



CONCUSSION GUIDELINES

EDITION 2017

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11.1 Summary Principles

- Concussion must be taken extremely seriously to safeguard the long-term welfare of athletes.
- Athletes suspected of having concussion must be removed from play and must not resume competition or training.
- Athletes suspected of having concussion must be medically assessed.
- Athletes suspected of having concussion or diagnosed with concussion must go through a graduated return to play protocol (GRTP).
- Athletes must receive medical clearance before returning to play.

11.2 Introduction

Sports Related Concussion (SRC) is considered to be among the most complex injuries in sports medicine to diagnose, assess and manage.

FIS takes Athlete Welfare seriously and aims to follow the World Consensus guidance on Concussion in Sport (Zurich 2008/2012; Berlin 2017). Scientific knowledge in the field of concussion is constantly evolving and the consensus process ensures that the FIS guidance keeps pace with these changes. The guidelines were designed to be used by physicians and other health professionals as well as coaches, team managers, teachers, parents and athletes.

The guidelines are set out to ensure that athletes who suffer concussion are managed effectively to protect their long-term health and welfare.

FIS recommends the following concussion guidelines, which are in line with the 2017 Berlin Consensus statement. We approach this from a conservative and prescriptive angle, according to the Berlin advice. The Pocket Concussion Recognition Tool (PCRT) and Sideline Concussion Assessment Tools (SCAT) that are used to evaluate concussion injuries and guide the recovery process have been updated, and we recommend that the latest versions (SCAT5 and Child SCAT5) are used. NB The PCRT may be used by non-medical personnel; *the SCAT tools are for medical personnel only.*

The FIS guidance is based on the latest international Consensus recommendations. Any deviation from the guidance must be supervised only by medical staff with specific expertise in this field. In practice, the outcomes are often more conservative than those directed in the guidance. For example, the median Return to Play (RTP) time across many sports is normally longer than the recommended 6/7 days.

We recognise that the word lists, processes and assessments contained within the SCAT5 tools are likely to be different in different nations. Medical personnel attending to athletes are encouraged to seek appropriately translated SCAT tools if the injured athlete's main language is anything other than English.

11.3 What is Concussion?

Concussion is a complex process caused by trauma that transmits force to the brain either directly or indirectly and results in temporary impairment of brain function. Its development and resolution are normally rapid and spontaneous.

The majority of Sports Related Concussions (SRCs) occur without loss of consciousness or frank neurological signs.

Concussion is associated with a graded set of clinical symptoms and signs that may evolve over time, and that resolve sequentially.

Concussion reflects a functional rather than structural injury and standard neuro-imaging is typically normal.

Athletes participating in the FIS disciplines may be subject to both direct and indirect forces which may lead to a concussion injury.

11.3.1 Concussion must be taken extremely seriously

Concussion-producing forces (both direct and indirect/transmitted) are common in snow sports; fortunately, most of these do not result in concussion.

There is widespread variation in the initial effects of concussion. Recovery is spontaneous, often with rapid resolution of signs, symptoms and changes in cognition (minutes to days). This could increase the potential for athletes to ignore concussion symptoms at the time of injury or return to play prior to full recovery from a diagnosed concussion. This may result in a more serious brain injury or a prolonged recovery period.

The potential for serious and prolonged injury emphasises the need for comprehensive medical assessment and follow-up until the concussion has fully resolved.

Returning to play before complete resolution of the concussion exposes the athlete to an increased risk of recurrent concussions. Repeat concussion may shorten an athlete's career and has some potential to result in permanent neurological impairment.

Rarely, repeat concussion may have devastating and even life-threatening consequences. Athletes must be honest with themselves and medical staff for their own protection.

We emphasise that concussion is a variable and fluctuating injury, and is often characterised by evolving and delayed signs and symptoms. Athletes suspected of having a concussion injury must be monitored for 48 hours. Onset of symptoms after 48 hours is uncommon.

11.4 What are the signs of Concussion?

The common signs and symptoms indicating that an athlete may have concussion are listed in Table 1 below. If an athlete shows any of the symptoms or signs described in the Table (as a result of a direct blow to the head, face, neck or elsewhere on the body with a force being transmitted to the head) they have suspected concussion.

Table 1: Common early signs and symptoms of concussion

Indicator	Evidence
Symptoms	Headache Dizziness “Feeling in a fog” Disorientation Double vision Vomiting
Physical signs	Loss of consciousness (suspected or confirmed) Impact seizure; tonic posturing Inappropriate playing behaviour, unsteady on legs, No protective action when falling Blank or vacant look Slow to get up Clutching head Balance or coordination difficulties Tinnitus; light/sound sensitivity
Behavioural changes	Inappropriate emotions, irritability, feeling nervous or anxious
Cognitive impairment	Slowed reaction times Confusion/disorientation Poor attention and concentration, Loss of memory for events up to and/or after the concussion
Sleep disturbance	Drowsiness

11.5 Stage 1: Diagnosis and Management of Concussion

What happens if an athlete is injured and has suspected concussion?

11.5.1 Remember the basic rules of First Aid:

Immediate – general assessment for injuries

- i. GCS
- ii. Cervical spine examination
- iii. Maddocks Questions (adapted for the sport, see below)

If the athlete's condition gives significant cause for concern, urgent transport to the nearest hospital must be arranged.

11.5.2 Recognise and Remove

If an athlete is suspected of having concussion, that athlete must be removed from the field of play and must not resume participation.

11.5.3 If in Doubt, sit it out

11.5.4 Continue to Monitor

For signs of deterioration, because concussion is often an evolving injury; the onset of signs and symptoms may be DELAYED (typically within 48 hours of the injury).

11.6 Medical Practitioner and/or Healthcare Professional present

Where an injury event with the potential to cause a head injury or concussion occurs and there is a Medical Practitioner or Healthcare Professional present the athlete will be examined and if any of the signs or symptoms in Table 1 are identified and/or the athlete fails to answer correctly the memory questions in the Pocket Concussion Recognition Tool (PCRT), the athlete **MUST** be removed from the field of play for a comprehensive medical evaluation. An assessment of the athlete's balance should form part of this off-field evaluation. The athlete **MUST NOT** resume participation once removed from the field of play for suspected concussion. It is preferable to remove the athlete from the field of play, or sideline, to a quiet place (e.g. Medical Room) for full assessment, including the SCAT5 assessment (medical personnel only). The athlete should be allowed a period of rest (10 minutes) prior to taking the tests. NB The SCAT5 should not, by itself, be used to make or exclude a diagnosis of concussion. An athlete may have a concussion even if his/her SCAT5 is 'normal'.

11.7 Examples of Memory questions (adapted from the Maddocks questions that were written originally for team field sports):

- At what venue are we today?
- Is this the first or second run?
- Where were you placed after the first run?
- Where were you competing last week?
- Where were you placed in your last competition?

The athlete must be removed in a safe manner in accordance with general emergency management procedures. If a cervical spine injury is suspected the athlete should only be removed by emergency Healthcare Professionals with appropriate spinal care training.

If a Medical Practitioner is present they can use the Sports Concussion Assessment Tool SCAT5 <http://bjism.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf> or other diagnostic tools to assist in the comprehensive medical evaluation of athletes with concussion or suspected concussion. Note that SCAT5 must only be used for athletes aged from 13 years and older.

An athlete suspected of having concussion shall move to Stage 2, the GRTP protocol, irrespective of the subsequent diagnosis.

For the use of Medical Practitioners only, the SCAT5 concussion assessment protocol can be downloaded on

11.8 Medical Practitioner and/or Healthcare Professional not present

If there is no Medical Practitioner or Healthcare Professional present, the athlete who is injured may be disorientated and must not be allowed to make a judgement about their own condition.

Fellow athletes, coaches, Race Officials, team managers, administrators or parents who observe an injured athlete displaying any of the signs in Table 1 after an injury event with the potential to cause a head injury or concussion should ensure that the athlete is removed from the field of play in a safe manner. The athlete must not be left on his or her own and must not be allowed to drive a vehicle. If a medical practitioner is not available on-site the athlete must be referred to a medical practitioner for diagnosis and comprehensive assessment as soon as possible. The Pocket Concussion Recognition Tool (linked under References) can be used to assist in the identification of suspected concussion where a medical practitioner is not present at the time of the incident. Most importantly, if an athlete suffers any of the following:

- a. Shows any of the listed symptoms in Table 1;
- b. Fails to answer any of the memory questions correctly in the Pocket CRT;
- c. Shows a lack of balance, or any of the red flag symptoms listed in the Pocket CRT
- d. There are any concerns that the athlete may have been concussed

If any of these are noted, these concussion management guidelines must be followed. The athlete must be removed from play and referred to a Medical Practitioner or Emergency Department for diagnosis and comprehensive assessment as soon as possible. An athlete suspected of having concussion shall move to the GRTP protocol, irrespective of the diagnosis.

The Pocket CRT is available on
<http://bjism.bmj.com/content/early/2017/04/26/bjism-2017-097508CRT5>

11.9 Onset of Symptoms – may be DELAYED

It should be noted that the symptoms of concussion may present immediately, but may also be delayed (typically in the first 24 – 48 hours) after the incident which caused the suspected concussion.

A monitoring mechanism must be set up to ensure that these delayed symptoms are not missed. All those who have suffered from a confirmed or suspected concussive injury must be repeatedly checked for development of new symptoms, or for signs of progression of symptoms.

11.10 Stage 2 - Return to Play

FIS recommends that there should be a minimum delay of return to play of 7-10 days, and that return to training should only be allowed following clearance by an appropriately experienced medical practitioner.

There is insufficient evidence that rest on its own achieves recovery; after a brief period of rest (24-48 hours) it is reasonable to commence a graduated return to play (GRTP) plan.

Persistent symptoms merit specialist referral:
 >10-14 days adult
 >4 weeks child (U13)

In the case of delayed or abnormal recovery, the athlete must undergo formal neuropsychological testing by a concussion expert.

Generally, the more severe the early symptoms, the slower the recovery.

The times outlined in Table 2 below may exceptionally be expedited, but only if there is access to daily multimodal expert testing.

NB There is evidence that:

- i. children take longer than adults to recover after concussive injuries
- ii. female athletes are more susceptible than males, and may also take longer to recover.

11.11 Graduated Return to Play Protocol

The table below (Table 2) shows a suggested outline for return to play; it must be flexible; it must not be started if symptoms persist, and *if symptoms recur*, the injured athlete must rest for 24 hours before returning to the previous step on the pathway. It is a collaborative process between athlete and medical/coaching staff.

The protocol should commence once symptom-free. The full GRTP process normally takes a minimum of one week, but often requires additional time.

Science is currently incomplete, and it is recognised that clinical judgement on an individual basis is the key to management of concussion and the GRTP protocol.

Table 2: Graduated Return to Play Protocol

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity, minimum 24 hours following the injury where managed by a medical practitioner (otherwise minimum 14 days post-injury)	Complete physical and cognitive rest without symptoms	Recovery
2. Light aerobic exercise during 24-hour period	Walking, swimming or stationary cycling keeping intensity, <70% maximum predicted heart rate. No resistance training. Symptom free during full 24-hour period.	Increase heart rate
3. Sport-specific exercise during 24- hour period	Running drills. No head impact activities. Symptom free during full 24-hour period.	Add movement
4. Non-contact training drills during 24- hour period	Progression to more complex training drills, e.g. passing drills. May start progressive resistance training. Symptom free during full 24-hour period.	Exercise, coordination, and cognitive load
5. Full Contact Practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6. After 24 hours return to play	Player rehabilitated	Recovered

There may be extreme situations where an athlete does not have access to a Medical Practitioner to diagnose concussion or to manage the GRTP. In these situations, if an athlete has shown any signs of concussion, that athlete must be treated as having suspected concussion and must not play until at least the 21st day after the incident. An attenuated GRTP schedule should be followed. Other athletes, coaches and administrators associated with the athlete should ensure that this process is followed.

Final written clearance to return to play by a Medical Practitioner should always be sought, as directed by local laws and regulations.

11.12 Children & Adolescents

Whilst the guidelines apply to all age groups, particular care needs to be taken with

children and adolescents due to the potential dangers associated with concussion in the developing brain.

An initial period of a few days of both physical and cognitive rest is recommended before starting the return to studies / return to play protocols.

Children under 13 years of age may display unusual concussion symptoms and should be assessed by a Medical Practitioner using appropriate diagnostic tools. Children (5-12 years) and adolescents (13 – 18 years) with suspected concussion MUST be referred to a Medical Practitioner immediately.

Additionally, they are likely to need specialist medical assessment. The Medical Practitioner responsible for the child's or adolescent's treatment will advise on the return to play process, however, a more conservative Graduated Return to Play approach is recommended – this must be preceded by a graduated return to studies/school (see SCAT5 CHILD, and Table 3 below). They should complete the Return to School protocol before progressing to Stage 4 or 5 of the GRTP protocol. It is appropriate to extend the amount of time of asymptomatic rest and /or the length of the graded exertion in children and adolescents.

Children and adolescents must not return to play without clearance from a Medical Practitioner.

For the use of Medical Practitioners only, the SCAT5-CHILD concussion assessment protocol can be downloaded from:

<http://bjism.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097492childscat5.full.pdf>

Table 3: Return to School Strategy

Stage	Aim	Activity	Goal of each step
1	Daily activities at home that do not give the student\athlete symptoms	Typical activities during the day as long as they do not increase symptoms (i.e. reading, texting, screen time). Start at 5\15 minutes at a time and gradually build up.	Gradual return to typical activities
2	School activities	Homework, reading or other cognitive activities outside of the classroom	Increase tolerance to cognitive work
3	Return to school part-time	Gradual introduction of schoolwork. May need to start with a partial school day or with increased breaks during the day.	Increase academic activities
4	Return to school full-time	Gradually progress	Return to full academic activities and catch up on missed school work

11.13 Recurrence of symptoms during GRTP process - 24 hours' rest before restarting protocol at the previous step

It is recognised that athletes will want to return to play as soon as possible following a concussion. Athletes, coaches, management, parents and teachers must exercise caution to:

- i. Ensure that all symptoms have subsided
- ii. Ensure that the GRTP protocol is followed
- iii. Ensure that the advice of Medical Practitioners is strictly adhered to

In doing so, all concerned can reduce the risks to an athlete's career longevity and long term health.

11.14 Return of Symptoms

All involved in the process of concussion management must be vigilant for the return of symptoms (including depression and other mental health issues) after a concussive incident, even if the GRTP has been successfully completed. If symptoms recur, the athlete must consult a Medical Practitioner and those involved in the process of concussion management and/or aware of the return of symptoms must do all they can to ensure that the athlete consults a Medical Practitioner as soon as possible.

11.15 Residual Effects & Sequelae

The many and various post-concussion symptoms that are recognised include (but are not limited to) the following:

- i. Depression
- ii. Cognitive impairment
- iii. Anxiety
- iv. Headache
- v. Sleep dysfunction
- vi. Post-traumatic stress disorder (PTSD)
- vii. Chronic Traumatic encephalopathy (CTE)

Ensuring complete recovery after any incident of concussion is the best way to lessen the risk of long-term sequelae.

12. Useful Links

1. Berlin Consensus Statement 2017
<http://bjsm.bmj.com/content/51/11/838>
2. SCAT5 2017 (Physicians only)
<http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf>
3. SCAT5 CHILD 2017 (Physicians only)
<http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097492childscat5.full.pdf>
4. PCRT 2017
2. SCAT5 2017 (Physicians only)
<http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf>
3. SCAT5 CHILD 2017 (Physicians only)
<http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097492childscat5.full.pdf>
4. PCRT 2017
<http://bjsm.bmj.com/content/early/2017/04/26/bjsports-2017-097508CRT5>

Please note that these tools are designed to be used in English speaking nations; the process of transposing them into the other major language groups is under way, and appropriate versions should be used

Many sports have developed on-line resources for professional development and education in concussion, for athletes, coaches, parents and spectators, as well as for medical personnel. One of the best is: <http://concussioninsport.gov.au>

FIS Concussion Guidelines – July 2013