

1. What is a Concussion?

A concussion is a common form of head and brain injury, and can be caused by a direct or indirect hit to the head or body (for example, a car crash, fall or sport injury). This causes a change in brain function, which results in a variety of symptoms (see section 5). With a concussion there is no visible injury to the structure of the brain, meaning that tests like MRI or CT scans usually appear normal.

2. What actually happens?

When a person 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. 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.

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 how the brain is working. The exact length of this change is unclear. During this time period, the brain does not function normally on a temporary basis, and 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 object or person is moving at a high rate of speed. 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 as soon as possible after any blow to the head or body after which you suffer signs and symptoms of a concussion. Often, concussions 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 person 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, CJSJ 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 the injury or even the next day.* 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, co-worker, teammate, employer, 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 person 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 current activity whether it is sports, work or school.

5. Symptoms of a concussion

Following a concussion, you may experience many different kinds of symptoms. Contrary to popular belief, most concussions occur without a loss of consciousness (LOC). It is important to remember that some symptoms may appear right away and some may appear 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 you as the injured person, co-workers, friends and family. 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, professional help should be sought immediately.

Some symptoms and signs include:

<i>Symptoms</i>	<i>Signs</i>
<ul style="list-style-type: none">• Nausea, vomiting• Dizziness• Confusion• Fatigue• Light headedness• Headaches• Irritability• Disorientation• Seeing bright lights or stars• Feeling of being stunned• Depression	<ul style="list-style-type: none">• Inappropriate behaviour• Decreased work/playing ability• Inability to perform daily activities• Cognitive and memory dysfunction (reduced attention, difficulty concentrating)• Sleep disturbances• Vacant stare• Poor balance

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 most resolve uneventfully. A concussion always has the potential to cause serious harm and needs to be checked by a medical doctor as soon as

possible. In addition, if symptoms are not gone in approximately 10 days, further consultation by a concussion expert is recommended.

A number of concussion-grading systems have been proposed, but consensus is that none can be supported or endorsed because they are not based on scientific evidence. Severity is probably impacted by a number of factors. For example, severity may be impacted by the person's history of previous head injuries. A factor such as this may lead to a different, slower recovery, which is why concussion history should always be monitored. Return to exertional activity 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 work/ 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 patient's brain. The patient 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 patient lies inside a cylindrical machine for 15-60 minutes while images are made. This technique is also painless, but noisy.

In the majority of 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.

Sometimes the role of neuropsychological testing is important in identifying subtle cognitive (i.e. memory, concentration) problems caused by the concussion and may at times help to plan to return to pre-injury activity. In addition, balance testing may be required. Usually these are arranged by the concussion expert.

7. When should I return to activity?

A concussed person should be removed from activity immediately and should be assessed by a medical doctor. Given that symptoms may worsen later that night and the next day, you should not return to your current activity. When concussed, your decision-making skills about your situation may not reflect the best judgement! Post-concussive symptoms may intensify with an increase in activity, so it is important that return to activity is gradual and monitored/supervised by a medical professional.

8. Coping with symptoms

The best medical management for a concussion is rest, both physical and mental. A person 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 friends 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 patients 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. One way to deal with these types of symptoms is to take special care in actions and movements. Move slowly and constantly be aware of your surroundings.

Other problems such as noise sensitivity and visual changes are also the result 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 or take any drugs not prescribed by a medical doctor. It may hinder 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 activity gradually. Make sure you can cope before making any changes and 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 person to become overwhelmed by a variety of emotions. Often times the patient feels concerned, anxious and

sometimes depressed. The first part of the healing process is knowing that these emotions are normal. After an injury, most people 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 work, activity or 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, displaced, and blaming others for your injury. It is quite common to become very angry at your co-workers, family and friends. 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. When you are unable to work, play and participate in your normal life, you may become doubtful of your personal abilities and struggle with your personal worth. You may worry that if you are out of the “loop”, 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.

With time, most patients 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 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 daily functions and activities, as your step-wise recovery allows you (see details provided in accompanying handout). Do not isolate yourself.

Lastly, it is important to be patient. Concussion 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 doctor and feel confident in the healing process.

10. Prevention

It is important to take a preventative approach when dealing with concussions. This is especially true when there has been a recent concussion because the brain is very vulnerable at that time. Prevention of concussion and head injury is most successful when workers and athletes are properly educated and the safety rules of the working and sporting environment are enforced. Respect for the mutual safety of fellow workers should always be important. 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. It is important to have a good quality, properly fitted hard hat/ helmet for work environments and collision sports. Workers should follow safety procedures mandated on work sites. All protective equipment should be certified and well maintained.

* This document has been modified from the ThinkFirst-SportSmart Concussion Education and Awareness Program “Concussion Information for Athletes” handout, with additional input from the following organizations:

1. Toronto Rehabilitation Institute, Neurology Service Program
2. St. Michael’s Hospital, Head Injury Clinic
3. Safe Communities (Whitehorse)