

CONCUSSION MANAGEMENT PROTOCOL

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A **CONCUSSION** is a disturbance in the functioning of the brain caused by direct trauma to the head, face or neck; or following a blow elsewhere on the body that transmits an “impulsive force” to the head. This results in the rapid onset of a short-lived impairment of neurologic function that resolves spontaneously. There may or may not be a loss of consciousness (LOC), but frequently there is **retrograde** amnesia which is difficulty recalling events immediately prior to the injury, and/or **anterograde** amnesia which is difficulty recalling events that occur following the concussive injury. Athletes suffering from a concussion can display a wide variety of signs and symptoms, some of which can be very subtle. Resolution of clinical and cognitive symptoms typically occurs gradually, over a 7-10 day period, but research shows that it typically takes the brain 22-30 days to fully recover. Some athletes may also have a more prolonged recovery.

There is currently no way to predict this in advance. It is also common that further (new) concussive injuries can cause the same or worse symptoms, with increasingly less force – especially if the athlete returns to training/competition before the brain is fully recovered.

POST CONCUSSIVE SYMPTOMS

Post concussive symptoms can be physical, cognitive and emotional.

Physical or “somatic” symptoms – include headache, nausea, and dizziness, ringing in the ears, double vision or other visual disturbances.

Cognitive symptoms – include confusion, amnesia, disorientation, poor concentration, memory disturbance.

Emotional symptoms – include depression, moodiness, anger, easy irritability.
There can also be problems with coordination and balance (vestibular function).

PRE-SEASON ASSESSMENT

All athletes shall undergo a **pre-season medical and physiotherapy examination**, which will include **baseline occulo-vestibular screening** (balance testing), a **SCAT5 test (Standardized Concussion Assessment Tool)** and neurocognitive testing with the computer-based **ImPACT test (Immediate Post-concussion Assessment and Cognitive Tool)**. SCAT 5 and ImPACT should be re-evaluated, i.e., base-line screening, every preseason.

The ImPACT test includes demographic information and a detailed concussion history which contains questions about previous head injuries, loss of consciousness, and amnesia, as well as time-off from training or snowboarding due to concussion. There are also very specific questions about cognitive, physical and emotional symptoms.

It is important to identify athletes who are not fully recovered from previous concussions, as they are more vulnerable for recurrent injury, persistent post-concussive symptoms, cumulative neurological problems, and potentially even injuries that are life-threatening.

ACUTE INJURY MANAGEMENT FOR CONCUSSION

When possible, a physiotherapist (PT) will be on-site for formal training and competitions, and on occasion, a team physician (MD). Should a crash or head injury occur, the injured athlete will be evaluated as soon as possible, in cooperation with local medical and paramedical staff. Athletes with a suspected concussion should be escorted by a teammate, coach or responsible adult to a physician.

If an athlete is suspected of sustaining a more severe head or spine injury during a training or competition, an ambulance should be called immediately to transfer the patient to the nearest emergency department for further medical assessment.

Where a team physician is not present, the physiotherapist will evaluate any athlete suspected of having a concussive injury at training or competition venues, and then bring that athlete to the attention of one of the event physicians at the venue. The Medical Lead should be notified of the injury at the first available opportunity. He/she may also be contacted as necessary, for further instructions about ongoing management. The team physician should also be contacted **PRIOR** to making travel arrangements to return home.

If no member of the medical team is present, COACHES should report any suspicion of a concussion to the medical team or event physician.

An experienced certified athletic therapist, physiotherapist or medical doctor providing medical coverage for the sporting event may make the determination that a concussion has not occurred based on the results of the sideline medical assessment.

However, athletes **CANNOT** be cleared to return to training/competition by paramedical staff or team coaches.

Any athlete who is thought to have suffered a concussive injury (even if the incident is not

witnessed) will be withdrawn from that competition or training session, and shall undergo a formal medical evaluation as soon as possible. Any athlete complaining of headache, nausea, change in vision, ringing in the ears, confusion, or dizziness; or displaying poor coordination, poor balance, difficulty answering questions or easy distractibility, should be immediately brought to the attention of the physician and physiotherapist.

It is critical that any athlete suspected of having a concussion not be left alone. He/she should be carefully monitored for any signs or symptoms of deterioration in the immediate post-injury period.

In the event of a structural brain injury, signs and symptoms may include: increasingly severe headaches; decreasing level of consciousness; increasing tiredness and confusion; lateralizing (to one side) weakness; or persistent vomiting. **Any one of these symptoms requires emergency assessment.** Neuro-imaging (CT or MRI) may be indicated. In such cases, if these tests are performed whilst undertaking travel, it is important to obtain copies of the reports as well as a CD with the images on it to bring back with the athletes for the Canada Snowboard medical leads.

POST INJURY MANAGEMENT

The cornerstone of concussion management is **relative rest** until complete resolution of all symptoms. This includes both **physical and cognitive or mental rest**. Athletes should therefore remain in a quiet environment and avoid excessive exposure to stimulation such as television, computer, video games or text messaging. Meditation has been shown to help in recovery from concussion. It is important to realize that resting too long, more than 2-3 days, may prolong concussion symptoms and that a step wise gradual activation of symptom free activity is recommended by the Berlin Consensus Statement.

Athletes should avoid sleeping pills, e.g., imovane, restoril, xanax, halcion; anti-inflammatory medication, e.g., aspirin, ibuprofen, aleve; and narcotics or other analgesics within the first 48 hours of concussion, and only use thereafter based on physician recommendations.

RETURN TO SNOW & RETURN TO COMPETITION PROTOCOL (RTS, RTC)

We will be using the return to play guidelines from the **Consensus Statement on Concussion in Sport from the Fifth International Conference on Concussion in Sport, Berlin 2016**. This is a step-wise process, each step being separated by a minimum of 24 hours.

The return to snowboarding progression is begun once the athlete has been off all medications and completely symptom-free for a minimum of 24 hours.

Progression to the next step only occurs if the athlete is completely asymptomatic at the current level. With any recurrence of even one of the concussive symptoms, the athlete should drop back to the previous asymptomatic level.

MODIFIED SIX (6) STEP PROGRESSIVE RETURN TO TRAINING/COMPETITION

Canada Snowboard (CS) practices collaborative medical management of concussion. The medical doctor (MD), physiotherapist (PT), neuropsychologist (NP), coaches, and athlete all work together to progress the athlete through the concussion protocol and safely return them to snow. If the athlete is diagnosed with a concussion and progresses into the 6 step Return To Play, it is Canada Snowboard's protocol that the MD, PT and NP (if applicable) collaborate in an ongoing manner, and all must recommend clearing the athlete to return to snow. The coaches and athlete then need to clear for return to competition based on how the athlete performs once back on snow. Please contact the relevant medical lead, either Dr. Karin Kausky, Dr. Rod French, or Dr. Paddy McCluskey, via email and telephone, and c.c. the lead physiotherapist if a concussion occurs to ensure transparency in the information sharing process.

Notes:

- Each of these steps should be separated by at least 24 hours. Unless there are specific recommendations, the athlete must be completely asymptomatic at each stage in order to progress to the next stage.
- If there are ANY concussion-like symptoms during any one of the stages, drop back to the previous stage for another 24-hour asymptomatic period before attempting that stage again.
- Each stage with two stars (**) represents a stage that must be carried out in the clinic and/or gym, and is under supervision of one of or combination of the MD, PT or qualified S and C coach.

STEP 1a Recognize the concussion.**

If there is a mechanism of injury and/or there are signs and symptoms that indicate concussion, remove the athlete from play immediately.

STEP 1b Assessment followed by Relative Rest. (No Sport) **

Traveling PT and/or MD if available performs thorough concussion assessment. There are daily symptom score sheets in the PT kit bag which should be used daily for monitoring the athlete. There is a complete spreadsheet of baseline SCAT 5, mini Vestibular Ocular (VOMS) and IMPACT scores available on the team database or through the physicians or paramedical coordinator. At this stage it is very important to thoroughly educate the athlete on the nature of injury and need for progressive safe return to sport to avoid second impact injury or long term consequences. Research shows education and re-assurance are key in management and subsequent recovery from a concussion.

During this phase, instruct the concussed athlete that they:

- Do not engage in physical or mentally stimulating activity: restrict reading, texting, watching TV, movies, playing video games, computer work, driving and no unprescribed drugs or alcohol.
- Can go on a light 20-minute walk each day, do basic non-strenuous daily tasks, listen to light music, meditation or mindfulness, do light stretching, are allowed short rides as

a passenger in a car, and are to sleep appropriately. Avoiding anything that increases symptoms.

Emerging evidence suggests that more than 3 days of complete rest may delay recovery. If symptoms continue beyond a few days, further visual, vestibular and cervical assessment is likely needed to assess their involvement and to direct further management.

GOAL: Allow the concussed brain to rest and recover. The brain has an energy imbalance caused by the concussion and is low in energy stores and just like any injury requires a downtime to start to recover.

STEP 2 Light cognitive activity

PT monitors and introduces treatment for cervical spine and easy visual and vestibular if indicated.

During this phase:

- Brief periods of computer work, catching up on emails, reading a book, or watching TV (30-45 mins max even if feeling good.)
- Take regular brain breaks and switch between doing and thinking tasks, continue to go for light walks. Important to get on a regular sleep schedule, around 7 to 8 hours, and to minimize naps (not greater than 20 mins).
- Perform vestibular-visual rehab with PT if indicated.

Emerging evidence suggests no more than 2 weeks of rest, if already completed minimum rest period. Minimizing educational/work time loss with accommodations generally improves outcome.

GOAL: Resume normal everyday activities like texting, reading, watching tv, light activities of daily living without over stressing the brain. Once able to do 45 minutes of mixed activity without symptoms progress to Step 3.

STEP 3 Light physical activity **

Validated Graded Exertion treadmill/bike test (monitored by PT/ S & C coach). Bike test can use modified YMCA bike test or Buffalo Treadmill test if treadmill available.

If **any** symptoms are provoked, stop the test and record symptom threshold and then exercise at 80% of the symptom induced heart rate to build aerobic tolerance.

Do not produce symptoms of more than 3 point increase on overall condition score ranking from 0-10, from the baseline at start of exertion test (as per Buffalo Treadmill test protocol) until more than 14 days post concussion.

Gradually build aerobic tolerance and improve % heart rate symptom free to 85% prior to progressing to step 4.

GOAL: To set a threshold parameter to start aerobic conditioning without creating symptoms and/or to be able to tolerate 85% of the predicated heart rate maximum with no symptoms. This means the brain is receiving adequate blood flow and starting to recover enough to be able to tolerate exercise induced stress.

STEP 4a Sport relevant off-snow training **

PT continues treatment and monitoring as indicated.

During this phase:

- Return to the gym for more intense dry land training / weight exercises. Athlete can do individual drills like light hopping/sliding and agility. Do not involve athlete in any drills, which have the potential for contact. Keep the intensity low to moderate.

STEP 4b Increase intensity of sport relevant off-snow training

GOAL: Challenge the brain and the body with increased physical and cognitive intensity using sport specific positions and dynamics in readiness for step 5, and Step 6 (return to snow).

STEP 5 Ongoing/Re-assessment, High intensity aerobic and agility **

Exertion and movement testing & re-testing of baseline / Physician for clearance for snowboarding.

PT re-test Scat 5, VOMS and exertion test such as the modified Blackhawks test, as developed by Complete Concussion Management. If zero symptoms, re-test IMPACT, against pre-injury test and then review findings with the Doctor (and NeuroPsychologist if involved). The athlete will consult one on one with the MD if at home.

This protocol involves intense physical exertion. Please advise the athlete and monitor accordingly. Pass only if concussion symptoms are not provoked.

Notes:

- Modified Blackhawks Test (developed by Complete Concussion Management) provided to Integrated Support Team in separate file.
- Impact website is impacttestonline.com and go to Canadian customer. Log in will be provided if this step is needed by the traveling PT and they do not have one.
- Medical staff needs to sign off that they have cleared the athlete for return to snow and that the athlete has been fully advised of risks of re-injury.
- Athlete signs off that they have been cleared and advised as well.
- If the team chooses not to follow all of the protocol steps then the reason for doing so

needs to be documented.

GOAL: Tolerate high intensity physiological stress/exercise and plyometric/jumping movement patterns similar to those which occur with snowboarding without concussion symptoms, recover cognitively to prior baseline to allow for medical clearance for return to snow.

STEP 6a Return to Snow (RTS) **

Once medically cleared, the athlete is allowed to participate in riding practice.

GOAL: Demonstrate ability to ride to full ability (same as prior to concussion) without any signs or symptoms of concussion.

Final clearance for full return to snowboarding competition (RTC) by coaches and athlete and medical team (if needed).

STEP 6b Full return to competition

The athlete will then sign an informed consent letter acknowledging that they were explained the risks and willingly accept that risk upon returning to high-risk sport training and competition. (See attached example.)

NOTE: When necessary an outside medical doctor may be asked to provide counselling on the risks of return to play and possible effects on cumulative concussions to an athlete returning to snow.

Checklist prior to Return to Snow:

- Medical Doctor (MD)
- Physiotherapist (PT)
- 3rd party independent physician consult, if applicable
- Neuropsychologist (NP), if applicable
- High Performance Director (HPD)
- Athlete informed consent signed
- Coach

Additional Details:

- With this protocol, it will take a minimum of one week following complete resolution of symptoms before an athlete is able to return to his/her full activities.
- Assessment and follow-up "on the road" can be done by the physiotherapist, using the SCAT5 and the vestibular screening protocol. Repeat neurocognitive testing (ImPACT)

may be performed once the athlete is completely symptom free after step 4 and the athlete will require medical clearance before moving onto 'Step 6a - Return to Snow'.

- Most athletes with concussion will typically easily progress through these steps over 7-10 days. An athlete with a concussion where the athlete suffers persistent symptoms, specific sequelae, or prolonged cognitive impairment, or an athlete who has suffered multiple concussions, may require a prolonged period of asymptomatic rest ('Step 1b') as well as more time at each of the subsequent steps in the progression. In this case, a NeuroPsychologist's (NP) involvement will usually be sought and follow up neuropsychology testing will take place.
- If the athlete has returned home and has to remain away from training and competition for some time, he/she should be followed on a regular basis by an IST member who will be designated as the "Case Manager". This could be the team physiotherapist or Medical Lead, but this person should be clearly identified, and should keep other IST members and the coach up-to-date on the athlete's progress, treatment and recovery. This process can be facilitated through the Canada Snowboard office.
- Other therapies that can be done at the same time include rehabilitation of any cervical (neck) symptoms, as well as visual and vestibular (balance) exercises and graded exertion therapy. Any athlete with persistent "somatic" symptoms after two weeks should be thoroughly re-evaluated. This may involve referral to a clinical neuropsychologist for more in-depth testing, and/or to a specialist in concussion (neurologist or neurosurgeon) for further management guidelines.



Appendix A

Return to Snowboarding following a Sport-Related Concussion

Athlete Informed Consent Acknowledgement Letter

Date:

Athlete Name:

Address:

Dear Athlete,

We are pleased that you are making good progress in recovery from your concussion and that you have remained symptom free in all post-concussion testing so far. Your post-injury testing looks good in comparison to your baseline tests. It is now safe for you to return to the sport-specific component of your monitored return to play protocol.

A member of our sport concussion medical team has discussed with you the risks associated with returning to high-risk sport. You have indicated that despite the risks, it is your desire to return to unrestricted sport participation.

The long-term risk and effects of multiple concussions is something that is difficult to predict. We don't know how many concussions a person can experience before there may be some permanent brain damage. We do know that some individuals never fully recover after one or two concussions, and that others can have multiple concussions with apparent full recovery. We do know that with each successive concussion, there may be an increased risk that the next concussion may take longer to recover from, or might not result in a full recovery.

In addition to the above, we know that the risk of persistent symptoms, permanent impairment, or in rare circumstances, death, is increased if an individual experiences another concussion before their current concussion has recovered. This is why we go to such great lengths to ensure that your concussion has recovered (to our best ability) before you return to your sport.

In your individual situation, you have the following features which may place you at higher risk of recurrent injury, prolonged concussion-like symptoms, or incomplete recovery, i.e., decline in cognitive function such as thinking, calculating or reasoning if you experience

another concussion. These features are:

1. You have now had at least _____ documented concussions.
2. _____ of your concussions have had a prolonged recovery (more than 14 days in adults or longer than 1 month if under 18 years).

By signing this letter, you indicate that you understand that you are returning to a high-risk sport and that because of your past concussive history, you have increased risk personally, and that you willingly accept that risk.

Sincerely,

Sport Concussion Consulting Physician

Medical Team Representative: _____

Medical Team Signature: _____

Athlete Name: _____

Athlete Signature: _____

Parent / Guardian Name (if under 18 years): _____

Parent / Guardian Signature (if under 18 years): _____