



GUIDELINES FOR THE MANAGEMENT OF SPORT-RELATED CONCUSSION - AFL & AFLW

Update for the 2024 Premiership Seasons

Issued by the AFL as a guideline under AFL Regulation 35 ('Medically Unfit Players')

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AIMS

1. To provide Club Medical Personnel with best practice guidelines for the diagnosis and management of Sport-Related Concussion (SRC);
2. To protect the short- and long-term health and safety of players from the potential risks presented by SRC and repeated head impacts.

INTRODUCTION

- Managing the potential risks to health and safety presented by SRC and repeated head trauma continues to be an extremely important priority for the AFL.
- Key components of the overall approach are outlined in the [Strategic Plan for Sport-Related Concussion in Australian Football 2022-2026](#).
- The Guidelines for the management of SRC in the elite competition (AFL & AFLW) form a key part of the Strategic Plan and provide an evidence-based clinical approach to the detection, management and support of players following SRC.
- The Guidelines also incorporate components of other important objectives of the Strategic Plan including ongoing education of players and Club Medical Personnel, and prevention strategies to reduce the risk of avoidable head contact and SRC.
- The AFL, in collaboration with the AFL Doctors Association (AFLDA) and the AFL Players Association (AFLPA), has continued to review and revise its guidelines and protocols regarding the diagnosis and management of concussion in AFL and AFLW players.

BACKGROUND

- The AFL Guidelines for the management of SRC adhere to the principles outlined in the most recent International Consensus Statement ([6th International Conference on Concussion in Sport, Amsterdam 2022](#)). Consequently, the Guidelines incorporate the key concepts from the 6th International Conference on Concussion in Sport including evidence derived from the systematic reviews and updated assessment tools.
- The Guidelines continue to be modified and enhanced in line with evolving scientific evidence, best practice management strategies for SRC, and specific clinical experience of concussion management in AFL and AFLW.
- The diagnosis of SRC and subsequent return to play remains an individual decision by the Club Doctor following the protocols and principles outlined in this document, by utilising good clinical judgment, reviewing video replay of the incident and evaluating all the information available at the time of the player's assessment (subject to compliance with the specific requirements stated in these Guidelines).

DEFINITION OF CONCUSSION

- The definition of SRC from the Consensus Statement of the 6th International Conference on Concussion in Sport is as follows:
 - *Sport-related concussion is a traumatic brain injury caused by a direct blow to the head, neck or body resulting in an impulsive force being transmitted to the brain that occurs in sports and exercise-related activities. This initiates a neurotransmitter and metabolic cascade, with possible axonal injury, blood flow change and inflammation affecting the brain. Symptoms and signs may present immediately, or evolve over minutes or hours, and commonly resolve within days, but may be prolonged.*
 - *No abnormality is seen on standard structural neuroimaging studies (computed tomography or magnetic resonance imaging T1- and T2-weighted images), but in the research setting, abnormalities may be present on functional, blood flow or metabolic imaging studies. Sport-related concussion results in a range of clinical symptoms and signs that may or may not involve loss of consciousness.*
 - *The clinical symptoms and signs of concussion cannot be explained solely by (but may occur concomitantly with) drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction) or other comorbidities (such as psychological factors or coexisting medical conditions).*

- The Consensus Statement does recognise that the definition provided is a conceptual rather than operational definition and as such does not provide specific diagnostic criteria.

DIAGNOSIS

- Concussion represents a broad spectrum of brain injury, rather than a single diagnostic entity. Furthermore, the underlying neurobiology of the injury is likely to be multifactorial, resulting in variable presentation and clinical course. Consequently, there can be challenges in identifying the injury, as well as the potentially complex and individual nature of its management. Ultimately, clinicians need to maintain a high index of suspicion and each case of SRC should be assessed and managed individually.
- The diagnosis of SRC can be difficult because:
 - a. Symptoms and signs are not consistent, can change rapidly and may emerge and evolve over time;
 - b. Many of the clinical features are not specific to concussion;
 - c. Currently, no test or biomarker exists that can be relied on for an immediate diagnosis, particularly on the sidelines; and
 - d. Structural brain injury (e.g., contusion) can present with similar or identical clinical features and often cannot be ruled out with the initial assessment.
- The diagnosis of SRC remains a clinical decision based on the serial assessment of a range of domains commonly affected by head trauma including symptoms (e.g., headache, difficulty concentrating, feeling like in a fog, emotional lability, etc); signs (e.g., loss of consciousness (LOC), motor incoordination); cognitive impairment (e.g., confusion, slowed reaction times, inability to lay down new memories); and neurobehavioural changes (e.g., irritability, not feeling quite right).
- For practical purposes, SRC may be diagnosed when a player reports any neurological symptoms and/or exhibits signs (including on video review) of a disturbance of mental status or brain function, following a biomechanically plausible mechanism of injury.

SCREENING

- All new players to the club (including draftees and players transferred from other clubs) must undergo detailed concussion history to determine the number of previous

concussions sustained, history of prolonged recovery from concussion(s), and the player's previous management of concussion(s).

- This history should inform an individualised approach to management of SRC that may include consideration for a longer time to return to play, and/or further baseline testing such as formal neuropsychological testing, neuro-imaging and/or referral to a specialist with expertise in the assessment and management of concussion (see "Management of Difficult or Complex Cases" below).
- At a minimum, all players should have annual preseason baseline testing that includes neurological assessment, [Sport Concussion Assessment Tool 6th edition](#) (SCAT6, or components of) and a computerised screening cognitive test e.g., Cognigram.
- A baseline Vestibular Ocular Motor Screening (VOMS) test from the [Sport Concussion Office Assessment Tool 6th edition](#) (SCOAT6) may also be helpful.
- With the development of the AFL Brain Health Initiative research program (see further details below), some of the clinical testing protocols will be incorporated into future iterations of the Guidelines for improved player care. The clinical testing protocols are likely to commence with the addition of structural neuroimaging, formal neuropsychological testing, and questionnaires assessing factors such as fatigue, pain, and mood into the standard baseline and post-concussion assessment protocols.
- Annual baseline testing promotes ongoing discussion with players and facilitates interpretation of post-injury test scores, which may improve decisions regarding diagnosis and assessment of recovery. If baseline data are not available, the player's post-injury results may be compared to normative data and a more conservative approach should be used.

EDUCATION

- The AFL provides an annual education program on SRC for all AFL and AFLW players.
- Important components of the education program include:
 - a) Common presentations of SRC,
 - b) The importance of accurate and complete reporting by players both at the time of injury and in the recovery phase, to facilitate diagnosis and monitoring of recovery,
 - c) Understanding of the AFL protocols, including the requirement for immediate removal for assessment if there is any suspicion of concussion (observed directly, observed on video or reported by other players or Club Officials),
 - d) Understanding of the short-term and potential long-term effects of SRC,

- e) Understanding of the potential long-term outcomes that may result from repeated non-concussive head impacts, and
- f) The importance of the use of mouthguards during all contact training and games, for protection against orofacial injuries and possibly also concussion.
- The presentations are doctor-led. The information provided is balanced, measured and evidence-based. The education material is revised annually, and the impact on knowledge transfer and behaviour change is routinely assessed, with modifications made to the program based on the results of this assessment.
- Coaches, high-performance staff, and other Healthcare Personnel e.g., trainers, should be encouraged to attend the AFL-led concussion education session at the club. The Club Doctor/s may also deliver further education to these groups.
- Coaches and Club Officials need to understand match-day assessment protocols as well as graded return-to-play protocols, with an emphasis on a conservative approach. They also need to understand that clearance for return to play following a concussion is **strictly a medical decision**.
- Other Healthcare Personnel and coaching staff need to be able to recognise signs of a possible concussion and report them to the Club Doctor.

MANAGEMENT – DAY OF INJURY

Any player diagnosed with a concussion is NOT permitted to return to play or train on the day of injury.

Head Injury Assessment

- The AFL Head Injury Assessment (HIA) form assists in the identification of SRC and facilitates a summarised process of assessment and management of players following head trauma on match day. The HIA is a rapid sideline screening tool for suspected SRC. As such, it should be used in conjunction with the SCAT6 and clinical judgement.
- Both the HIA and SCAT have been incorporated into the CSX App. Data entered into the CSX App forms part of the player's record. It is also submitted to the AFL as part of the overall concussion audit. This data is not owned by a third-party provider.
- **Use of the CSX App is mandatory for all assessments of concussion/suspected concussion in any AFL or AFLW player, whether they occur at training or during matches (including injuries sustained while playing in lower-tier competitions).**
- **A HIA form must be completed for any case of suspected concussion on match-day, including any incidents notified by the medical spotter in the AFL Review Centre (ARC) to the club bench.**

Use of video

- The AFL provides all available broadcast video feeds via the HawkEye system to the club bench at match venues (there is some variability across AFL and AFLW venues in the video footage from the HawkEye system). This link enables Club Medical Personnel to review real-time video feeds, with variable playback speeds, and multiple camera views.
- Video review allows direct observation of the mechanism of injury, identification of early/immediate signs (e.g. no protective action, impact seizure or tonic posturing) as well as signs that may occur in the time after the injury (e.g. lying motionless, motor incoordination, dazed or blank and vacant look). Consequently, it is important to review all available video footage focusing on the player in the immediate period following the injury.
- Video signs of concussion have been validated in the AFL. Through collaborations with other national and international sporting organizations, the definitions of the video signs have been revised (Summarised in Appendix 1).

- **Sideline video review is mandatory in the assessment of a suspected concussion.**

Revised ARC match day procedures

- Independent match-day medical spotters will be in the ARC during all AFL and AFLW matches, and monitor the game for suspected SRC.
- The ARC spotters are trained medical doctors who function independently from the teams playing in the match.
- When a forceful head impact is noted by the spotter and any clear, probable or possible signs that may be consistent with SRC are noted, these observations will be communicated to the Club Doctor.
- The message will be sent by the ARC medical spotter irrespective of the action(s) by the Club Doctor i.e. the message will be sent even if it appears that the Club Doctor has reviewed footage or has attended to the player.
- The message will be sent via Bee Beep on the Hawkeye tablet and/or direct messaging from the dedicated ARC mobile phone to the Club Doctor's mobile phone.
- The ARC mobile phone will enable messages/calls from the Club Doctors back to the ARC spotters, to facilitate real-time discussion of the video review when required.
- The Club Doctor will receive one of two standard messages from the ARC medical spotter
 1. Mandatory off-field assessment (including SCAT6)

“Hi, <player full name> incident at <insert quarter & time to go> is being flagged with you as a **probable motor incoordination/no protective action**, best seen on the <Hawkeye camera angle> angle. Please review the incident, remove the player for a comprehensive off-field clinical assessment (including SCAT), and notify the ARC on receipt of this message.”
 2. Discretionary off-field assessment

“Hi, <player full name> incident at <insert quarter & time to go> is being flagged with you as a **possible or probable** <list sign/s>, best seen on the <Hawkeye camera angle> angle. Please review the incident, assess the player as clinically indicated and provide a summary of your review and any action taken.”
- The Club Doctor must review the incident and provide a summary of action taken back to the ARC, either via the Hawkeye tablet or ARC mobile phone when they are able.
- For any notification from the ARC medical spotter, the Club Doctor must complete a HIA form in CSX.

- If notified of a “probable motor incoordination or no protective action”, the Club Doctor must remove the player for a comprehensive off-field clinical assessment, which includes the SCAT, unless there is another clear cause for the observable sign.
- If notified of other probable or possible signs, the club doctor should review the video footage, and at the least, briefly review the player before deciding on any requirements for further assessment.
- The ARC medical spotter will complete a modified HIA form once they have finished notifying the Club Doctor of the incident. The modified HIA form has a similar set of observations to the Club Doctor’s match-day HIA form, but the format is specific to the spotter process and facilitates the auditing of incidents.
- The spotter HIA form is later used by the AFL Concussion Coordinator to ensure Club Doctors have completed a corresponding Match HIA form.
- All head impact incidents are reviewed and discussed by the Concussion Coordinator and AFL CMO in a weekly audit meeting. Any further queries regarding management and/or follow-up will be sent to Club Doctors.
- An independent AFL-appointed match-day doctor is present in AFLW games to assist the Club Medical Personnel of both teams. The match-day doctor has access to a separate Hawkeye tablet and will also receive messages directly from the ARC medical spotter via Hawkeye and mobile phone. The match-day doctor will work collaboratively with the Club Doctor/s to decide the most appropriate course of action for the player.

Removal from play

An injured player **must** be removed from play or training if **any** of the following clinical features are present (identified by direct observation, review of the video feed and/or initial assessment of the player. Observations reported by players or other Club Officials should also be taken into consideration):

a. *Clear diagnosis of concussion requiring immediate removal and no return to play or training (category one signs)*

1. Loss of consciousness
2. No protective action in fall to ground
3. Impact seizure or tonic posturing
4. Motor incoordination
5. Dazed, blank/vacant stare or player not his/her normal self
6. Behaviour change atypical of the player

7. Confusion or disorientation (e.g. fails Maddocks questions)
8. Memory impairment
9. Player reports significant, new or progressive concussion symptoms*

b. Requires immediate removal from play or training for further assessment (including SCAT6 where appropriate) (category two signs)

10. Lying motionless (for > 2 seconds)
11. Possible no protective action in fall to ground
12. Possible impact seizure or tonic posturing
13. Possible motor incoordination
14. Possible dazed, blank/vacant stare
15. Possible behaviour changes atypical of the player
16. Any clinical impression or uncertainty from the club doctor that the player is not quite right following trauma

* Symptoms should be interpreted according to the clinical presentation of the player. It is important to note that symptoms can be due to other diagnoses e.g. post-traumatic migraine, neck injury, eye injury, etc. Moreover, the clinical signs can also be caused by other injuries (such as cervical injuries, peripheral vestibular dysfunction etc), or other comorbidities (e.g. psychological factors or coexisting medical conditions etc). **Care should be taken however when ascribing post-traumatic symptoms and signs to other diagnoses without objective evidence of injury to those systems, and a conservative approach should be followed (including removal for a clinical assessment that includes a SCAT6).**

AFL Regulations

- When a player is removed from the field of play for a concussion assessment, the AFL Interchange Official must be notified. The player cannot return to the playing surface for at least 15 minutes (including quarter breaks) after this notification. The 15-minute time period facilitates medical assessment as it allows the SCAT6 to be completed in a quiet, distraction-free environment, with the player in a resting state.

Where there is a clear diagnosis of concussion

- The player should be medically evaluated using standard emergency management principles and particular attention should be given to excluding a cervical spine injury.

- The player must not be returned to play (or training) on the day of injury.
- The player must be monitored regularly for possible signs of deterioration or other warning signs of a potential underlying structural brain injury. The SCAT6 provides a useful assessment and monitoring tool and should be used at a convenient time following the injury (e.g. major break or after the match).
- **Any player with clinical features including abnormal neurological signs or a serious or structural head and/or neck injury requires emergency management and ambulance transport to a hospital with a neurosurgical unit.**

Where there is a clinical suspicion of SRC but no clear on-field diagnosis

- The player should be removed from the field and must be assessed in a quiet distraction-free environment with the player in a resting state.
- The player should be allowed to rest while the Club Doctor reviews the video footage of the injury where available (paying particular attention to signs of SRC such as tonic posturing or motor incoordination).
- The player should then be fully assessed, including the use of the SCAT6.
- The time taken to complete the SCAT6 is at least 10 minutes.
- If the diagnosis of SRC is confirmed following assessment, then the player must not be returned to play or training on the day.
- In cases where the Club Doctor may have been concerned about a possible SRC; but after the sideline assessment (including additional information from the player, the comprehensive clinical assessment, which includes the SCAT, and inspection of available video of the incident) there are no clinical or video indicators to support a diagnosis of concussion, and a non-concussive condition definitively accounts for the player's presentation, then the Club Doctor can determine the disposition and timing of return to play for that player.
- The clinical features of SRC may be delayed or evolve over several hours. Consequently, in any cases where there is uncertainty about the diagnosis after an initial assessment, the player must be managed conservatively on the day of injury (i.e. not returned to play). Furthermore, **all players who have had a concussion assessment during the match and are returned to play, including those who have had an incident flagged by the ARC medical spotter, must be regularly medically assessed during the match and when clinically indicated undergo repeat SCAT6 assessment after the match (or following day).**

- In cases that are withheld from play on the day of injury with a presumptive diagnosis of SRC, but on subsequent assessment over the next 24-48 hours the diagnosis is changed, the case details must be submitted to and discussed with the AFL CMO. **This is only relevant for cases with isolated symptoms (e.g., headache) or signs (e.g., brief balance disturbance) with a clear alternate diagnosis.**
- Although trainers and other Club Officials may assist in the reporting of concussion symptoms and signs and the monitoring of a player on the field, it ultimately remains the Club Doctor's responsibility to oversee this process and determine the player's fitness to play.
- **The Club Doctor is required to provide timely and full documentation (completed HIA and SCAT6 forms) of head injury assessments to the AFL CMO via the CSX App. Information collected will be utilized as a part of ongoing audit/compliance, education and research activities.**

MANAGEMENT – RETURN TO PLAY

- Decisions regarding return to play following SRC rely on a multifaceted individualised clinical approach, managed by the Club Doctor.
- Measurement of recovery has significant challenges, as domains typically recover independently, many tools used to measure clinical recovery lack sensitivity, and advanced measures of physiological recovery show changes that persist beyond clinical recovery (although the clinical relevance of these changes remains unclear).
- Consequently, a **conservative approach to return to play is recommended** with incremental increases in physical +/- cognitive load and avoidance of activities with a risk of repeated head trauma until late in the return to play process.
- **The minimum requirement for return to play is that a player must have returned to baseline level of symptoms and cognitive performance, had resolution of all concussion-related neurological signs, and has completed a graded loading program without recurrence of symptoms or signs of SRC.**
- The [SCAT6](#) is a useful tool to facilitate the assessment of players within the acute phase of concussion (i.e. within 72 hours of injury).
- The [SCOAT6](#) (or components thereof) facilitates the assessment of players from 72 hours following injury. The SCOAT6 (or components thereof) is a screening tool, and abnormalities in any domain may require further assessment and management including referral to clinical psychology, neuropsychology, vestibular physiotherapy, cervical physiotherapy, etc).
- Players must be monitored medically as they progress through the return to play program. There should be 24 hours (or longer) for each step of the progression.
- Attention should be given to the early identification and treatment of confounding and coexisting pathologies e.g., cervical spine injury, vestibular deficits, and psychological factors, which may contribute to ongoing symptoms.
- The return to play program consists of three stages (outlined in Figure 1):
 - **Stage 1: REST** - A brief period of **relative rest** (maximum 24-48 hours).
 - Players should be allowed to engage in activities of daily living immediately following injury, even during the initial period of relative rest.
 - There is some benefit in reducing screen time in the first 48 hours after a concussion, but it may not be effective beyond that.
 - The player may use simple analgesics to help manage symptoms during this time.

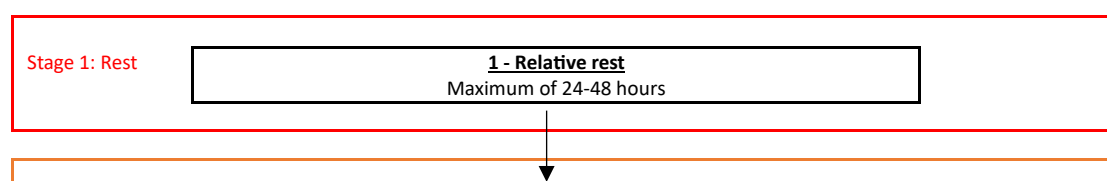
Stage 2: RECOVERY – A **recovery period** where a symptom-limited progressive increase in physical and cognitive activity is encouraged.

- Physical activity during the recovery phase can be used as part of the treatment.
- The overall structure of the recovery phase can be individualised, considering the player's symptoms and level of function. The focus of the stage must be progressive cognitive and cardiovascular loads, with **no team-based training drills included in the program. Furthermore, the time requirements of this stage must be met (i.e., it cannot be shorter than 4 days).**
- A symptom-limited progressive increase in physical and cognitive activity is encouraged. This must be performed in a safe environment that is free from the risk of repeat head contact (i.e. no team training drills).
- Mild and brief exacerbation of symptoms is acceptable during the recovery phase (i.e., an increase of no more than 2 points on a 0–10 point scale for less than an hour when compared with the baseline value reported prior to physical activity).
- If there is more than a mild exacerbation of symptoms, the player should stop and then attempt to exercise at the same level the next day.
- The player requires **medical clearance** to enter Stage 3, the graded loading program.

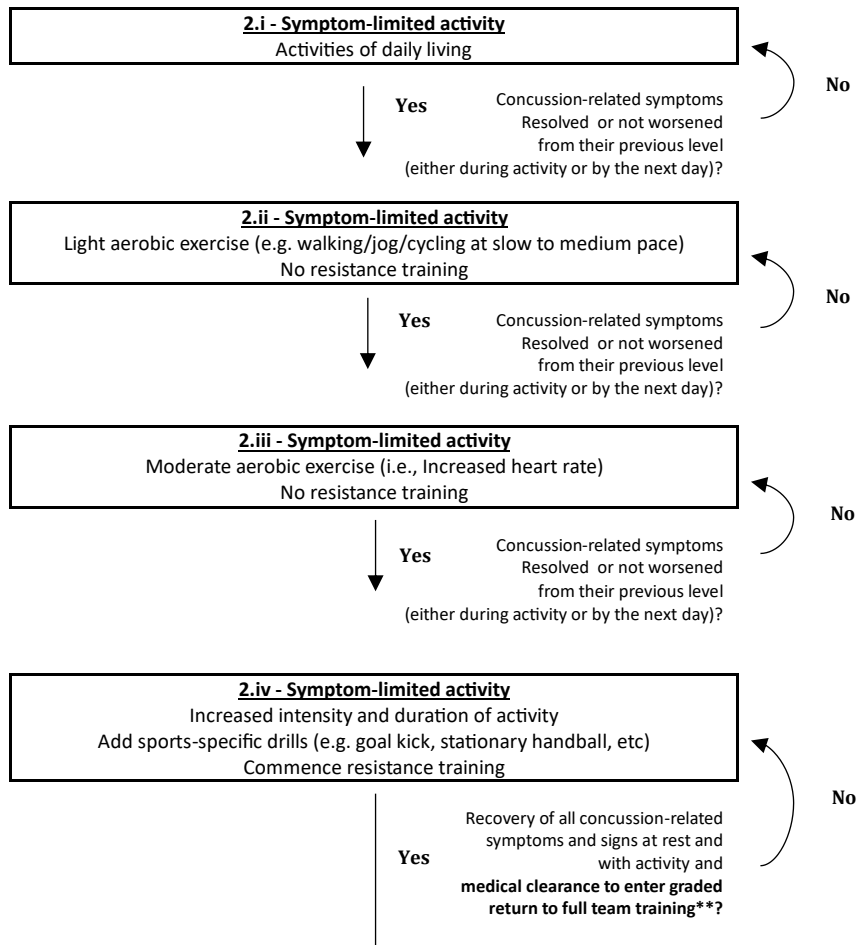
Stage 3: GRADED LOADING PROGRAM

- This stage consists of six steps prior to a medical clearance for unrestricted return to play. Players can only enter Stage 3 **once they have clinically recovered from their concussion, including the completion of a SCAT6/SCOAT6 demonstrating return to baseline (or within normative range) in CSX.**
- Players experiencing **any concussion-related symptoms** during this stage must return to Stage 2 and be reviewed thoroughly. The player will need to establish full resolution of symptoms with exertion before re-entering the graded loading program.

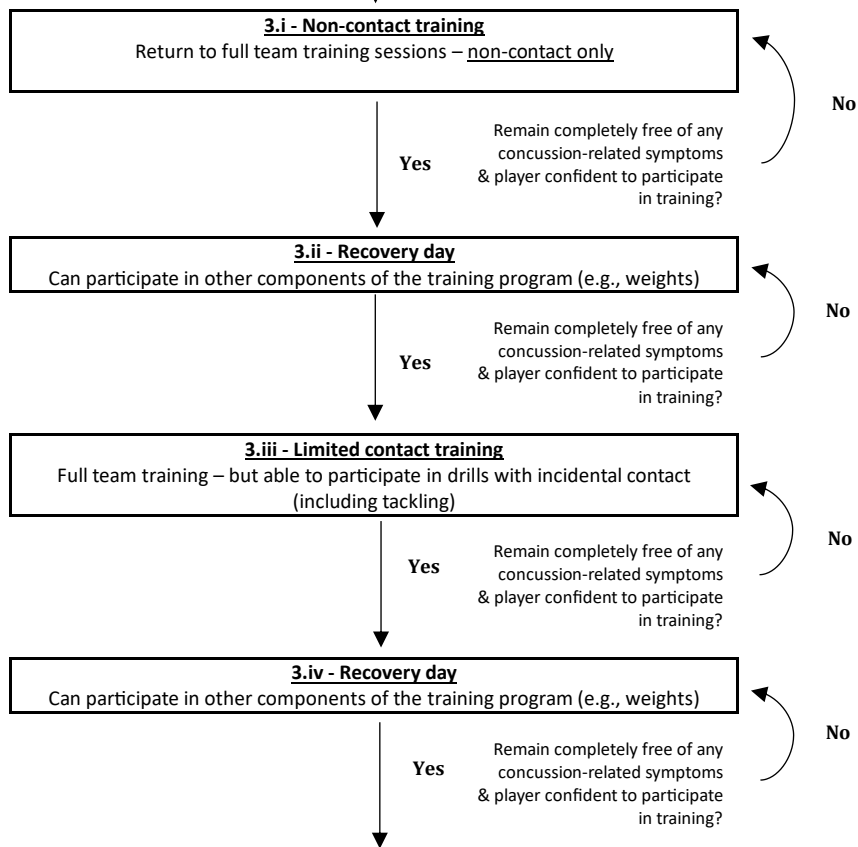
Figure 1. Return to play program following concussion

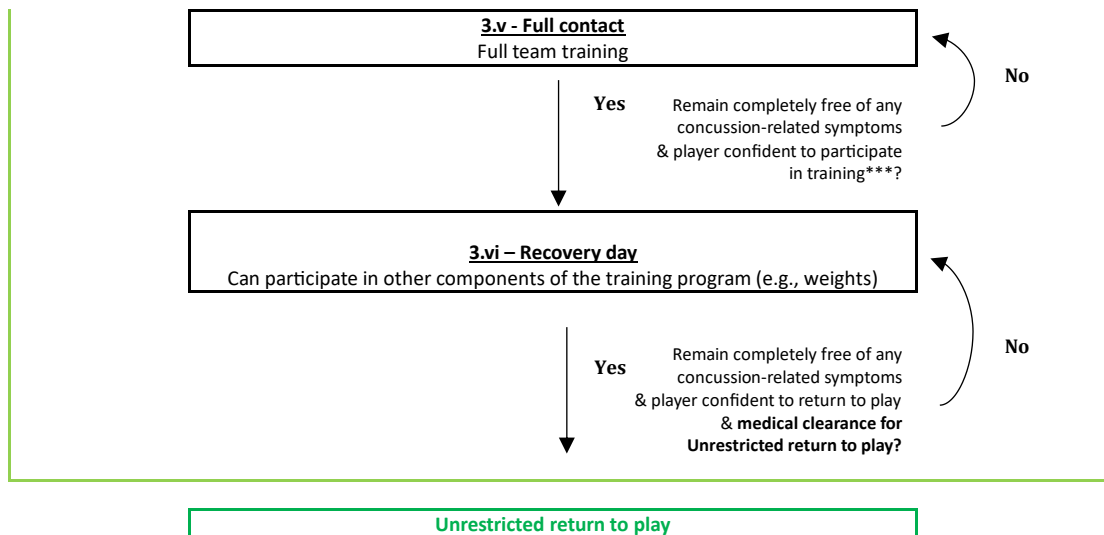


Stage 2:
Recovery*



Stage 3: Graded
loading program





* An example of progression through Stage 2 – Recovery is illustrated in the figure. The overall structure of the recovery phase can be individualised, considering the player’s symptoms and level of function. The focus of the stage must be progressive cognitive and cardiovascular loads, with **no team-based training drills included in the program. Furthermore, the time requirements of this stage must be met (i.e., it cannot be shorter than 4 days).**

**At a minimum, a SCAT6 demonstrating return to baseline (or within normative range) must be completed in CSX before the player is allowed to enter the graded loading program (stage 3).

*** The player must have completed a Cognigram test (or equivalent) demonstrating return to baseline (or within normative range) before they are allowed to return to full contact training,

- **The player must have a medical assessment and clearance prior to**
 - a) **Entering Stage 3 – graded loading program; and**
 - b) **Being cleared for unrestricted return to play** (this should include an assessment of the player’s psychological readiness to return to play).

- Compliance requirements
 1. A SCAT6 demonstrating return to baseline (or within normative range) must be completed in CSX before the player is allowed to enter Stage 3, the graded loading program.
 2. The player must have completed a Cognigram test (or equivalent) demonstrating return to baseline (or within normative range) before they are allowed to return to full contact training, as part of stage 3.
 3. The date of clearance for return to play must be entered into CSX and the incident closed on the App (cannot be earlier than the 12th-day post-injury, with the day of injury being day “0”).

- Players with SRC should be managed on an individual basis, accounting for specific factors that may affect their recovery trajectory, such as pre-existing factors (e.g., migraine history, anxiety) or postinjury factors (e.g., aggravation of injury, psychological stress, social factors) that impact recovery. Furthermore, a more conservative approach for return to play is encouraged for younger players (i.e., 18 years or younger).

- The focus of these guidelines is a graded progression to return to play that considers the player’s clinical presentation and recovery, within a high-performance environment that facilitates close medical monitoring.

- The ultimate timing of return to play however will be dictated by the individual clinical presentation and time taken for the player to recover, **which is variable from injury to injury**.

- In following the guidelines, the earliest that the player may return to play is on the 12th day following the concussion (where the day of concussion is designated day “0”).

- The time frame for clinical recovery following a concussion is typically 7-10 days. Therefore, the average time to return to play is expected to be approximately 2-3 weeks.
- Additional considerations for **difficult or complex cases** are discussed below.
- The final determination regarding concussion diagnosis and/or fitness to play is a medical decision based on clinical judgment. The Club Doctor is in the best position to make this clinical decision as they have training and experience in the assessment and management of SRC and have a detailed knowledge of the player (including typical presentation and affect), which can assist in identifying subtle behavioural changes that may accompany SRC.

Role of neuropsychological testing and other investigations

- Computerised screening cognitive tests provide a practical method to assist with the assessment of cognitive recovery. Computerised test platforms have been validated for use following SRC and are readily available (e.g., Cognigram, ImPACT).
- It is important to remember that computerised screening cognitive tests are only one component of assessment, and therefore should not be the sole basis of management decisions. Computerised screening cognitive tests do not replace the need for a full history and clinical/neurological examination.
- Given that concussion affects multiple domains, and there are currently no single objective tests of recovery, consideration should also be given to assessment using psychological screening tools, advanced imaging, formal neuropsychological assessment, VOMs testing, etc. Ideally, any investigation of novel biomarkers for the diagnosis and assessment of recovery following SRC should be conducted within an overarching research program to help advance the knowledge base and improve the management of SRC.
- There are currently many different tools and technologies (e.g. App based platforms, oculo-motor assessment tools, blood and saliva biomarker assays, etc) claiming to assist with diagnosis of concussion and/or track player recovery available on the market, and whilst the AFL is committed to advancing the science and trialing select devices in a research context, evidence-based application of such proposed solutions in clinical practice is recommended to be undertaken in collaboration with the AFL Concussion Innovation and Research working group.

Role of imaging

- Conventional imaging (e.g. CT or MRI) should be considered in cases where there is concern regarding an underlying structural head/brain injury.
- If structural MRI is requested to assess for concussive injuries, such as microhaemorrhages, it is necessary that, at a minimum, the following sequences are obtained (and that the MRI facility, and reporting radiologists, are sufficiently experienced in neuroimaging): Sagittal T1, Axial T2, Axial DWI, Axial FLAIR, Axial SWI (or similar sequence), and Axial dual echo T2.
- Advanced imaging and investigation techniques (such as Diffusion Tensor Imaging, functional MRI, Magnetic Resonance Spectroscopy, quantitative EEG, etc.) have demonstrated changes in brain function, activation patterns and white matter fibre tracts in some studies of SRC. The clinical significance of these changes remains unclear.

MANAGEMENT OF DIFFICULT OR COMPLICATED CASES

- Difficult cases or decisions regarding retirement due to concussion are often complex and require broad and detailed consideration of issues such as mental health, VOMS deficits, recalcitrant headache syndromes, autonomic dysfunction, etc. They also involve education of the player to adequately address his/her concerns about future concussions and concussion management. Consequently, these cases should be managed in a multi-disciplinary manner.
- Difficult or complicated cases include (but are not limited to):
 - a) Players with symptoms that persist beyond 4 weeks following SRC,
 - b) Any uncertainty about clinical recovery following SRC, including players who are unable to progress through the return to play protocols due to recurrent exacerbation of symptoms,
 - c) Players with two or more concussions in a single season (including pre-season training), or three or more concussions within a 12 month period,
 - d) Concussions occurring with apparent diminishing force (i.e. lowered threshold to repeat injury)
 - e) Multiple concussions with increasing symptom duration or symptom load,
 - f) Players who are self reporting concerns regarding their brain health (even in the absence of a recent SRC).

- **Any difficult or complicated case must be reported in a timely fashion to the AFL CMO for a discussion about appropriate further management. The discussion will be treated with strict medical confidentiality.**
- Further management will be guided by the individual circumstances of the case, and may include any one or combination of:
 - a) Formal neuropsychological testing,
 - b) Neuroimaging (including MRI),
 - c) Recommendation/s for review by an independent clinician with expertise in concussion management or specific treatment techniques, or
 - d) Review by a Concussion Panel (see below)
- Advanced imaging and investigation techniques in approved research projects may also be considered in complicated cases.

Implications for baseline testing and timing of return to play

- A more detailed baseline assessment, that includes formal neuropsychological testing, and neuroimaging (if clinically indicated), and a more conservative return to play approach is strongly recommended for any player:
 - a) Who has previously presented as a difficult or complicated case (see list above), or
 - b) With a history of learning disorders, mood disturbance, etc that may create difficulties in measuring recovery following SRC

AFL Interdisciplinary Panel for the Assessment of Concussion (Concussion Panel)

- The AFL can facilitate referral to Independent Concussion Panels to provide players and Club Doctors a mechanism for a timely and efficient expert multidisciplinary assessment of complex cases of concussion.
- The Concussion Panel can provide an expert multidisciplinary opinion in response to a written medical referral with clinical questions from the referring Club Doctor.
- A case appropriate for referral to a Concussion Panel includes:
 - a) Advice for management of difficult or complicated cases (see list above),
 - b) Consideration of retirement due to concussion-related issues, or
 - c) Any other complex issues

- Referral to a Concussion Panel can be facilitated by contacting the AFL CMO.
- Whilst this process (Concussion Panel) is facilitated by the AFL CMO, the Panel of independent medical experts is not employed by the AFL; the consultative relationship is between the referring Club Doctor, the player, and the independent multidisciplinary medical practitioners.
- The Panel is made up of healthcare practitioners with specific experience and expertise in the management of SRC. The composition of the Panel will largely depend on the clinical questions being asked but may include Neurologists, Neurosurgeons, Rehabilitation Medicine Physicians, Psychiatrists, Sport and Exercise Medicine Physicians, Physiotherapists, Neuropsychologists, etc.
- The Panel members will review all the documents, reports and files (e.g. video of the incident/s) relating to the case provided to them by the Club Doctor. The Panel will also obtain a history and examine the player directly.
- The Panel will provide a written report to the Club Doctor, in response to the medical questions contained within the referral letter to the Panel.
- In instances where the answer to specific questions remains unclear, the Panel will attempt to highlight risks and potential risk mitigation measures. In these cases, it is ultimately up to the Club Doctor and the player to consider the Panel's opinion, and together, the player and Club Doctor determine the management plan.

STRATEGIC APPROACH TO CONCUSSION AND HEAD IMPACTS

- The AFL has formulated a five-year [Strategic Plan \(2022-2026\)](#) for research and management of SRC and repeated head impacts in Australian Football. The plan sets out the strategic pillars including Education, Prevention, Detection, Recovery, Support and Innovation and identifies key priorities, objectives and actions for each of these pillars. The plan covers all levels of the game.
- Important components of the action plan to highlight for AFL and AFLW include:
 - a) Prevention of concussion and repetitive head impacts.
 A comprehensive prevention strategy will involve incorporating an evidence-based approach with broad industry consultation, to consider the prevention of head impact exposure through education programs, protective equipment, training practices, policy, and rules and/or rule enforcement.
 This program will be underpinned by important research on the measurement of head impact exposure, which currently includes a collaborative study between

HITiQ, Monash University and the AFL on mouthguard impact sensors in AFL and AFLW. Ideally as many players as possible wear the instrumented mouthguards throughout every match in the season.

b) The AFL Brain Health Initiative

A longitudinal program is being developed to monitor the brain health of AFL and AFLW players across their career in football (from recruitment to retirement) and into later life. It will examine factors associated with player demographics, head impact exposure, recovery from SRC and return to play, other known risk factors and long-term brain health and player wellbeing. Many of the clinical measures outlined in these guidelines (e.g. SCAT6, SCOAT6, HIA form), plus additional clinical and research measures, will be included as research datapoints for players who consent to participate. Advanced imaging will also be offered, and a Brain Donor program will be established.

Appendix 1. Definitions of video signs to identify a possible concussion

	Yes	No
Lying motionless	Lying without purposeful movement on the playing surface, for >2 seconds*. Does not appear to move or react purposefully, respond or reply appropriately to the game situation (including teammates, opponents, umpires or medical staff). Concern may be shown by other players or match officials.	Reacts, responds or replies appropriately. Video shows no clear view of player on ground.
Tonic posturing	Involuntary sustained contraction of one or more limbs (typically upper limbs), so that the limb is held stiff despite the influence of gravity or the position of the player. The tonic posturing could involve other muscles such as the cervical, axial, and lower limb muscles. Tonic posturing may be observed while the athlete is on the playing surface, or in the motion of falling, where the player may also demonstrate no protective action	No clear evidence of tonic movements. Video shows no clear view of player on ground
No protective action - floppy	Falls to the playing surface in an unprotected manner (i.e., without stretching out hands or arms to lessen or minimise the fall) after direct or	Any motor response from player in process of falling. The player's arms are being held, so that they are unable to move to protect themselves.

	indirect contact to the head. The player demonstrates loss of motor tone (which may be observed in the limbs and/or neck*) before landing on the playing surface.	Insufficient time to react – rapid momentum carries the player to ground. Video shows no clear view of player falling.
Impact seizure	Involuntary clonic movements that comprise periods of asymmetric and irregular rhythmic jerking of axial or limb muscles	No clear evidence of clonic movements. Video shows no clear view of player on ground.
Slow to get up	Remains (sitting or lying) on the ground (without being held down by an opponent) despite play continuing (i.e. not upright on feet).	Return to feet (within an appropriate period of time) and continued to participate in the match (and/or the ball is not in play). Video shows no clear view of player on ground.
Motor incoordination	Appears unsteady on feet (including losing balance, staggering/stumbling, struggling to get up, falling), or in the upper limbs (including fumbling). May occur in rising from the playing surface, or in the motion of walking/running/skating.	Able to stand/walk/run in usual fashion. If assisted off the ground – does not have any signs of motor incoordination No attempts to move (e.g. stretched off). Video shows no clear view of player.
Blank / Vacant Look	Player exhibits no facial expression or apparent emotion in response to the environment. <i>(*May include a lack of focus/attention of vision.</i>	Any facial expressions. Video does not show clear view of face.

Blank/vacant look is best appreciated in reference to the athlete's normal or expected facial expression)

Clutching at head/face	Reaches for head/face with one or both hands, and maintains hand(s) on head for more than 1 sec (not a simple wiping motion).	Does not reach for head. Wipes head/face with hand(s). Video shows no clear view of player. Holding cloth/dressing on head or face to manage bleeding
Facial Injury	Any facial laceration, facial bleeding, blood coming from mouth, epistaxis/nose bleed or apparent eye injury.	No visual signs of facial injury. Video shows no clear view of player's face.

adapted from

1. International Consensus Definitions of Video Signs of Concussion in Professional Sports. Gavin Davis et al. British J Sports Medicine. doi.org/ 10.1136/bjsports-2019-100628
2. The reliability and validity of video analysis for the assessment of clinical signs of concussion in Australian football. Makdissi and Davis. Journal of Science and Medicine in Sport. DOI 10.1016/j.jsams.2016.02.015.