

# Guidelines for Athletes

## 1. What is a Concussion?

A concussion is the most common form of head injury suffered by athletes. A concussion can be caused by a direct or indirect hit to the head or body (for example, a hard tackle or check). This causes a change in brain function which results in a variety of symptoms (see below). With a concussion there is no visible injury to the structure of the brain, meaning that tests like MRI or CT scans appear normal.

## 2. What actually happens?

When an athlete suffers a concussion, the brain suddenly shifts or shakes inside the skull and can knock against the skull's bony surface. A hard hit to the body can result in an acceleration-deceleration injury when the brain brushes against bony protuberances inside the skull. Such forces can also result in a rotational injury in which the brain twists, potentially causing shearing of the brain nerve fibres.

In the minutes to days following a concussion, brain cells remain in a vulnerable state. New research emphasizes that the problem may not be the structure of the brain tissue itself but the abnormality causes functional damage of the brain cells, i.e. how they work. The exact length of this period is unclear, but the brain temporarily does not function normally and during this time it is more vulnerable to a second head injury.

## 3. How do concussions occur?

Most concussions occur as a result of a collision with another object while the person is moving at a high rate of speed. When the person comes into sudden contact with arena glass or boards, opponent, stick or the ground direct trauma may result. Forces such as these (and others) can result in deceleration and rotational concussive injuries.

## 4. Who to tell?

It is extremely important to seek medical advice after any blow to the head or body in which you suffer signs and symptoms of a concussion. Often, concussions in athletes can go untreated (and even unnoticed by others) because few symptoms are visible to casual observers. Many times the symptoms of a concussion may not be identified until the athlete recovers to the point where increased exertion causes symptoms to worsen. In fact, 4 out of 5 professional athletes do not even know that they have been concussed (Delaney et al, CJSM 2001)

Although symptoms may not be immediately apparent, it is important to be aware of possible physical, cognitive and emotional changes. You can never be too careful! Symptoms may actually be worse later the same day of an injury or even the next day.

Athletes may be reluctant to report symptoms of concussion because of a fear that they will be removed from the game, or that it may jeopardize their status on a team or adversely affect promising careers. But, it is important to consider the permanent repercussions of a concussion. Without proper management, a concussion can result in permanent problems and seriously affect one's quality of life.

It is important to tell a family member, friend, teammate, trainer or coach if you think you have had a concussion. Memory loss or amnesia associated with the trauma is one hallmark of a concussion and some people may forget that they were injured until after the diagnosis is established. However if the athlete is aware of the signs of concussion, informing someone will help assure proper medical care. If you think you have had a concussion, you should immediately remove yourself from the game or practice.

## 5. Symptoms of a concussion

Following a concussion the athlete may experience many different kinds of symptoms. Contrary to popular belief most concussions occur without a loss of consciousness (LOC). It is not yet known exactly what happens to brain cells in a concussion, but the mechanism appears to involve a change in chemical function. It is important to remember that some symptoms may appear right away and some may show up later. Symptoms may be a little different for everyone although certain combinations of symptoms classically occur. Some may be subtle and may go unnoticed by the athlete, team medical staff or coaches. Also, some symptoms may be attributed to any accompanying neck strain, scalp bruises and other injuries, not just the brain injury. \*\*LOC is not necessary for the diagnosis of a concussion, but if it occurs there should be professional help called immediately.

### Some symptoms and signs include:

Symptoms	Signs
<ul style="list-style-type: none"> <li>• Nausea, vomiting</li> <li>• Dizziness</li> <li>• Confusion</li> <li>• Fatigue</li> <li>• Light headedness</li> <li>• Headaches</li> <li>• Irritability</li> <li>• Disorientation</li> <li>• Seeing bright lights or stars</li> <li>• Feeling of being stunned</li> <li>• Depression</li> </ul>	<ul style="list-style-type: none"> <li>• Difficulty concentrating</li> <li>• Inappropriate playing behaviour</li> <li>• Decreased playing ability</li> <li>• Inability to perform daily activities</li> <li>• Reduced attention</li> <li>• Cognitive and memory dysfunction</li> <li>• Sleep disturbances</li> <li>• Vacant stare</li> <li>• Loss of bowel and bladder control</li> </ul>

Other more “vague” symptoms that are described include “head rush”, “lack of focus”, mood changes, feeling “slowed down” and feeling “not myself”.

## **6. Screening and Diagnosis**

Concussion is a common occurrence and usually resolves uneventfully. A concussion always has the potential to cause serious harm and always needs to be checked by a medical doctor. If symptoms are not gone in 10 days (simple concussion), further consultation by a concussion expert is recommended (complex concussion).

A number of concussion-grading systems have been proposed but consensus is that none can be supported or endorsed because none are based on scientific evidence. Severity is probably impacted by a number of factors. For example severity may be impacted by the athlete’s history of previous head injuries. These may lead to a different, slower recovery, which is why concussion history should always be monitored. Return to exertional activity or play while still concussed and symptomatic may also prolong recovery.

Diagnosing a concussion may take several steps. Your doctor may ask questions about your concussion and sport history, the most recent injury and will conduct a neurological exam. This can include checking your memory and concentration, vision, coordination, reflexes and balance. Your doctor may request further tests:

Computerized Tomography (CT scan)- CT is fast, patient friendly and has the ability to image a combination of soft tissue, bone, and blood vessels. It is a sophisticated X-ray machine linked to a computer to produce detailed, two-dimensional images of the athlete’s brain. The athlete lies still on a movable table that is guided into a large X-ray machine where the images are taken. A CT scan is painless and usually takes around 10 minutes.

Magnetic Resonance Imaging (MRI) - An MRI uses magnetic fields and radio waves to generate images of the brain. The athlete lies inside a cylindrical machine for 15-60 minutes while images are made. This technique is also painless.

In the majority of sport related concussions there will not be any obvious damage found on these tests. At times they can be important to assess for other skull or brain injury but in general they currently have little to add to concussion management.

More important is the role of neuropsychological testing. This testing may identify subtle cognitive (i.e. memory, concentration) problems caused by the concussion and may at times help to contribute to return to play decisions. In addition, balance testing may be required. Ideally, neuropsychological and balance testing should have been done in “baseline” in your preseason medicals for good comparison.

## **7. When should I return to play?**

A concussed athlete will be removed from play immediately and should be assessed by a medical doctor. Under NO circumstances should a player be returned to competition when concussed. Because symptoms may worsen later that night and next day, you should not return to the current game or practice. When concussed, your decision-making about this may not reflect the best judgment! Post-concussive symptoms may increase with increase in activity so it is important that return to play is gradual.

## **Return to Play Steps**

The return to play process is gradual, and begins after the medical doctor has given the player clearance to return to activity. If any symptoms/signs return during this process, the player must be re-evaluated by a physician. No return to play if any symptoms or signs persist. Remember, symptoms may return later that day or the next, not necessarily when exercising!

Step 1. No activity, only complete rest. Proceed to step 2 only when symptoms are gone.

Step 2. Light aerobic exercise, such as walking or stationary cycling. Monitor for symptoms and signs. No resistance training or weight lifting. Progress to increased intensity and duration as tolerated (ie no symptoms next day!).

Step 3. Sport specific activities and training (e.g. skating).

Step 4. Drills without body contact. May add light resistance training at Step 3 or 4 and progress to heavier weights.

The time needed to progress from non-contact to contact exercise will vary with the severity of the concussion and the player. Go to Step 5 after medical clearance.

Step 5. Begin drills with body contact.

## **Step 6. Game play.**

\*\*Note: Players should proceed through return to play steps only when they do not experience symptoms or signs. Remember these are steps, not days! It may take more than one day to progress from one step to the next especially if symptoms have lasted for a while. If symptoms or signs return, the player should return to the previous step, and be re-evaluated by a physician.

## **Never return to play if symptoms persist!**

## **8. Coping with symptoms**

The best medical management for a concussion is rest. An athlete who has suffered a concussion may often feel lethargic and tired. It is important to admit this fatigue to yourself. Your brain is telling you that you need rest and it is extremely vital to listen to it. If you continue pushing

yourself and struggling on, it is likely you will make yourself worse and less able to cope.

The first thing to fail when you get tired is your concentration. If there is something important to get done, it is best to complete it when you are fresh after resting. When your attention starts to fade you may need to stop, rest again and write down the important things for later.

Many patients who have suffered a concussion often complain of being very irritable. You may find that things that would not normally annoy you suddenly do. Patients sometimes find themselves losing their temper, snapping at family members or teammates and being very annoyed over things. This may be because one's own self-control needs a fresh, working brain as well. In order to cope with this you need to be aware of emotions. Some athletes have learned personal relaxation methods such as imagery and progressive relaxation methods to optimize their coping skills.

Other symptoms such as dizziness and clumsiness appear because the brain is reacting slowly and less efficiently. Concussions can upset balance organs in the ear resulting in vertigo. The only way to deal with these types of symptoms is to take special care in actions. Move slowly and constantly be aware of your surroundings

Other problems such as noise sensitivity and visual changes are also the product of a concussion. Putting up with noise and bright lights needs brain energy and you may find that you do not have the energy level to do so. You may be around a loud radio, bright lights or a stimulating environment and find yourself suffering from bad headaches. One answer to coping with this is to avoid loud noise and bright lights as much as possible. Many people find it helpful to wear sunglasses everywhere, even indoors.

When dealing with other symptoms it is crucial to only take medications that your doctor has prescribed or approved of. Also, do not drink alcohol until you have recovered fully. It may hinder the recovery and can put you at risk for further injury. Remember, although in most cases symptoms resolve spontaneously usually in a couple of weeks, in some cases the process of healing from a concussion may take a considerable amount of time. It is important to pace yourself and increase gradually. Make sure you can cope before making any changes and also consult with your family or friends before making any important decisions.

## **9. Coping with emotions**

When coping with a concussion it is not uncommon for the athlete to become overwhelmed by a variety of emotions. Often times the athlete feels concerned, anxious and sometimes depressed. The first part of the healing process is knowing that these emotions are normal. After an injury, most athletes go through an initial stage of denial or disbelief. You may refuse to believe that you are injured or unable to participate in your selected sport. It is extremely tough to realize that after sustaining a concussion your body may not be able to respond as it did before. Other emotions such as anger and depression are also common when suffering a concussion. You may find yourself being angry and displaced and you may blame others for your injury. It is quite common to become very angry at your teammates, coaches, staff, family and friends. And, as

you continue to become more aware about the extent of your injury depression may set in. This may include self-pity, crying, insomnia, etc. Because professional athletes are playing in a popular sport it gives them a large source of self-esteem. When you are unable to play and participate in that sport anymore you may become doubtful of your personal abilities. If your team continues to be successful without your participation you may struggle with your personal worth. You worry that if you are out of the game somebody will take your spot or permanent position. You may suffer a blow to your ego and it is not uncommon to isolate or alienate yourself.

As time continues most athletes learn to accept the injury. It is important to allow yourself to mourn and be sad and then move on. Attempting to be mad or tough and find blame for your injury is a waste of time. It is important to leave the “should haves” or “would haves” out of the picture and focus on the future. The reality is that you have suffered a concussion and you have to deal with it. This may include setting goals for yourself and maintaining a positive attitude. You may find yourself weighing the pros and cons of your future. Dealing with a serious concussion is very demanding and can result in economic loss and emotional burden for you and your family. A positive, optimistic outlook can help to speed up the healing process and to lessen the emotional pain. The only thing that thinking negatively will do is discourage everyone around you.

It is also important to take an active role in your recovery and seek out the resources available to you. Continue to participate in team functions and activities, as your step-wise recovery allows you. Do not isolate yourself.

Lastly, it is important to be patient. Athletes may experience considerable emotional pressure to resume sports participation. Emotion might tell you that you can play hurt, but the reality is that risk of re-injury is too great. It can result in permanent damage and seriously affect your quality of life. Do not rush your recovery because it will only lead to negative results. Follow the advice of the trained medical staff and feel confident in the healing process.

## **10. Prevention**

Any time a player is involved in a contact sport, there is a chance of sustaining a concussion. Approximately 85-90% of concussions are not reported until after the practice or game. Therefore, it is important to take a preventative approach when dealing with concussions. Prevention of concussion and head injury is most successful when athletes are properly educated and the rules are enforced. Respect for the mutual safety of fellow players should always be important. Hits to the head should be eliminated in sports. Because most often a concussion is an invisible injury it is important to share information with the people surrounding you. This will help them understand your own situation and educate them for the future.

Protective equipment can reduce the risk and severity of head injury in sports. It is important to have a good quality properly fitted helmet for collision sports. The helmet strap must be buckled tightly, and only one finger should fit between the strap and the chin. All protective equipment should be certified and well maintained.

