



Australian Government
Australian Sports Commission



AMA

Sport-related concussion

Rural Medicine Australia
Melbourne, October 2017

Dr David Hughes
Chief Medical Officer, Australian Institute of Sport

"if in doubt, sit them out"

www.concussioninsport.gov.au



The History and Culture of Sport-Related Concussion

- Concussion has historically been an accepted part of contact and collision sport
- In the past, it was given little consideration beyond the immediate effect on the performance of the team
- There was a strong culture of playing on with concussion as a measure of resilience and commitment



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The History and Culture of Concussion

- “Getting knocked out during those days wasn’t an issue, it was an opportunity to prove to your teammates that you were made of the right stuff, worthy of the jersey”



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The History and Culture of Concussion

- NFL \$1 billion no fault settlement
- Covers up to 20,000 players over the next 65 years



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5th Consensus Conference on Concussion in Sport, Berlin October 2016

- Start with > 60 questions
- Delphi process to reduce to 12 questions
- Systematic review of each question
 - 59,309 papers screened
 - 750 papers included (1.7%) via PRISMA process
- 60 minute session on each question
 - 2 x 5 minute presentations of key research
 - 25 minute presentation of systematic review
 - 25 minute open discussion
- Several weeks of synthesis afterwards

Consensus statement

Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016

Paul McCrory,¹ Willem Meeuwisse,² Jiří Dvořák,^{3,4} Mark Aubry,⁵ Julian Bailes,⁶ Steven Broglio,⁷ Robert C Cantu,⁸ David Cassidy,⁹ Ruben J Echemendia,^{10,11} Rudy J Castellani,¹² Gavin A Davis,^{13,14} Richard Ellenbogen,¹⁵ Carolyn Emery,¹⁶ Lars Engebretsen,¹⁷ Nina Feddermann-Demont,^{18,19} Christopher C Giza,^{20,21} Kevin M Guskiewicz,²² Stanley Herring,²³ Grant L Iverson,²⁴ Karen M Johnston,²⁵ James Kissick,²⁶ Jeffrey Kutcher,²⁷ John J Leddy,²⁸ David Maddocks,²⁹ Michael Makdissi,^{30,31} Geoff T Manley,³² Michael McCrea,³³ William P Meehan,^{34,35} Shinji Nagahiro,³⁶ Jon Patricios,^{37,38} Margot Putukian,³⁹ Kathryn J Schneider,⁴⁰ Allen Sills,^{41,42} Charles H Tator,^{43,44} Michael Turner,⁴⁵ Pieter E Vos⁴⁶

PREAMBLE
The 2017 Concussion in Sport Group (CISG) consensus statement is designed to build on the principles outlined in the previous statements¹⁻⁴ articles were screened by the expert panels for the Berlin meeting. The details of the search strategies and findings are included in each of the systematic reviews.

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/bjsports-2017-097699>)



Background Key Information

- Concussion is a sub-type of mild traumatic brain injury
 - Results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously
- Concussion is common
 - 1.6 – 3.0 million cases per year in USA
 - Approximately 100,000 cases per year in Australia
 - Only 1:10 cases go to hospital
 - 1000 cases per year at ED, RCH Melbourne
- Concussion is not a ‘bespoke medical condition for over-paid professional athletes’, it is a public health issue



Clinical considerations

- Concussion is difficult to diagnose, even for experienced medical practitioners familiar with this condition
- There is no blood test or medical imaging scan which can reliably diagnose concussion
- Concussion cases often present after the fact, with a suggestive history, possibly some symptoms and almost never any objective signs
- Premature RTP places individual at risk of further concussion or other injuries



Clinical considerations

- Clinical indicators can be subtle
 - Difficulty concentrating
 - Emotional lability
 - Sensitivity to light
 - Blank or vacant stare
 - Not themselves
- Suspecting concussion or being aware of the possibility of concussion is critical to athlete safety and welfare
- Direct force to the head is not required

“if in doubt, sit them out”



Diagnosis

- Diagnosis is via a combination of history, physical examination and (sideline) clinical testing
- The most widely accepted clinical tool for use by doctors is the Sport Concussion Assessment Tool version 5 (SCAT5)
- Computer-based cognitive tests contribute to assessment



Monitoring post-concussion

- Concussion is an evolving injury
- An individual can appear unaffected or mildly affected initially, and may then deteriorate over the subsequent hours or days
- No return to sport until cleared by a medical practitioner
- The problem is, initially, we don't know it is concussion



Children and concussion

- There is strong and reproducible research indicating that adolescents take longer than adults to recover from concussion
- The vast majority of adult concussions resolve over 10 – 14 days without need for intervention
- Recent studies suggest that as many as 50% of concussed children have persisting symptoms at 14 days



Children and concussion

- There is strong and reproducible research indicating that adolescents take longer than adults to recover from concussion
- Prolonged concussion in adults = > 2 weeks
- Prolonged concussion in adolescents = > 4 weeks
- **AIS-AMA CISPS takes a more conservative approach to children and adolescents than some sporting codes**

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Position statement summary

Australian Institute of Sport and Australian Medical Association position statement on concussion in sport

Lisa J Elkington, David C Hughes

Sport-related concussion is a growing health concern in Australia. It affects athletes at all levels of sport from the recreational athlete to the full-time professional.^{1,2} Concerns about its incidence and possible health ramifications for athletes have led to an increased focus on safe and appropriate diagnosis and management.^{3,4} Parents, coaches, athletes, medical practitioners and others involved in sport are seeking information regarding the best management of sport-related concussion. Participant safety and welfare is paramount when dealing with all concussion incidents.

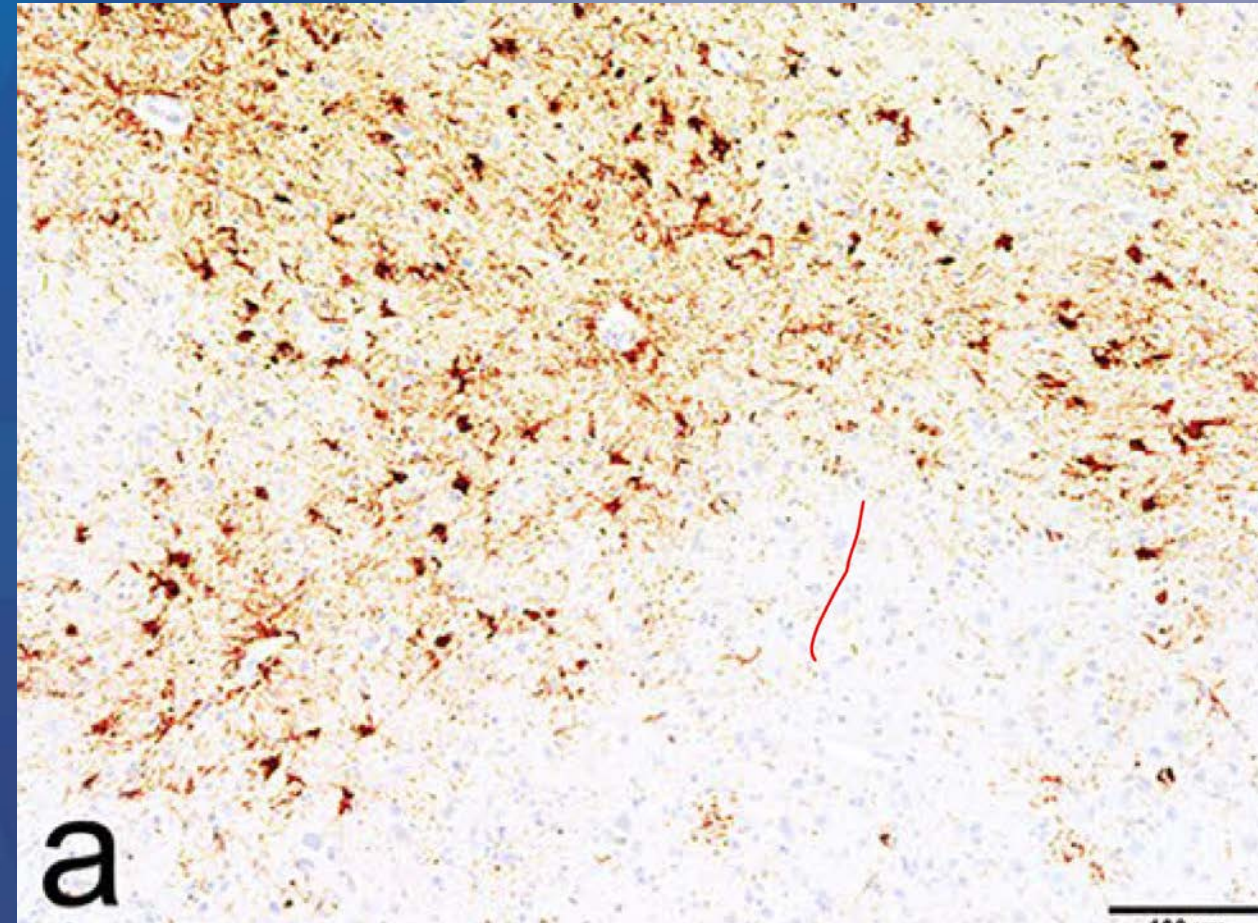
Summary

Introduction: Sport-related concussion is a growing health concern in Australia. Public concern is focused on the incidence and potential long term consequences of concussion. Children may be more prone to concussion and take longer to recover. The Australian Institute of Sport and the Australian Medical Association have collaborated to present the most contemporary evidence-based information in a format appropriate for all stakeholders. This position statement aims to ensure that participant safety and welfare is paramount when dealing with concussion in sport.



Long term effects

- Chronic traumatic encephalopathy (CTE)
 - An accumulation of abnormal hyperphosphorylated tau (p-tau) in neurons and astroglia distributed around small blood vessels at the depths of cortical sulci and in an irregular pattern
 - Can only be definitively diagnosed by post-mortem examination of brain tissue



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Long term effects

- Case series of ex-footballers with pathological changes of CTE
- Brains donated by 202 deceased American football players
- CTE neuropathologically diagnosed in 177/202 (87%) players across all levels
- 110/111 (99%) former National Football League players (99%)

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Research

JAMA | **Original Investigation**

Clinicopathological Evaluation of Chronic Traumatic Encephalopathy in Players of American Football

Jesse Mez, MD, MS; Daniel H. Daneshvar, MD, PhD; Patrick T. Kiernan, BA; Bobak Abdolmohammadi, BA; Victor E. Alvarez, MD; Bertrand R. Huber, MD, PhD; Michael L. Alosco, PhD; Todd M. Solomon, PhD; Christopher J. Nowinski, PhD; Lisa McHale, EdS; Kerry A. Cormier, BA; Caroline A. Kubilus; Brett M. Martin, MS; Lauren Murphy, MBA; Christine M. Baugh, MPH; Phillip H. Montenegro, BA; Christine E. Chaisson, MPH; Yorghos Tripodis, PhD; Neil W. Kowall, MD; Jennifer Weuve, MPH, ScD; Michael D. McClean, ScD; Robert C. Cantu, MD; Lee E. Goldstein, MD, PhD; Douglas I. Katz, MD; Robert A. Stern, PhD; Thor D. Stein, MD, PhD; Ann C. McKee, MD

IMPORTANCE Players of American football may be at increased risk of long-term neurological conditions, particularly chronic traumatic encephalopathy (CTE).

OBJECTIVE To determine the neuropathological and clinical features of deceased football players with CTE.

DESIGN, SETTING, AND PARTICIPANTS Case series of 202 football players whose brains were donated for research. Neuropathological evaluations and retrospective telephone clinical assessments (including head trauma history) with informants were performed blinded. Online questionnaires ascertained athletic and military history.

← Editorial page 338

+ Author Video Interview and JAMA Report Video

+ Supplemental content

+ CME Quiz at jamanetwork.com/learning

Mez et al, JAMA July 25, 2017 Volume 318, Number 4



Long term effects

- Research into possible links between concussion and chronic traumatic encephalopathy (CTE)
 - Poorly designed studies, based on a series of case reports
 - No longitudinal studies
 - No control of confounding variables (alcohol abuse, drug abuse, family history, mental illness etc)
 - Small numbers
 - Selection bias +++
 - Mostly out of one research centre



Long term effects

- Boston research group
 - “This is a highly skewed population”
 - “We can’t say from this sample whether the rate of CTE in pro players is 1 percent or what; we have no idea”
 - Questioning the science has become politically incorrect
 - Questioning the science makes one a ‘CTE-denier’
 - McKee JAMA interview: <http://jamanetwork.com/learning/video-player/14591368>





Long term effects – to be clear:

- There is no such thing as a ‘good concussion’
- AIS & AMA are not saying that there are no long term effects, but the quality of evidence (for a causative link) to date is poor
- Properly designed, long term prospective epidemiological studies are required, controlling for confounding variables
- The vast majority of individuals who suffer concussion go on to live normal, healthy and fulfilling lives
- The best way to care for the (immediate and long term) health of athletes is to take concussion seriously, treat each case carefully and be conservative with RTP

“if in doubt, sit them out”



Community concern

- There is growing concern in the Australian community regarding concussion
 - Parents are concerned about the safety of their children
 - Events in the USA have elevated concern regarding long-term effects
 - NSOs and schools are concerned about safety, litigation and financial ramifications
 - Parents, coaches, teachers and medical practitioners feel uncertain about how to recognise and manage concussion



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Changing the concussion culture

- Advances in Australian sport over past decade, but still a long way to go
- Need contact sport role models telling children that “it is okay to say you are not okay”

NRL issues record \$350,000 in fines to clubs for breaching concussion rules

By Stuart Honeysett | Mar 20th, 2017





New recommendations for on-field situations

- Immediate and permanent removal from sport
 - Loss of consciousness
 - No protective action in fall
 - Seizure
 - Confusion, disorientation
 - Memory impairment
 - Balance disturbance
 - Athlete reports new or progressive concussion symptoms
 - Dazed, blank/vacant stare
 - Behavioural change



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Changing the concussion culture

- NFL
 - 2004 – > 50% concussed players returned to contact training within 1 day
 - 2013 – independent neurologist at every match
 - 2015 – ‘No go’ criteria for immediate and permanent removal
 - 2017 – Concussed players not allowed to play for at least 6 days



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Changing the concussion culture

- AFL
 - 20 minute window to assess concussion
 - Doctor access to all video footage
 - Player rest for 10 minutes – then SCAT5
 - No return if any suggestion of concussion
 - Graduated RTP protocol



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Changing the concussion culture

- World Rugby
 - No RTP if concussion can not be excluded
 - HIA1: During match, use of video
 - HIA2: After match
 - HIA3: 48 hours after concussion
 - 2002: Of those players subsequently diagnosed with concussion, 56% RTP same day
 - 2015/16: No player diagnosed with concussion RTP < 6 days





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A variety of positions on concussion

- Not all codes differentiate management of child concussions from management of adult concussion



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www.concussioninsport.gov.au



How do we manage acute concussion?

- Institute normal first aid principles, including spinal care
- Remove from play if any suspicion of concussion
- No RTP unless a medical practitioner is onsite and can exclude concussion
- SCAT5 / neurological assessment or transfer for medical assessment
- Ensure
 - Supervision
 - No driving
 - No alcohol, aspirin, NSAIDS, opiates, sedatives

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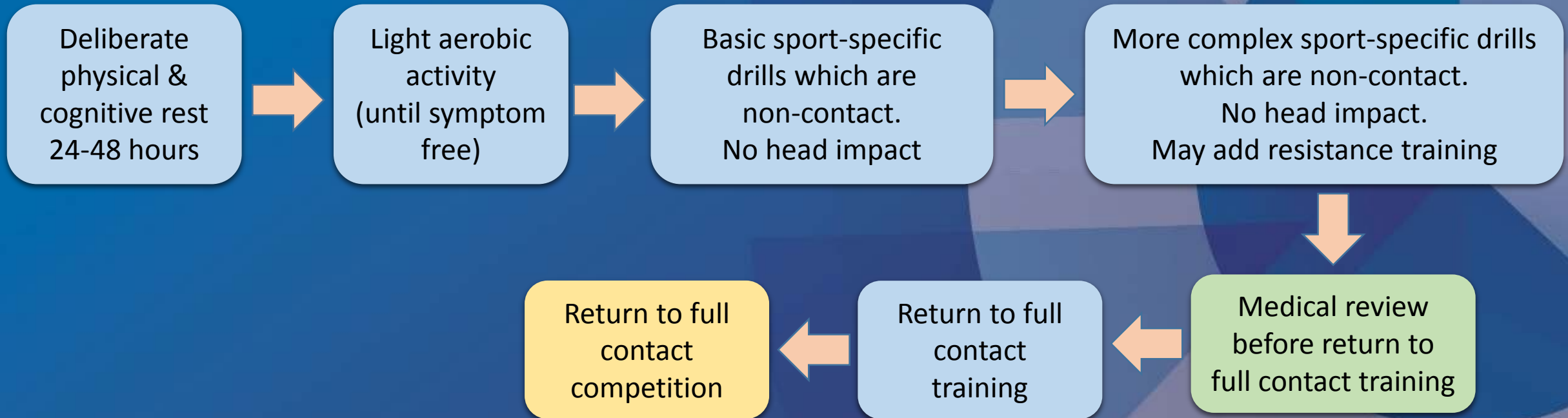
Red flags

- Neck pain
- Increasing confusion or irritability
- Repeated vomiting
- Seizure or convulsion
- Weakness or tingling/burning in the arms or legs
- Deteriorating conscious state
- Severe or increasing headache
- Unusual behavioural change
- Visual or hearing disturbance

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How do we safely manage return to sport?

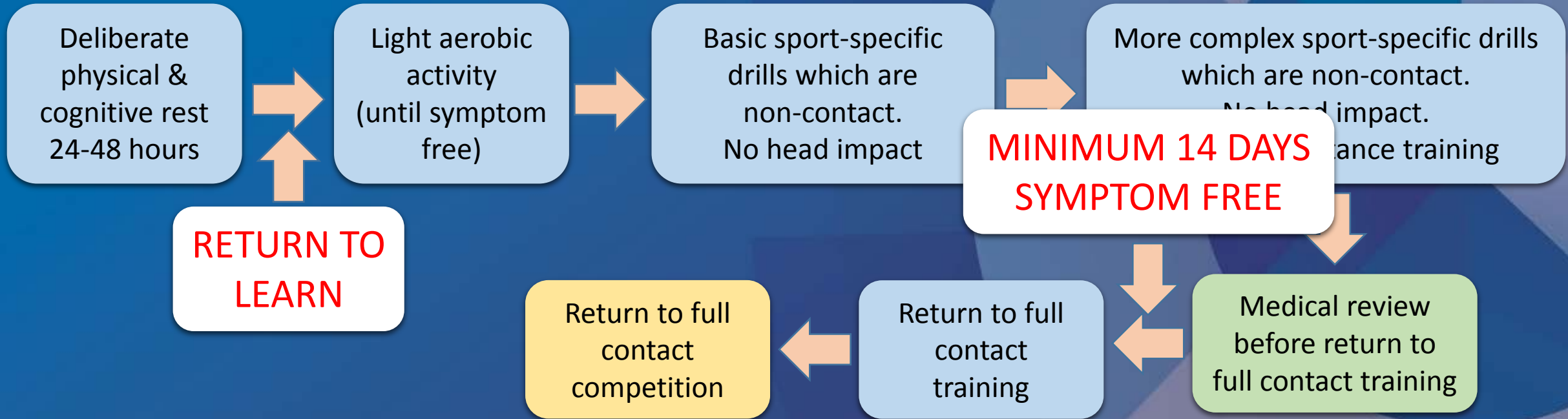


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How do we safely manage return to sport?

**CHILDREN
18 YEARS AND UNDER**



"if in doubt, sit them out"



Why did AIS & AMA create a Position Statement?

- A high degree of public concern about concussion in sport
 - Particularly in relation to children
- A paucity of accessible, accurate information on concussion
- Perception of lack of consistency in diagnosis and management of concussion
- Perception that sport-specific concussion policies may be written from a position of conflict



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Australian Institute of Sport and Australian Medical Association Concussion in Sport Position Statement

Dr Lisa Elkington, Dr Silvia Manzanero and Dr David Hughes
Australian Institute of Sport

Updated October 2017

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Concussion in sport

HOME ABOUT US ATHLETE PARENTS AND TEACHERS COACH MEDICAL PRACTITIONER POSITION STATEMENT RESOURCES/LINKS CONTACT US

Concussion in sport



ATHLETE



PARENTS AND TEACHERS



COACH



MEDICAL PRACTITIONER



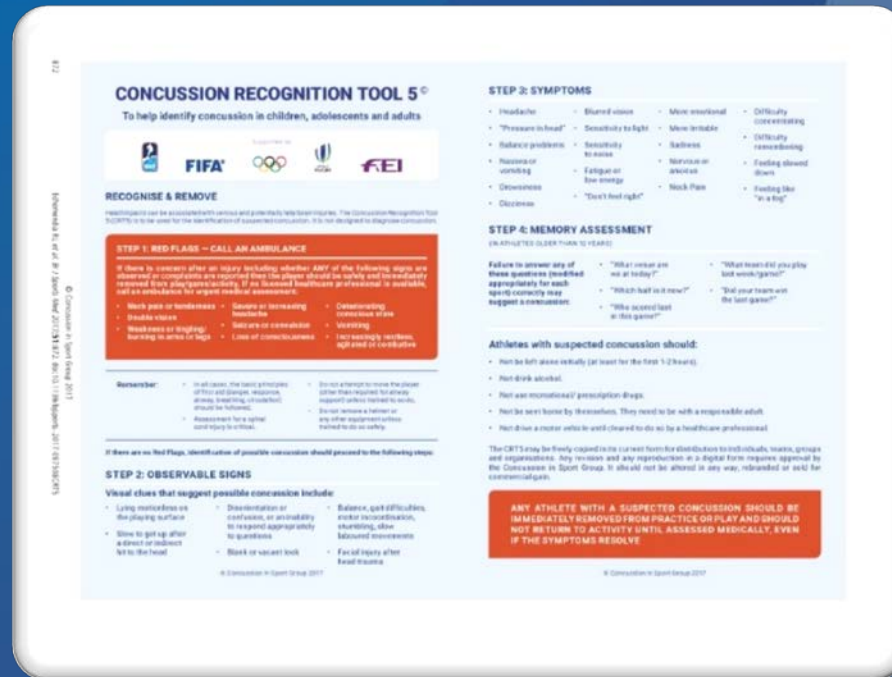
This AIS/AMA website on Concussion in Sport brings together the most contemporary evidence-based information for athletes, parents, teacher, coaches and medical practitioners. Funded by the Australian Government, this site seeks to ensure that all members of the public have rapid access to information to increase their understanding of sport-related concussion and to assist in the delivery of best practice medical care.

Concussion affects athletes at all levels of sport from the part-time recreational athlete to the full-time professional. There has been growing concern in Australia and internationally about the incidence of sport-related concussion and potential health ramifications for athletes.



Website

➤ Tools for recognition by non-medically trained individuals - CRT5

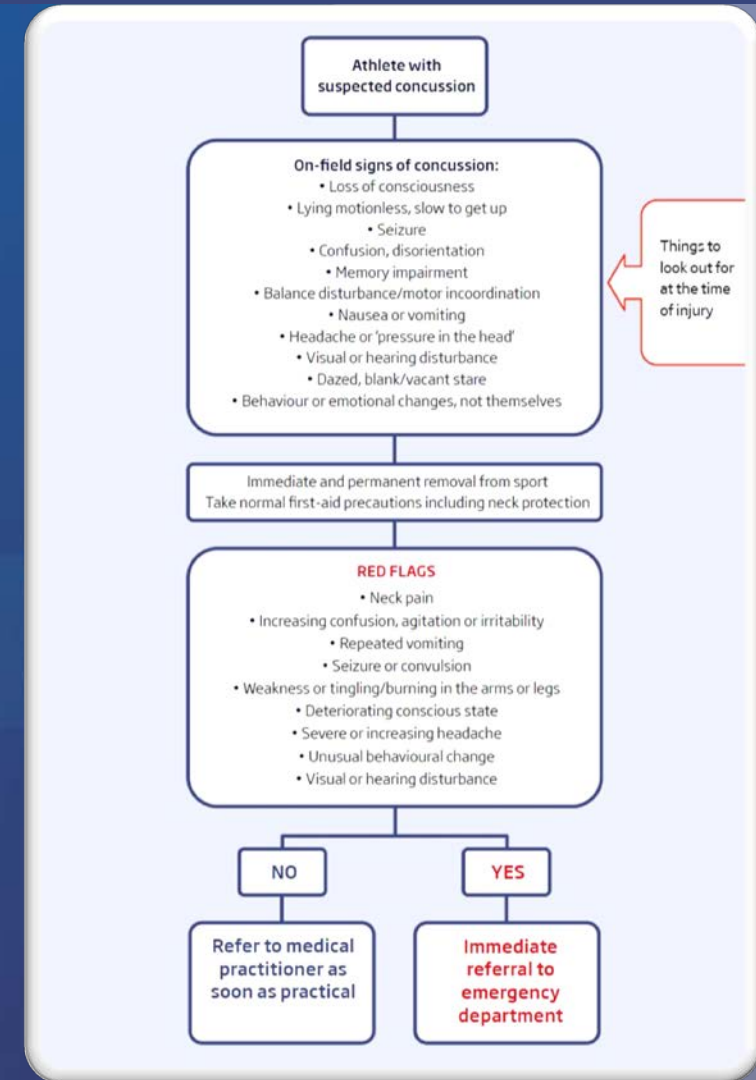


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Concussion in Sport Position Statement

- Recognition & management algorithms
- Non-medical, on-field

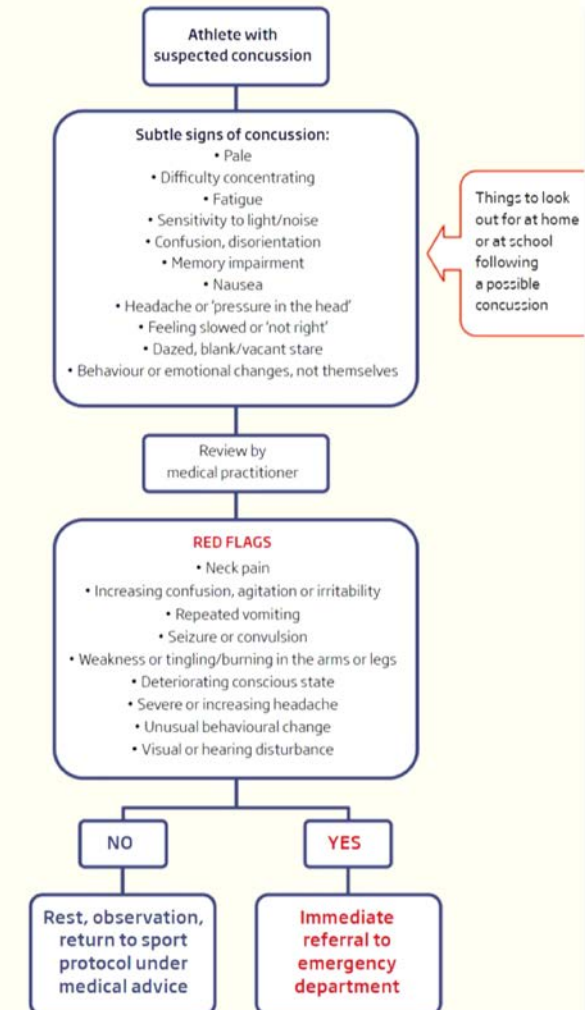


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Concussion in Sport Position Statement

- Recognition & management algorithms
- Non-medical, off-field
- Return to learn guidelines

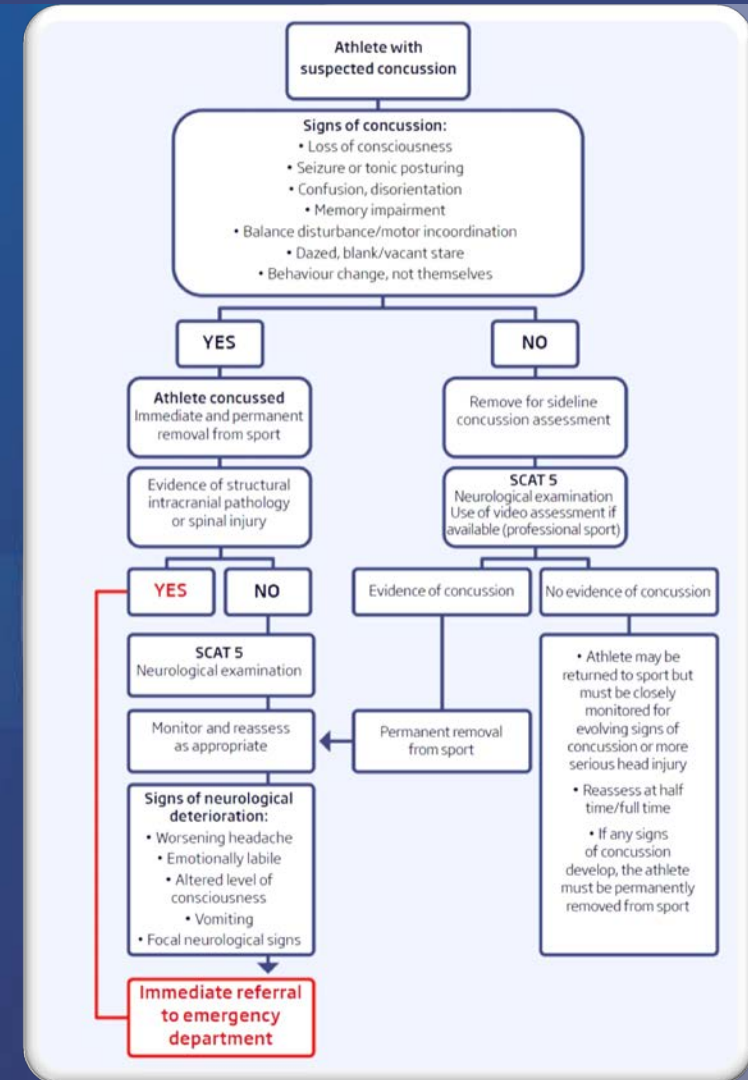


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Concussion in Sport Position Statement

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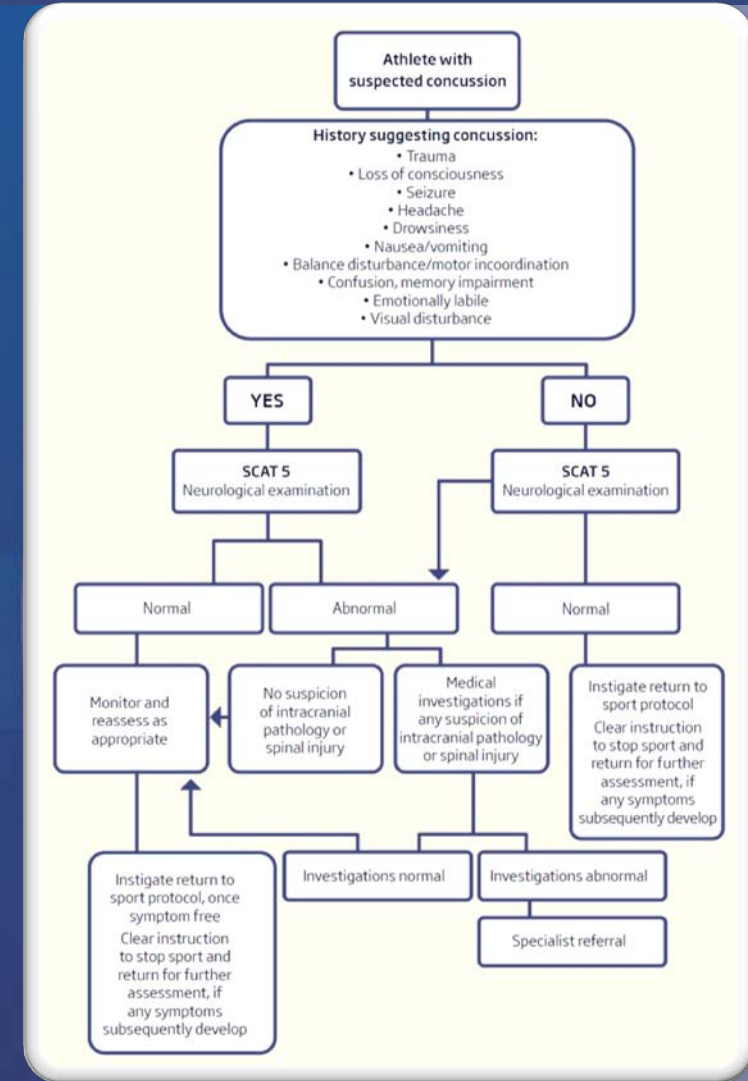


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Concussion in Sport Position Statement

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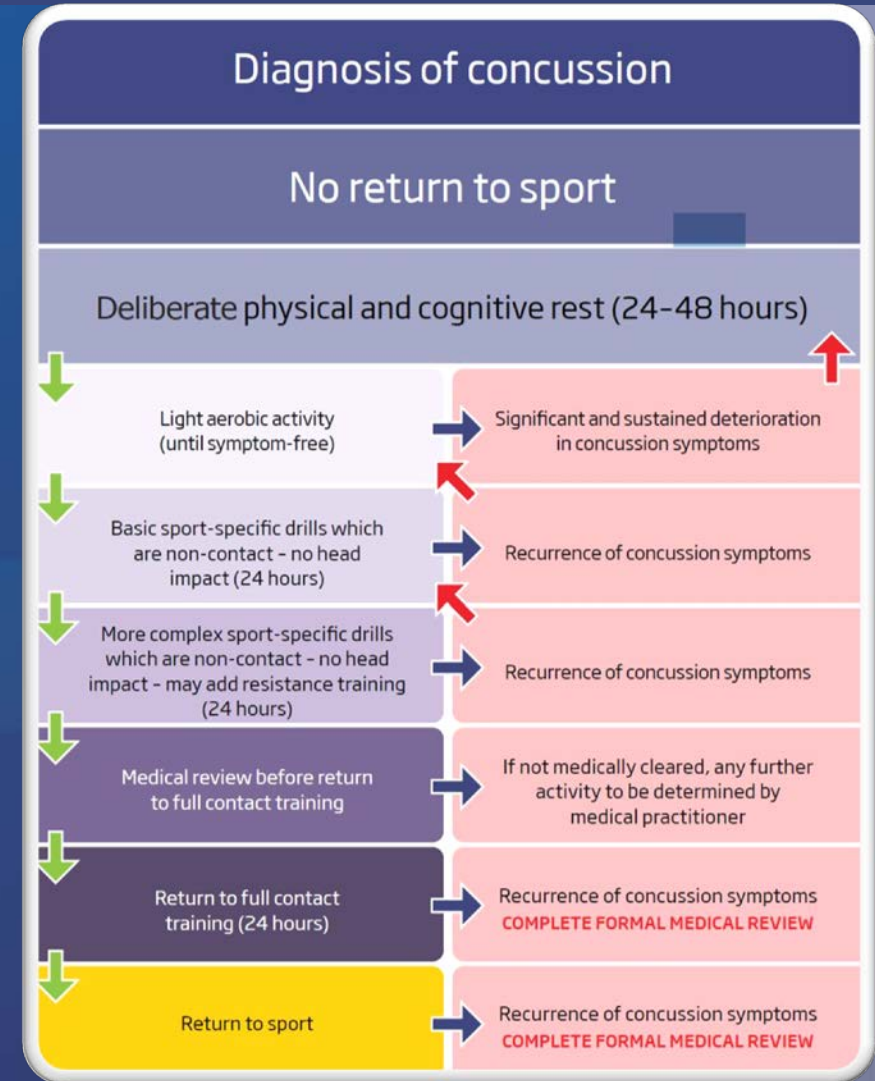


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Concussion in Sport Position Statement

➤ Return to sport algorithm - Adults



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Concussion in Sport Position Statement

- Return to sport algorithm – Children
 - Return to learn before physical activity
 - 14 days symptom free before return to contact activities



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Key best practice messages for concussion management

- If in (any) doubt, sit them out
- 24 - 48 hours of deliberate rest
- Return to moderate activity as long as it doesn't exacerbate concussion symptoms
- Stepwise progression through increasing levels of physical activity
- Final medical clearance before return to full contact
- More cautious RTP in children and adolescents (18 years and under) – 14 days symptom free
- Well-designed, properly controlled, prospective epidemiological studies are required to explore effects of concussion on long term neurological function



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