reasonably is not expecting or prepared for contact.*
2020	*Amended guidelines (mid-season) relating to the potential to cause serious injury to insert the words "any dangerous tackle" to replace existing (narrower) references to "spear tackle" and "driving an opponent into the ground when his arms are pinned" in order to expand the situations in which (heavier) penalties can be applied.*
2020	*Amended guidelines (mid-season) relating to dangerous tackles that may be sanctioned to include a scenario where a single arm is pinned in a tackle creating vulnerability (noting the guidelines previously contemplated a tackle where both arms were pinned).*
2021	*Amended guidelines to expand the definition of "High" contact for a dangerous tackle which has the potential for injury to be caused through dangerous high contact with the ground to include a scenario where high contact does not actually occur (with punitive consequences).*
2021	*Amended guidelines to expand the scenarios in which the Impact classification may be upgraded based on the potential to cause serious injury (with punitive consequences) to capture all Intentional strikes, not just those that are High contact.*
2021	*Amended guidelines and the regulations to narrow the "contesting the ball" exception/defence in relation to high bumps etc (with punitive consequences) from "the Player was contesting the ball and did not have a realistic alternative way to contest the ball" to "the Player was contesting the ball and it was reasonable of the Player to contest the ball in that way".*
2022	*Amended guidelines requiring that the potential to cause injury "must" be factored into the determination of Impact for Head-High Contact, rather than only requiring "strong consideration" to be given to the potential to cause injury.*
2022	*Amended guidelines outlining that any Careless or Intentional Forceful Front-On Contact or Rough Conduct (High Bumps) where High Contact has been made and that has the potential to cause injury will usually be classified at a minimum as Medium Impact.*
2023	*Amended guidelines to provide that, in respect of Forceful Front-On Contact, it is not necessary for a Player's head to be "down" over the ball, it is only necessary for the Player's head to be over the ball (thus broadening the scope of the prohibition on dangerous and sanctionable conduct).*

10) The 2023 Tribunal Guidelines are linked here. The guidelines identify the guiding principles for the AFL Tribunal system and at the top of that list is "[t]o prioritise the health and safety of players". That principle sounds throughout the entire guidelines and the particular deterrence accorded to conduct that involves high (head) contact.

11) The process of considered evaluation of further potential changes that incrementally result in appropriate changes to make the game safer, whilst preserving the fabric of our game, is ongoing.

Education (potential risk disclosure)

12) In terms of potential risk disclosure, the AFL conducts an extensive education program at all levels of the game.

13) At the **elite level**, the AFL provides an annual concussion education presentation for all AFL and AFLW players. The objective has been to provide clear, consistent, and up-to-date information on key topics related to concussion and repetitive head trauma, across all clubs in the competition. The presentation for AFL and AFLW players is face-to-face, doctor-led and with time for a frank and informal question-and-answer session at the end.

14) The presentation includes an outline of the short-term effects of concussion and potential long-term outcomes that may result from concussion and/or repeated head impacts (including adverse effects on mood/mental health and risk of neurodegenerative diseases including Chronic Traumatic Encephalopathy). In 2022, the education program was broadened to include football staff and also a bespoke presentation for our Indigenous players and officials was also conducted and led by an Indigenous doctor.

15) At the ***Pathway Competition level***, the AFL is presently undertaking an extensive player concussion education program including face to face, doctor-led education session for numerous talent pathway cohorts nationally and additional "train the trainer" sessions for other cohorts such as state-based doctors.

16) At the ***Community Football level***, a National Community Concussion Education Webinar Series will again be undertaken with a series of webinars aimed at improving understanding of the risks related to concussion as well as concussion recognition and management. The content has been curated with sensitivity to health literacy and delivered by a doctor. The presentation also includes informal question-and-answer time. Additionally, in April 2023, there will be a "Concussion & Paediatrics" webinar focussing on concussion and children. Further, the AFL is also presently developing a mandatory concussion module for all sports trainers in Australian Football that will be produced following the release of the next iteration of the Community Football Guidelines.

17) The AFL is currently working to increase the education resources available to the entire football community through a new AFL concussion website, and content to be shared across other multimedia platforms.

Development and benchmarking of AFL's concussion management practices with other sports and important governmental and tertiary education collaborations

18) Valuable input on the Concussion Guidelines is provided by the AFL Doctors Association (**AFLDA**), made up of all AFL and AFLW doctors, including head doctors and assistants, as well as SANFL and WAFL Club doctors). For over 15 years, the AFLDA has run an annual professional development conference for its members in the period immediately following each AFL season. The AFLDA membership is comprised of experienced sports doctors and sport and exercise medicine physicians with expertise in sports-related concussion.

Amongst other sessions, the conference provides an opportunity to review selected head trauma incidents from the preceding AFL and AFLW seasons to facilitate learnings and collective education opportunities for AFLDA members as well as a broader discussion of concerns regarding any emerging mechanisms of head impact requiring investigation and/or intervention (e.g. sling tackles) and potential changes that may need to be made in the next iterations of the Concussion Guidelines.

19) The AFL also benchmarks its concussion management practices internationally and domestically through its participation in the following bodies:

a) The ICSG, which is a collaboration between international sporting bodies (i.e. AFL, Gaelic Athletics Association (Ireland), International Ice Hockey Federation, National Hockey League (US), Hockey Canada, National College Athletics Association (US), National Football League (US), National Rugby League (Australia), World Rugby and the English Football Association). The Group is a forum for the medical directors and principal physicians of each sporting organisation to share practical experiences in the management of contact sports, the learnings of which inform the Concussion Guidelines and the recommendations of the AFL's Concussion Scientific Committee. The Group meets annually and the AFL hosted the most recent annual conference in 2022. The findings and discussion of the Group are not published, however the process of consultation and collaboration has been documented.[1]

b) Australian Contact Sports Chief Medical Officers Group (involving the Chief Medical Officers of the AFL, Rugby Australia, NRL and Cricket Australia) by which these sports work together to harmonise the approach to diagnosis of concussion in athletes and in respect of rules regarding the important issues of treatment and management, and return to play.

20) The AFL also has important collaborations with governmental and tertiary education institutions with respect to concussion management and research as follows:

a) In 2023, the AFL commenced a research partnership with the Victorian Government Department of Health which aims to understand and articulate elite AFL and AFLW players' knowledge and understanding of the AFL/AFLW Concussion Guidelines, and how these differ between sex and gender. The project will qualitatively explore factors associated with honest disclosure of concussion symptoms immediately post-injury and with regard to return to sport. Additionally, elite players' concerns regarding long-term brain health and association with participation in collision sport will be explored. In community football players, quantitative surveys will measure concussion knowledge as well as understanding of the various components of the Community Football Concussion Guidelines. Qualitative focus groups and/or semi-structured interviews will attempt to identify facilitators and barriers to compliance with such guidelines, including sex and gender differences;

[1] Patricios JS, et al. *Br J Sports Med* 2018; 0: 1-7

b) For several years, the AFL has, in conjunction with Monash University, been piloting the HIT-IQ Nexus A9 instrumented mouthguard with AFL and AFLW players to measure exposure to repetitive head impacts. The main aims of the project are to investigate the validity, reliability and feasibility of mouthguard sensors in the measurement of head impacts in the sport of Australian football;

c) Additionally, the AFL is a research collaborator with Monash University in the Medical Research Future Fund (**MRFF**) funded INFORMED: INtegrative approaches For Optimising Recognition, Management and EDucation of concussion at the community sports level, research trial aimed at improving concussion care in community football 2023-2024;

d) The HeadCheck App is an evidence-based app that has been co-developed by leading concussion experts from the Murdoch Children's Research Institute and the AFL. It is a freely available education and concussion management tool to assist in the identification of concussion signs and management in community sports;

e) The AFL is a partner organisation in the MRFF funded AUS-mTBI: designing and implementing the health informatics approaches to enhance treatment and care for people with mild TBI. The AUS-mTBI team, a collaboration across the AFL, Curtin, Monash, Edith Cowan, Griffith and Deakin Universities, the Queensland Brain Institute, Curve Tomorrow, Synapse Australia Limited and the Poche Centre for Indigenous Health is a national initiative that will develop comprehensive online platforms that personalise and improve care for mild TBI, leveraging the validated interactive computer application HeadCheck. The aim is to build sustainable digital platforms to facilitate collection of mTBI data from across Australia, mine this information to determine major predictors (biological, treatment, social) of optimal outcomes and generate models that predict outcomes and identify better care pathways. This will be followed by an assessment of whether enhanced platforms that recommend the better care pathways improve outcomes. Programs specific for Aboriginal and Torres Strait Islander Peoples and those who live in rural/remote areas will be included. General practitioners, physiotherapists and other healthcare providers and patients themselves will be able to input data and consult the resource. Although not specific to sport-related concussion, it is likely that community football sporting injuries will be included in the data capture and that learnings regarding outcome predictors will inform player care and management.

f) The AFL has partnered with La Trobe Sport and Exercise Medicine Research Centre to co-develop the "Prep-to-Play" program. "Prep to Play" is an evidence-based, injury prevention program that was co-designed with players, coaches and high-performance and medical support staff (from AFL/AFLW and other women's sport). The program was developed and implemented at the elite level (AFLW)[2] and contains important warm-up and tackling technique modules designed to reduce injury risk in Women's AFL. The program has been adapted for community football and the resources are freely available online. In partnership with the AFL, AFL Victoria, Medibank, the

[2] Bruder et al *Journal of Science and Medicine in Sport* 2020; 23(4): 353-50

Australian Physiotherapy Association, the Australasian College of Sport and Exercise Physicians, and Sports Medicine Australia, La Trobe are currently undertaking a National Health and Medical Research Council funded trial to evaluate the implementation and effectiveness of Prep-to-Play in community football.

b. *the long-term impacts of concussions and repeated head trauma, including but not limited to mental, physical, social and professional impacts;*

1) ***What is known?***

a) Cognitive function typically declines after peaking in the 3rd decade of life. The decline in cognitive function is affected by numerous intrinsic and extrinsic factors. These factors include lifestyle risk factors such as inactivity, smoking, hypertension and heavy alcohol use, as well as reversible factors such as hearing loss, and mental health disorders including anxiety and depression. Head trauma – either as a single event or repetitive "non-concussive" blows - also appears to be associated with an increased risk of neurodegenerative disease.[3]

b) Cross-sectional studies in ex-professional American football players[4] and in Scottish soccer players[5] demonstrated that they lived longer than "controls" but also had higher rates of neurodegenerative disease listed on their death certificates.

i. The potential association between a pathology consistent with a Chronic Traumatic Encephalopathy – neuropathological change (CTE-NC) diagnosis and head trauma in contact sports (not including boxing) dates back to the 2005 publication of Dr Bennet Omalu's case study in "Neurosurgery" in a paper entitled "Chronic Traumatic Encephalopathy in a National Football League Player" and has been explored further in subsequent research by Omalu and others.

ii. CTE-NC has been identified at autopsy in case series of contact sport athletes in NFL[6] and AFL[7].

iii. Neuropathological criteria for CTE-NC have been refined over the years through international consensus meetings.[8]

iv. CTE-NC is often found with other neuropathologies, such as Alzheimer's, fronto-temporal dementia, Parkinson's disease.

[3] Livingston et al Lancet 2020; 396(10248): 413-446
[4] Lehman et all Neurology 2012; 79(19): 1970–1974
[5] Mackay et all NEJM 2019; 381: 1801-1808
[6] Mez et al 2017 *JAMA*; 318(4):360-370
[7] Suter et al *MJA* 2022; 216:230-1
[8] Bieniek et al *J Neuropathol Exp Neurol* 2021; 80:210-219

v. The presence of CTE-NC at autopsy does not necessarily mean that the individual exhibited any clinical symptoms. This is especially true for lower severity of CTE-NC.[9]

vi. CTE-NC can only be diagnosed at autopsy and whilst there are a number of advanced imaging technologies currently being investigated to explore the neuropathology of head trauma and concussion and mechanisms of recovery, none are readily applicable for standard clinical use.

vii. Traumatic Encephalopathy Syndrome (**TES**) is the name given to the clinical syndrome associated with CTE-NC. The First National Institute of Neurological Disorders and Stroke Consensus Workshop to Define the Diagnostic Criteria for TES was held in April 2019.[10] The authors acknowledge that the primary goal of developing criteria for diagnosis of TES was to facilitate research on CTE-NC and not for clinical purposes. The authors cautioned against giving any living individual a clinical diagnosis of CTE or TES.

viii. Furthermore, a diagnosis of CTE or TES during life, may be associated with unintended negative consequences, such as a sense of hopelessness and fatality. In such cases, problems with cognition that are perhaps associated with psychiatric illness, rather than neurodegenerative changes in the brain, if treated pharmacologically and with counselling, might lead to functional improvement. If the person is told that their symptoms are related to CTE, they may be less likely to seek alternative diagnoses and treatment options.

2) ***What remains unknown?***

a) The association between head trauma and long-term psychological health is less clear. While depression and anxiety are common symptoms associated with traumatic brain injury (**TBI**), they are also common in the general community and, it remains unclear to what extent pre-morbid mental health conditions represent confounding factors in outcome of injury. There are conflicting results in some of the research. In a recent, large cross-sectional study, former professional soccer players had half the risk of hospital admission for common mental health disorders than matched controls, and there were no differences in the rate of suicide.[11]

b) The prevalence of CTE-NC in contact sports remains unclear. Limited brain bank studies exist that examine the presence of CTE-NC in the broader population. A brain-bank study conducted in the US identified CTE-NC in 21 of 66 former athletes (32%).[12] In a recent study in an Australian brain bank, the incidence of CTE-NC was found to be

[9] Asken *JAMA Neurol*. 2017;74(10):1255-1262
[10] Katz et al *Neurology* 2021; 96:848-863
[11] Russell et al *J Neurol Neurosurg Psychiatry* 2020; 0:1-5
[12] Bieniek et al *Acta Neuropathol* 2015; 130:877-889

5 of 636 cases (<1%), although the cases were not stratified according to previous exposure to sport.[13]

c) The presence of CTE-NC in populations without exposure to concussion or repeated head trauma remains poorly defined. CTE-NC has been reported in previously donated brains of individuals who had no known exposure to contact sports. But the incidence and risk factors are unclear.

d) Risk factors for the development of neurodegenerative diseases including CTE-NC remain unclear. Factors may include age at first head impact exposure, longer duration of exposure, higher number and magnitude of impacts, etc but the evidence for any of these factors remains speculative.

3) ***What is the AFL's position?***

a) The AFL acknowledges that there is an association between head trauma and neurodegenerative disease (including chronic traumatic encephalopathy – neuropathological change - CTE-NC).

b) The AFL supports and adopts the recent statement on CTE-NC by the National Institutes of Health (being part of the U.S. Department of Health and Human Services and the nation's medical research agency):

> ***Chronic traumatic encephalopathy (CTE)*** *is a delayed neurodegenerative disorder that was initially identified in postmortem brains, and research-to-date suggests, is caused in part by repeated traumatic brain injuries*[14]

c) The AFL also endorses the view expressed by the Concussion in Sport Australia Position Statement prepared by the Australian Institute of Sport, Australian Medical Association, Australasian College of Sport and Exercise Physicians and Sports Medicine Australia that further exploration of the potential link between concussion and/or repeated head impacts and CTE-NC is needed through "well-designed prospective epidemiological studies that take into account the potential confounding variables"[15].

d) The AFL is committed to furthering and supporting research into an increased understanding of concussion (and repeated head impacts), neurodegenerative disease and CTE-NC as may exist in our sport and more generally (and in this regard the research projects provided in connection with the answer to paragraph 3 of the ToR below are noted, particularly those that potentially have relevance to the prevention of CTE-NC). Indeed, the relatively recent CTE-NC diagnoses of former VFL/AFL footballers Danny Frawley, Graham "Polly" Farmer and Shane Tuck, have served to

[13] McCann et al *Brain Communications* 2022 https://doi.org/10.1093/braincomms/fcac189
[14] https://www.ninds.nih.gov/current-research/focus-disorders/focus-traumatic-brain-injury-research
[15] https://www.concussioninsport.gov.au/__data/assets/pdf_file/0006/1090680/concussion-and-brain-health-position-statement-2023.pdf

further confirm the importance of further research into and increased understanding of head trauma and concussion in our sport.

c. *the long and short-term support available to players affected by concussion and repeated head trauma;*

1) There are a range of supports available to former AFL and AFLW players that are affected by concussion and repeated head trauma and other injuries.

Past Player Program (funded and administered by the AFL)

2) The Past Player Program is administered by the AFL to assist past elite players in accessing and funding expert neurological assessments and treatments in relation to concerns as to cognitive impairments that may have arisen from concussions and/or other head trauma sustained in the course of their VFL/AFL careers. The Past Player Program has been in existence for several years.

3) Following a review in 2022, the Past Player Program is currently undergoing a substantive restructure that in particular involves the recruitment of a Clinical Nurse Consultant (who will work in conjunction with the AFL Chief Medical Officer) to oversee a clinical care coordination redesign of the Past Player Program to improve the accessibility and quality of services provided. Those substantive improvements in the conduct of this Past Player Program are likely to be in place by 30 June 2023 and will meet the needs of most of the participants in that Program.

4) Further reforms to the Past Player Program are presently under consideration and may be the subject of negotiation with the AFL Players Association in connection with the next AFL and AFLW Collective Bargaining Agreements.

Mental Health & Wellbeing Navigation Service Hub (funded under the CBA and administered by the AFLPA)

5) The Mental Health & Wellbeing Navigation Service Hub (**Mental Health Navigation Service**) is a program funded under the AFL and AFLPA Collective Bargaining Agreements and administered by the AFLPA. The Mental Health Navigation Service triages and refers past player to AHPRA registered psychologists.

6) Reforms to the Mental Health Navigation Service are presently under consideration and may be the subject of negotiation with the AFL Players Association in connection with the next AFL and AFLW Collective Bargaining Agreements.

Injury & Hardship Fund (funded under the CBA and administered by the AFLPA)

7) The Injury & Hardship Fund is funded under the AFL and AFLPA Collective Bargaining Agreements and administered by the AFLPA. It provides a range of benefits to former VFL and AFL Players and AFLW Players (other than the Football-ending Injury Payment), some

or all of which may assist in the provision of support to players affected by concussion and repeated head trauma:

a) ***Lifetime Health Care***: Reimbursement of medical costs (not related to concussion or brain trauma);

b) ***Past Player Hardship*** : Financial assistance for members experiencing financial hardship due to illness, injury or wellbeing issues;

c) ***Hospital Excess Reimbursement***: Reimbursement of any excess paid for a hospital stay or procedure conducted in hospital;

d) ***Football-ending Injury Payment***: Payment for players who exit the game due to an injury sustained during employment as an AFL footballer which prevents the player from playing at senior level in any competition thereafter;

e) ***Delisted Injury Player Payment***: Payment for players who are unable to complete full-time work in the first 6 months after their delisting due to a football injury, which is identified in their exit medical.

8) Reforms to the Injury & Hardship Fund are presently under consideration and may be the subject of negotiation with the AFL Players Association in connection with the next AFL and AFLW Collective Bargaining Agreements. In addition to potential other reforms, it is likely that the Injury & Hardship Fund will at the least be expanded to provide benefits to past AFLW players.

d. *the liability of contact sports associations and clubs for long-term impacts of player concussions and repeated head trauma;*

1) The AFL makes no substantive submission in relation to this matter, save that it is comfortable that it has, in respect of concussion and head trauma in Australian Football, conducted the AFL and AFLW competitions (and predecessor competitions, where applicable) and played its role more broadly with respect to other levels of Australian Football, consistent with applicable duties of care. Those duties are, amongst other things, informed by the relevant state of knowledge at the relevant time as to concussion and head trauma and their potential short-, medium- and long-term effects.

e. *the role of sports associations and clubs in the debate around concussion and repeated head trauma, including in financing research;*

1) It is recognised that sport-related concussion represents a significant area of public health attention, and therefore broad representation and diversity in any dialogue, interpretation of research findings, policy development or implementation of care guidelines is critical.

2) Whilst there are significant learnings from the wider mild traumatic brain injury literature that have application to the occurrence and consequences of concussion in sport, sports-related concussion and head trauma (from junior and youth through to the professional levels of competition), and by extension sports-related concussion and head trauma in Australian Football have their own unique challenges and demands that require specific expertise both in the detection and management of concussion, and in efforts to improve prevention.

3) It is likely that much, but of course not all, of that expertise is in some way associated with organised sport. Thus, the quest to design and conduct research into sport-related concussion that will facilitate an evidence-based approach to guidelines and policy development that is completely independent of sporting organisations is, in practice, sometimes difficult to achieve.

4) Full transparency of potential competing and conflicting interests should, however, be achievable in all situations. National guidelines address conflicts of interest disclosure and management from an ethical framework in conduct of research (e.g. NHMRC Statement) and the Independent Council of Medical Journal Editors (ICMJE) establishes requirements in regard to these issues for publication.

5) With regard to the AFL specifically, our Chief Medical Officer (Dr Michael Makdissi) and Head of Concussion Innovation and Research (Adjunct Associate Professor Catherine Willmott) are concussion experts, with university appointments, who contribute to the field beyond their roles for the AFL within a scientist-practitioner framework, (i.e. they are both researchers and clinicians). For example, they have been chief investigators on national competitive grants in the field of sport-related concussion and are involved in the process of guideline development for the management of sport related concussion and development and conduct of treatment programs e.g. i-RECOVER[16]).

6) It is absolutely critical that AFL concussion team staff have an open dialogue and regular participation with the wider mild traumatic brain injury/concussion research and clinician community internationally, in addition to participation in sport-specific “think tanks” such as the annual ICSG meeting and the quadrennial CISG International Conference.

7) The AFL Concussion Scientific Committee membership is composed of national and international concussion experts, some of whom are also AFL employees, all of whom are required to complete annual conflict of interest statements and are excused from deliberations which represent a potential conflict of interest. The current members of the AFL Concussion Scientific Committee are as follows:

    a) Adjunct Assoc Prof Catherine Willmott, Clinical Neuropsychologist, AFL Head of Concussion Innovation & Research – Chair;

    b) Adjunct Assoc Prof Michael Makdissi, Sports Medicine Physician, AFL Chief Medical Officer;

[16] Nguyen et al *BMC Pilot and Feasibility Studies*, 2022; 8(1), 198

c) Dr Peter Harcourt, Sports Medicine Physician, AFL Medical Consultant;

d) Dr Kate Hall, Clinical Psychologist, AFL Head of Mental Health & Wellbeing;

e) Dr Jonathan Reyes, Clinical Neuropsychologist, AFL Concussion Research Lead;

f) Adjunct Professor Gavin Davis, Neurosurgeon, University of Notre Dame Australia, Monash University;

g) Associate Professor Andrew Gardner, Clinical Neuropsychologist, The University of Sydney;

h) Professor Thomas W. McAllister, M.D., the Albert Eugene Sterne Professor of Psychiatry at the Indiana University School of Medicine;

i) Associate Professor Kathryn Schneider Clinician Scientist (Physiotherapist) at the Sport Injury Prevention Research Centre, Faculty of Kinesiology at the University of Calgary.

8) The AFL has implemented a standard operating procedure for the decision-making around funding for initiatives and research pertaining to sport-related concussion guided by the AFL Concussion Strategic Plan.

9) In terms of the AFL's role in financing concussion research, we have made a substantial and open commitment to fund research across all levels of participation for male and female participants to improve education, prevention, detection, and management of concussion and head trauma in our code. These various projects include both current and future cross-sectional studies and the AFL prospective, Longitudinal Brain Health Initiative (discussed further below). We will continue to seek to collaborate both nationally and internationally, including applying for national competitive grants to additionally fund research projects. As outlined above, processes are in place regarding the funding of external research proposed to the AFL. Such funding decisions cannot be completely removed from the AFL, or other sporting organisations, as an understanding of sport-related concussion in Australian Football (or any other code) specifically is required in order to ensure that outcomes delivered have potential for translation into the management of concussion in that particular code.

10) The AFL was supportive of the MRFF's specific call for funding applications in sports-related concussion in 2022, and indeed the AFL was a successful recipient, along with the lead investigators from Monash University, in a multi-faceted sports-related concussion research program in amateur football aiming to improve initial management, along with treatment for persisting problems, and identification of biomarkers to assist with predicting injury risk and recovery.

11) Into the future, the AFL would be supportive of further Federal Government funding initiatives to address innovation and research in the field of sports-related concussion, particularly with respect to community football.

12) The AFL undertakes a comprehensive concussion and head trauma research program, details of which are set out in Annexure A to this submission.

f. *the lack of a consistent definition of what constitutes 'concussion';*

1) The term "traumatic brain injury" (**TBI**) describes a range or spectrum of disorders that result from traumatic forces transmitted to the brain. Traditionally, the descriptor of "mild" has been used to distinguish "transient" functional injuries, that are likely to resolve spontaneously, from more "severe" structural brain injuries (e.g., intra-cerebral haemorrhage), that often require neurosurgical intervention or management, and are more likely to result in permanent deficits.

2) Consequently, TBI does not reflect a single diagnosis or refer to a specific underlying pathology. Instead, it refers to a spectrum of disorders that present with a range of common symptoms (i.e., felt by the individual), and signs (which can be observed or elicited). These common features are non-specific and often overlap creating challenges in diagnosis.

3) Historically, a working party was formed at the (US based) Congress of Neurological Surgeons in 1964 to standardise the definition of concussion or mild TBI. After a period of discussion and debate, concussion was defined as "*a clinical syndrome characterized by immediate and transient impairment of neural function, such as alteration of consciousness, disturbance of vision, equilibrium, etc., due to mechanical forces*" (Congress of Neurological Surgeons, 1966).

4) At the 1st CISG International Conference (Vienna, 2001), it was felt that whilst the Congress of Neurological Surgeon's definition was useful, it was *"too simplistic and failed to account for some of the common clinical presentations of sport-related concussion"*[17].

5) The CISG defined concussion as "*a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces*" that "*may be caused by a direct blow to the head, face, neck or elsewhere in the body with an impulsive force transmitted to the head*"[18].

6) The definition went further to state that concussion[19]:

a) *"Typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously"*;

b) *"May result in neuropathological changes but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury"*;

[17] Aubry et al *British Journal of Sports Medicine* 2002; 1:6-10
[18] Aubry et al *British Journal of Sports Medicine* 2002; 1:6-10
[19] Aubry et al *British Journal of Sports Medicine* 2002; 1:6-10

c) *"Results in a graded set of neurological syndromes that may or may not involve a loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course"*; and

d) *"Is typically associated with grossly normal structural neuro-imaging studies*".

7) The definition of sports-related concussion has undergone updates and modifications at subsequent CISG International Consensus meetings. The most recent published definition is as follows[20]:

> "*Sport related concussion is a traumatic brain injury induced by biomechanical forces. Several common features that may be utilised in clinically defining the nature of a concussive head injury include:*
>
> - *SRC may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an impulsive force transmitted to the head.*
> - *SRC typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, signs and symptoms evolve over a number of minutes to hours.*
> - *SRC may result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.*
> - *SRC results in a range of clinical signs and symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases symptoms may be prolonged.*
> - *The clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc) or other comorbidities (eg, psychological factors or coexisting medical conditions*)".

8) The conceptual definition above does not provide specific diagnostic criteria, nor does it consider pathophysiological processes that may underly the different clinical presentations. These limitations are often the cause of confusion around the diagnosis of concussion. Further challenges also arise because of the reliance on subjective reporting of symptoms. This is especially of concern in sports, where it is well-recognised that participants fail to report symptoms because they don't recognise that the symptoms are related to head injury or they fear being removed from competition.

9) More recently, the American Academy of Neurology has moved to try to operationalise the definition of concussion, based on the presence of 1) a plausible mechanism of injury; 2) signs of concussion; and 3) symptoms of concussion[21].

[20] McCrory et al *British Journal of Sports Medicine* 2018; 51: 838-847
[21] Silverberg et al *Archives of Physical Medicine and Rehabilitation* 2021; 102:76-86

10) In Australian Football, we have been working towards an operational definition of concussion over a number of years. This has largely been based on work conducted on video review of head impacts.[22] The work has led to an international collaboration regarding the definition of "video signs" of concussion[23] and the development of a Head Injury Assessment form for AFL and AFLW competitions, to assist in the recognition and initial management of head trauma in AFL. Observable signs of concussion have also been used to improve education and awareness of concussion in community sport and have been adapted to a community-level HIA form that relies on observations rather than video review.

11) Additionally, as noted above, the HeadCheck App is an evidence-based app that has been co-developed by leading concussion experts from the Murdoch Children's Research Institute and the AFL, which is consistent with the most recent operational definition of concussion. It is a concussion management tool to assist in the identification of concussion signs and management in community sports.

g. *the prevalence, monitoring and reporting of concussion and long-term impacts of concussion and repeated head trauma, including in First Nations communities;*

PREVALENCE/MONITORING/REPORTING OF CONCUSSIONS

Elite football (AFL and AFLW)

1) The Australian Sports Commission funded a survey of elite AFL, rugby league and rugby union injuries in 1992 and the AFL has continued to fund annual surveillance of concussions in our elite football competitions ever since. The 5th annual AFL injury report was publicly released in 1996 and was one of the first occasions worldwide that a professional sport openly tabled its injury data. From 1997 onwards, the definition of an injury has been an "injury or medical condition which causes a player to miss a match". This definition and methodology were used to promote consistency across all AFL clubs and from season to season[24].

2) In the AFL, all concussion injuries have been documented since 2011 and from the inception of the AFLW competition in 2017.

3) Since 2016 in the AFL and 2017 in the AFLW, the AFL injury report has included all medically diagnosed concussions that occurred in AFL games (both during the regular season and finals) and for every Head Injury Assessment Form completed (i.e. when a head knock that *may* have resulted in a concussion occurs and warrants assessment) with the following data recorded:

[22] Makdissi and Davis *Journal of Science & Medicine in Sport* 2016 19(10): 859-863
[23] Davis et al *British Journal of Sports Medicine* 2019; 53:1264-1267
[24] Orchard et al American Journal of Sports Medicine 2013 41(4):734-41

a) round, quarter, time, club, player, circumstance (e.g. marking contest, head clash, strike, bump etc), noting that more detailed data points as to the circumstances of the head knock have been recorded since 2019;

b) the assessment results on the HIA Form;

c) whether the player returned to play following the HIA or was subject to a more detailed concussion assessment (i.e. a SCAT);

d) whether the player missed any subsequent matches and how many;

e) comments provided by the Doctor on the HIA form.

4) Data from the 2022 AFL Injury report demonstrates that the incidence of all concussions (regardless of whether a match was missed or not) in AFL remains relatively stable (6.34 per 1000 player hours, 95% confidence interval (CI) 4.77-7.91) compared to previous seasons, and comparable to that of the AFLW (2022 Season 6 injury report: 7.26 per 1000 player hours, 95% CI 4.29-10.23). These incidence figures continue to be published annually in the AFL & AFLW Injury Reports and are summarised in tables below.

Table 1. Concussions reported in the AFL Competition

Year	Number of Concussions	Number of Clubs	Matches	Player Hours	Incidence (Per 1000 Player Hours)
2011	75	17/17	392	9,408	7.97 (95% CI 6.17-9.78)
2012	68	13/18	300	7,200	9.44 (95% CI 7.20-11.69)
2013	61	17/18	389	9,336	6.53 (95% CI 4.89-8.17)
2014	58	18/18	414	9,936	5.84 (95% CI 4.34-7.34)
2015	52	16/18	360	8,640	6.02 (95% CI 4.38-7.65)
2016	63	17/18	391	9,384	6.71 (95% CI 5.06-8.37)
2017	63	17/18	392	9,408	6.70 (95% CI 5.04-8.35)
2018	74	18/18	414	9,936	7.45 (95% CI 5.75-9.14)
2019	65	18/18	414	9,936	6.54 (95% CI 4.95-8.13)
2020	42	18/18	324	6,221	6.75 (95% CI 4.71-8.79)
2021	74	18/18	414	9,936	7.45 (95% CI 5.75-9.14)
2022	63	18/18	414	9,936	6.34 (95% CI 4.77-7.91)

Table 2. Concussions reported in the AFLW Competition

Year	Number of Concussions	Number of Clubs	Matches	Player Hours	Incidence (Per 1000 Player Hours)
2017	14	8/8	29	928	15.09 (95% CI 7.18-22.99)
2018	16	8/8	29	928	17.24 (95% CI 8.79-25.69)
2019	14	10/10	38	1216	11.51 (95% CI 5.48-17.54)
2020	17	14/14	46	1472	11.55 (95% CI 6.06-17.04)

Year	Number of Concussions	Number of Clubs	Matches	Player Hours	Incidence (Per 1000 Player Hours)
2021	19	14/14	68	2176	8.73 (95% CI 4.80-12.66)
2022 (S6)	23	14/14	75	2400	9.58 (95% CI 5.67-13.50)
2022 (S7)	23	18/18	99	3168	7.26 (95% CI 4.29-10.23)

5) Since 2019 team doctors have been required to use the CSx platform, an online and App platform, which incorporates the HIA form and (where applicable) the SCAT-5, for mandatory documentation of concussion injuries. It allows for subsequent audit and compliance monitoring and is also used for research purposes.

6) In the AFL competition, the incidence of concussions causing matches to be missed increased from 1.30 injuries per club per season in 2020 (prior to the introduction of the revised return to play protocols that required players to miss a minimum of 12 days following a diagnosed concussion) to 4.66 injuries per club per season in 2022 (following the introduction of that revised protocol) (AFL Injury report – season 2022). Furthermore, over the past five seasons in AFL, 20-30% of players with a concussion missed more than one match following their injury. This data reflects a more conservative approach to concussion management, particularly in recent seasons.

State League and Talent Pathway football competitions

7) A trial of the CSX platform in the VFL competition has been underway since 2022, and will be widened to include the VFLW for the first time in 2023, and may in time provide a mechanism for the collation of such data in these important State League competitions.

8) The WAFL is looking to introduce CSX in 2023.

9) In the AFL National Development Championships (U16 boys and girls) and the AFL National Championships (U18 boys and girls) doctors attending games are responsible for identifying possible concussion injuries which are logged in an electronic system (Smartabase). In the Coates Talent League (formerly the NAB League) competition games, concussion injuries are identified by doctors, trainers and/or physiotherapists and are logged.

10) There are less resources available for the identification of concussion in these competitions compared to the elite level AFL/AFLW competitions. Like senior State League football, Championships and underage talent competitions do not have live at ground video feeds for subsequent review by doctors, or the ARC review system with concussion spotters. Variability in list sizes, season length and engagement throughout make calculating incidence rates challenging. Notwithstanding these limitations, preliminary data from the 2021-2022 seasons across boys and girls shows that return to play appears

to be managed relatively conservatively and in line with the Community Football Concussion Guidelines.

Community Football competitions

11) Community Football Clubs are encouraged to use the HeadCheck app (of which there are bespoke versions for both children and adult participants), which assists individuals with non-medical training to identify the signs and symptoms. This evidence-based App was co-developed by the Murdoch Children's Research Institute and the AFL. It does not record incidence data.

12) There is currently no requirement for mandatory reporting of suspected concussion in community football. The AFL has partnered with research institutions over the recent years to fund trials that seek to pilot methodologies for concussion reporting (e.g. live injury surveillance +/- subsequent follow-up to confirm diagnosis). These studies have estimated concussion rates between 3-4 per 1000 player hours in junior community football, with no sex differences[25], however the application of different methodologies within the existing literature makes comparison complex.

13) Other studies have employed injury surveillance in adult community football populations. Over the 2007-2008 seasons one study revealed data indicating concussion incidence as 1.2 per 1000 game hours (95% CI: 0.8 - 1.7). All concussions occurred during games (none in training), most often occurring in the context of body contact with other players[26]. Other studies suggest concussion incidence rates of 3.2[27] to 6.1[28] per 1000 player hours. There is a dearth of literature regarding concussion incidence in females, which future studies must address given the exponential increase in female participation.

14) There are also a number of App based programs that may provide a technology solution to improve documentation and reporting of concussion in the future, however there are some queries as to the feasibility of broader uptake as there are significant methodological limitations inherent in these processes given the largely volunteer nature of community football programs nationally (i.e. most existing solutions require the involvement of medical practitioners or additional use of technology by volunteers and subsequent additional requirements in terms of auditing and compliance that is not available in most settings). The AFL is committed to identifying potential solutions for such processes in order to determine a way to accurately ascertain the incidence in the community and current initiatives.

15) The other means by which to collect limited data pertaining to the prevalence of sport-related concussion is to refer to hospital emergency department presentations for concussion. This data is not able to be documented as incidence data, as only those requiring hospital triage are captured, and those who present to a local GP or do not seek

[25] Makovec-Knight et al *Journal of Science and Medicine in Sport* 2021: https://doi.org/10.1016/j.jsams.2021.11.043
[26] Fortington et al *Injury Epidemiology* 2015; 2:20.
[27] Makdissi et al *American Journal of Sports Medicine* 2010; 38(3): 464-471.
[28] Costello et al Costello et al *Clinical Journal of Neuroscience*, 2018; 56: 88-89.

medical consultation are not able to be identified, nor are exposure hours able to be accurately documented. Australian data identified that there were over 2,300 cases of hospitalised concussion caused by all sports in 2019–20, with disproportionate representation across sex (around 1,600 were male, and 700 were female)[29].

16) Within the context of Australian Football participation across 2019-20, 10% of all injuries requiring hospitalisation were for intracranial injuries, with a total of 246 concussion injuries, again with considerably higher incidence in male athletes (AIHW). These statistics were collected nationally across the period of various COVID lockdowns and competition restrictions and so need to be interpreted with that in mind. Within a similar timeframe across Victoria, approximately 14% of hospital admissions in the context of Australian Football were for concussion.[30]

First Nations communities

17) Few studies to date have specifically focused on First Nations communities, and hospital data may not capture First Nations players who do not present to Emergency Departments, or who may instead present to Aboriginal Community Controlled Health Organisations. That said, hospital admission data from 2011-2016 indicates that concussion is the most common outcome of intracranial injury in First Nations peoples and non-Indigenous Australians, with a larger proportion of concussion injuries as the principal diagnosis in First Nations peoples (70% versus 52% respectively)[31], although there is little data pertaining to sport-related concussion rates specifically. One study that is now 10 years old found that First Nations AFL and State League/lower-level competition players had almost the same overall risk of injury and games missed through injury as compared to other cohorts. Although there were subtle differences in overall risk profile, concussion rates did not differ across the cohorts.[32]

PREVALENCE/MONITORING/REPORTING OF REPEATED HEAD TRAUMA

18) The monitoring and recording of repeated head impacts is considerably more complex, given they cannot always reliably be directly observed.

19) The AFL has previously trialled the accelerometer devices which were not sufficiently reliable.

20) As noted above, for several years, the AFL has, in conjunction with Monash University, been piloting the HIT-IQ Nexus A9 instrumented mouthguard with AFL and AFLW players to measure exposure to repetitive head impacts, regardless of concussion injuries. The mouthguards contain accelerometers to measure impact frequency and magnitude with a

[29] Australian Institute of Health and Welfare (2022) Sports injury hospitalisations in Australia, 2019–20, AIHW, Australian Government – accessed 23 March 2022
[30] Gill et al *Journal of Science and Medicine in Sport* 2018; 24:670-676
[31] AIHW: Pointer SC 2019. Hospitalised injury among Aboriginal and Torres Strait Islander people, 2011–12 to 2015–16. Injury research and statistics series no. 118. Cat. no. INJCAT 198.
[32] Orchard et al *Sports* 2013; 1:69-77

longer-term objective of improving identification of head trauma and to develop a benchmark metric for head trauma. This project is potentially extremely important in the objective identification of head impacts and monitoring of the load of non-concussive head trauma over time.

21) The NFL and Amazon Web services are creating the "Digital Athlete", a virtual representation of the player which can leverage data and machine learning to predict injury risk. These types of tools may be very valuable to assist sports to quantify exposure to repetitive head impacts, however much more work is required to determine the reliability and validity of various technological advances with documentation of independent evaluations in peer reviewed publications, and risk associated with such exposure. Investment in this sector going forward will be fundamental to successful progress. The AFL is liaising with the NFL in relation to the Digital Athlete and potential application to Australian Football.

LONG-TERM IMPACTS OF CONCUSSION AND REPEATED HEAD TRAUMA

22) Whilst the majority of individuals who sustain a concussion typically recover within the first 2-4 weeks post-injury, concussion can be associated with a continuum of persisting after-effects, across a number of domains (physical, cognitive, emotional and behavioural). There is considerable variability in the presentation of those with persisting symptoms, the cause or causes of which are likely multidimensional. These ongoing difficulties in some people can contribute to disability/reduced participation across vocational, educational, social & recreational endeavours.

23) The existing body of evidence for rehabilitation for those with persistent symptoms is relatively limited, particularly in the domain of cognitive rehabilitation, and interdisciplinary, evidence-based treatment programs are few and far between. Support for the establishment of such expert clinical services in the community is much needed to optimise player recovery and return to activities of daily living.

24) The AFL is presently preparing for the conduct of a major research project that will significantly advance understanding of the long-term impacts of concussion and non-concussive head trauma. That project is the AFL Brain Health Initiative (**AFL BHI**).

25) From 2023/2024 the AFL BHI will provide the opportunity to monitor AFL and AFLW players' brain health from graduation from pathway programs to elite football via the draft or other entry points, across their professional footballing careers, through to retirement and beyond. It will examine athlete, injury and environmental factors associated with recovery from sport-related concussion and return to play, and long-term brain health and player wellbeing. The AFL will ensure equity of access and implementation regarding culturally safe, relevant and well communicated inclusion of First Nations players. This research program will be offered to all AFL and AFLW players, however, participation will require provision of informed consent. The success of this research program to answer critical questions regarding risk exposure and potential long-term consequences will be largely dependent upon player participation. Collaboration

with brain banks with capacity to map longitudinal clinical data to brain health at autopsy will constitute an essential component of this research program (and will provide much greater insights into the brain health of a much broader sample of deceased former players than has occurred to date and compared to control subjects). Whilst the AFL has previously collaborated with the AFLPA to encourage former players to donate their brains for such research, a donation program with increased scale and enhanced learnings is very much part of the BHI project design.

26) Whilst some of this data is already being collected across our elite player cohort, the AFL BHI will be conducted in a comprehensive, longitudinal research program (incorporating individual cross-sectional research studies) which is unprecedented in our sport and relatively rare at an elite level in sports globally.

27) The true value of the AFL BHI is in the data set that is curated, and findings which will in turn inform concussion management policy frameworks through knowledge translation. It is envisaged that de-identified data access could be provided to external collaborators for data analysis and interpretation, akin to national injury registry models, with strict protocols and procedures to ensure adherence to ethical principles and privacy requirements.

28) The translation of findings from the AFL BHI will inform policy aspects of concussion management and athlete care at all levels of the game (i.e. Elite, State and Pathway and Community Football) with the aim to prioritise player brain health across the lifespan. This research program will be a nation-wide initiative that focuses on male, female and gender diverse players with particular consideration of unique issues that may arise for indigenous and other culturally diverse groups.

29) The field of sports concussion in Australia would benefit greatly from cross-code research collaboration, use of methodological innovations such as common data elements, data harmonisation, sharing and linkage.

h. *workers, or other, compensation mechanisms for players affected by long-term impacts of concussions and repeated head trauma;*

1) Sporting contestants, which includes professional Australian Football players, are generally excluded from accessing compensation for injuries sustained in sporting activities through the various workers compensation schemes and legislative frameworks across Australia.

a) In *Victoria*, sporting contestants are ineligible to receive compensation for injuries sustained whilst participating as a contestant in a sporting or athletic activity, training or preparing for such participation and travelling in connection with that participation.[33] However, an exception is provided to jockeys and other riders.

[33] *Workplace Injury Rehabilitation and Compensation Act 2013* (Vic), Schedule 1, cl 17;

b) The position is the same in the *Northern Territory*, except if the annual remuneration they are entitled to under the contract is not less than the prescribed amount.[34] Again, similar to many jurisdictions, jockeys are defined as workers and are therefore eligible to receive compensation for injuries.[35]

c) The position in *Western Australia* is the same as *Victoria*, save that a sporting contestant is also ineligible to receive compensation for injuries sustained whilst engaged in promotional activities in accordance with the participation contract.[36] There is an exception for jockeys.[37]

d) The position in *Tasmania* is the same as *Victoria* if the contract does not provide for remuneration other than remuneration for participating as a contestant in a sporting activity, training or preparation for such participation and travelling in connection with that participation or travel.[38]

e) In *Queensland*, professional sportspersons are excluded from the definition of worker whilst they are participating as a contestant in a sporting or athletic activity, training or preparing for such participation, performing promotional activities offered by virtue of their standing as a sportsperson and travel associated with the foregoing,[39] thereby making them ineligible to receive compensation for sporting injuries.

f) In the *Australian Capital Territory,* a person is not entitled to receive compensation for an injury sustained as a result of the person's engagement in a professional sporting activity.[40]

g) In *New South Wales,* registered participants of a sporting organisation (within the meaning of the *Sporting Injuries Insurance Act 1978* (NSW)) are excluded from the definition of worker thereby making them ineligible to receive compensation for injury sustained while participating in an authorised activity of that organisation, including training and preparation, and travel in connection with participating.[41] There are however exceptions for certain types of registered sporting participants, such as jockeys, harness racing drivers, caddies, boxers and wrestlers. The *Sporting Injuries Insurance Act 1978* (NSW) provides lump sum benefits to registered participants of a sporting organisation which is recognised by the Sporting Injuries Compensation Authority for permanent injuries or death while participating in an authorised activity.

h) In *South Australia*, if a worker is employed solely to participate as a contestant in a sporting or athletic activity, including training and preparation for participation, and remuneration is not payable under the contract of employment except in respect of

[34] *Return to Work Act 1986* (NT), s3B(14) and s3B(15).
[35] *Return to Work Regulations 1986* (NT), r3A.
[36] *Workers Compensation and Injury Management Act 1981* (WA), s11
[37] *Workers Compensation and Injury Management Act 1981* (WA), s11A
[38] *Workers Rehabilitation and Compensation Act 1988* (Tas), s7;
[39] *Workers Compensation and Rehabilitation Act 2003* (Qld), Schedule 2, Part 2, cl 2
[40] *Workers Compensation Act 1951* (ACT), s84
[41] *Workplace Injury Management and Workers Compensation Act 1986* (NSW), Schedule 1

such employment, then any injury sustained in the course of that employment is not compensable.[42] Exceptions are provided to jockeys, boxers, wrestlers or sporting contestants who derive an entire livelihood from such employment or an annual income in excess of the prescribed amount.[43]

i. *alternative approaches to concussions and repeated head trauma in contact sport, and awareness raising about its risks;*

The AFL makes no submission in relation to this ToR other than to note that, as referred to in the response to paragraph a of the ToR above, the AFL engages in various forums with other sports in order to learn from other sports and benchmark our activities with respect to reduction and management of concussion and head trauma.

j. *international experiences in modifying sports for children;*

The AFL makes no submission in relation to this ToR other than to note that, as referred to in the response to paragraph a of the ToR above, the AFL engages in various forums with other sports in order to learn from other sports and benchmark our activities with respect to reduction and management of concussion and head trauma, including as to the modification of sports for children.

k. *any other related matters.*

The AFL makes no submission in relation to this ToR.

[42] *Return to Work Act 2014* (SA), s69(1)
[43] *Return to Work Act 2014* (SA), s69(2). In this section the prescribed amount means $65,600 (indexed).

ANNEXURE A – AFL's concussion and head trauma research program

AFL Recent Concussion Innovation and Research (March 2023)

Project	Status	Area of impact	Notes
RISK REDUCTION			
Laws of the Game & AFL Regulations	Ongoing	Collective risk reduction	• Ongoing industry engagement of relevant bodies/committees (ie AFL Doctors, Competition Committee) and research to identify potential risks • Ongoing review of the Laws of the Game and AFL Regulations to address potential player safety risks
Head impact sensors (neck patch)	Complete	Frequency and magnitude of head impacts	• Neck sensor study conducted by Monash University in 2017 JLT Series & AFLW Season to assess the head impact frequency and magnitude in elite players • Aimed to benchmark the level of head trauma and assess associations with concussion • Relevant to sub-concussive trauma, delayed recovery and long-term outcomes such as CTE-NC
Head impact sensors (mouthguard)	Ongoing	Frequency and magnitude of head impacts	• Ongoing (2021-2023) instrumented mouthguard study to assess the head impact risk exposure in elite male and female players aiming to assess head impact exposure and concussion correlations, as well as reliability • Relevant to sub-concussive trauma and hence CTE • Partnered with Monash University
Headgear research (community)	Complete	Assessment of headgear use and effectiveness for concussion prevention in junior and youth football	3 phase study in junior football, including: • Systematic review of current literature examining evidence of efficacy of headgear for prevention of concussion • Assessment of headgear use and attitudes amongst male and female junior community participants • Analysis of injury incidence with and without wearing headgear
Headgear standard development	Complete	Safety/regulation of products	• Development of a standard to regulate headgear design and performance • Aimed at ensuring all headgear models worn during elite and community matches/training sessions are safe
Prep to play	Complete	Injury reduction in AFLW	• An injury prevention program (Prep-to-Play) was codesigned with consumers (eg, coaches, players) and stakeholders. The impact of supported and unsupported interventions on the use of Prep-to-Play (primary aim) and injury rates (secondary aim) will be evaluated in women and girls playing community Australian Football. • Collaboration with LaTrobe University
Elite and Community Australian Football Player Perspectives to Optimise Concussion Management (elite and community)	To commence in 2023	Player perceptions regarding sport-related concussion and associated guidelines among elite and community Australian football players	• To understand and articulate elite AFL and AFLW players' knowledge and understanding of Guidelines for the Management of Sport-related Concussion - AFL & AFLW, and how this may differ between sex/gender. • To understand and articulate male and female community players' knowledge and understanding of AFL Concussion Guidelines for Australian Football 2021, and how this may differ between sex/gender. • To qualitatively and quantitively explore factors associated with honest disclosure of concussion symptoms immediately post-injury and with regard to return to play. Players' concerns regarding long-term brain health and association with participation in collision sport will also be explored • Collaboration with Victorian Government Department of Health and university partners

AFL Recent Concussion Innovation and Research (March 2023)

Project	Status	Desired Outcomes	Notes
DIAGNOSIS & MATCH DAY MANAGEMENT			
Concussion Guideline revision	Ongoing	Collective risk reduction and ensuring best practice in player care and management	• Annual update of AFL/AFLW Concussion Guidelines, incorporating evidence from international and national initiatives, concussion management guidelines and best practice
Audit of concussion management	Ongoing	Diagnosis, mechanisms, injury rates, compliance	• Live head injury spotting from the AFL Review Centre with Club notifications where relevant • Significant head impacts/suspected concussion events reviewed for compliance with the AFL Guidelines • Diagnosed concussions recorded and incidence rates published annually with publicly released injury report
Video assessment & audit	Complete	New diagnostic tool	• Study and validation of the use of video signs for the diagnosis of concussion • Continual refinement of head injury assessment criteria and process • Dedicated Hawk-Eye vision technology installed at all AFL venues to facilitate this (interchange bench tablet)
Pilot Trial of CSX App in VFL/VFLW	VFL – ongoing VFLW - To commence in 2023	Improved management of concussion in VFL/VFLW	• Since 2019, AFL/AFLW team doctors have been required to use the **CSX platform**, a web-and and App-based platform which incorporates the Head Injury Assessment form (HIAf) and the Sport Concussion Assessment Tool (SCAT-5), for mandatory documentation of concussion injuries • In 2022, whilst not mandatory, VFL doctors were encouraged to use the CSX platform in order to determine whether the App assisted doctors in the management of concussion and return to play (RTP). • Use of the CSX platform in the 2023 season is not mandatory however it is strongly encouraged for all VFL/VFLW doctors to optimize concussion management, and guide return to play. Data collected will provide insights into time taken to RTP and compliance with AFL RTP guidelines.
Concussion education	Ongoing	Risk reduction, improve player's understanding of concussion risk, player care and return to play process	• Annual, face to face doctor led concussion education for AFL/AFLW players • Concussion education for our Indigenous players and officials conducted and led by an Indigenous doctor • Concussion education for talent pathways, coaches • Concussion education webinars for community football leagues, clubs and participants
Biomarkers	Ongoing	New diagnostic tools, return to play	• Partnered with Monash University for investigation of MRI, blood and saliva biomarkers for concussion
Ocular motor	Complete	New diagnostic tools, return to play	• Ongoing trial of eye tracking technology with the potential for them to augment diagnosis and return to play decisions • Partnered with Monash University

AFL Recent Concussion Innovation and Research (March 2023)

Project	Status	Desired Outcomes	Notes
ONGOING MANAGEMENT & RETURN TO PLAY			
Advanced imaging (current players)	Complete	Diagnosis, return to play, long term consequences	• All players sustaining a concussion given the opportunity for an advanced scan with the Florey Institute • Typically employed for players with persistent symptoms or repeated concussions • Technology currently exists primarily in research domain but may have future diagnostic/management relevance
Mental health screening	Ongoing	Incidence, recognition tools	• Mental health screening tool currently being trialled clubs for all players suffering concussion and included within club annual/entry/exit medicals. • Also mental health reviews as a part of the past player assessments (see below)
PAST PLAYERS			
Past players: Clinical assessment	Ongoing	Identification, clinical issues & incidence, potential long term effects	• All registered Past Players sent invitation for concussion screening survey • AFL funded clinical assessments for players with persisting concussion symptoms offering neurology, neuropsychology, MRI scan or mental health review • This program is currently being completely revised & will be linked to AFL Brain Health Initiative
Imaging (past players)	Complete	New investigative tools, diagnosis, long term effects	• Past player concussion survey participants offered AFL funded advanced imaging (fMRI & PET) offered through Florey Institute • Technology currently exists primarily in research domain but may have future diagnostic/management relevance • May be relevant for early signs of CTE for those with persistent issues
AFL BRAIN HEALTH INITIATIVE (BHI)			
Prospective, longitudinal research program	To commence in 2023	To identify athlete, injury and environmental factors associated with recovery from sport-related concussion (SRC) and return to play; and long-term brain health and player wellbeing	• The AFL BHI will monitor AFL and AFLW players' brain health from their graduation from pathway programs and competitions to elite football via the draft/or other entry points, across their professional footballing careers, through to retirement from AFL and beyond • Data collection consists of Principle (e.g. concussion injury surveillance, head impact exposure) and Advanced (blood, saliva and imaging biomarkers) components. • Collaboration with brain banks with capacity to map longitudinal clinical data to brain health at autopsy will constitute an essential component of this research program • The translation of findings from the BHI will inform policy aspects of concussion management and athlete care at all levels of the game (i.e. Elite, State and Pathway and Community Football) with the aim to prioritise player brain health across the lifespan

AFL Recent Concussion Innovation and Research (March 2023)

Project	Status	Desired Outcomes	Notes
OTHER COMMUNITY & EDUCATION			
INtegrative approaches For Optimizing Recognition, Management and EDucation of concussion at the community sports level (INFORMED) – MRFF Stream 2 (Mitra et al.,)	To commence in 2023	To develop and implement new approaches to prevention, diagnosis and treatment of persistent post-concussion symptoms	• i) a telephone game day injury management advice line for trainers in VAFA • ii) a novel telehealth approach for more accessible and personalized diagnosis and initial treatment of sport-related concussion (SRC); • iii) evaluation of an innovative, multidisciplinary treatment for persistent post-concussion symptoms at two weeks (i-RECOveR-Sports Study); and • iv) development of new biomarker tools for concussion diagnosis and for tracking neuropathological recovery • Collaboration with Monash, Deakin, Curtain and Australian National Universities and the Royal Brisbane and Women's Hospital.
AUS-mTBI: designing and implementing novel health informatics approaches to improve outcomes for people with mild TBI across Australia' (AUS-mTBI) -MRFF Stream 1 (Fitzgerald et al.,)	To commence in 2023	Prediction of care models to optimise treatment interventions	• Designing and implementing a best practice approach to gathering and linking nationally representative data outcomes of value to people with lived experience of mild TBI. • Machine learning to analyse the data to develop a predictive approach to personalise care, with tailored interventions to enhance treatment and outcomes for people with mild TBI.
HeadCheck App	Ongoing	Community concussion education, recognition & management	• Partnership with the Murdoch Children's Research Institute (MCRI) in the provision of a children's concussion recognition and management App, and an adult version more recently launched • Currently been downloaded by over 50,000 parents, coaches & trainers • Data captured from the app being utilised in research studies
Yarra Junior Football League extended concussion management trial	Ongoing	Community concussion management	• Extension of current trial of telephone contact within 24 hours post-injury • Provision of medical consultation for i) diagnosis and ii) medical clearance for return to play • Collaboration with LaTrobe University
Hospital admission audit	Complete	Measuring community concussion associated with ED presentations	• Partnership with Deakin University to study hospital admission rates following injuries in men's and women's community football matches • Study includes rate of hospitalisation due to suspected concussion
Train the trainer	Ongoing	Community education & compliance	• Management of the Emergency Response Coordinator (ERC) accreditation for junior sports trainers – includes a mandatory concussion component • Ongoing work with certified sports trainer accreditation providers (ie Sports Medicine Australia) regarding mandatory concussion modules to ensure in-line with AFL guidelines
Coach concussion module	Ongoing	Community education & compliance	• Management of the community coach accreditation pathway – includes a mandatory concussion component • Concussion module includes videos, information and quizzes

AFL Recent Concussion Innovation and Research (March 2023)

Project	Status	Desired Outcomes	Notes
OTHER COLLABORATION			
Australian Chief Medical Officer (CMO) Consensus Group	Ongoing	Code comparison of data, nationally aligned approach	• Regular meetings with Chief Medical Officers and administrators from Australian codes to align policy & research • Also involves sharing of data regarding incidence, severity and video audits
International Consensus Group meetings	Ongoing	Code comparison of data and guidelines with internationally aligned approach	• Participation and scientific committee representation in International Consensus Group meetings (every 4 years)
International Collision Sports Meeting	Ongoing	Translation of concussion scientific knowledge	• Involvement in annual Collision Sports Meetings aimed at translation of the international scientific advances/meetings and policy/research/data sharing

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