



Key points

- All concussions are traumatic brain injuries.
- You do not need to hit your head to have a concussion.
- Concussion temporarily changes how the brain works.
- Common symptoms include headaches, dizziness, nausea and trouble concentrating.
- The brain must rest to recover.
- Assessment and treatment need to be individualized.
- Most people recover quickly.

What is concussion?

Concussion is a force to the head, either direct (for example, a blow to the head) or indirect (for example, a force transferred from the body to the head). You do not need to hit your head to have concussion.

This force to the head moves the brain within the skull. It typically causes brain tissue to change at a cellular level, leading to a rapid onset of neurological changes. These usually resolve spontaneously.

All concussions are traumatic brain injuries – they need to be recognized as serious events.

There are physiological changes to the brain after a concussion. A neurometabolic cascade takes place immediately. A neurometabolic cascade is a series of events that occur at the cellular level.

There is a disruption in the normal chemical makeup of the brain at the time of a concussion. The levels of chemicals that are normally in the brain are changed. The function of these chemicals and their ability to do their normal tasks is not the same. Cerebral blood flow is reduced.

The disruption to the normal function of the brain after a concussion means it has to work harder than normal. This is a vulnerable time for the brain – it needs time to rest and recover.

Watch [What Happens in the Brain After a Concussion \(YouTube\)](#) a short, animated film that effectively illustrated these physiological changes.

What causes it?

Concussions happen in different ways including but not limited to:

- motor vehicle accidents, including whiplash
- falls, trips and slips
- workplace injuries, such as reaching for a box and having it fall on your head
- sports injuries, including running into something or someone
- assaults

What are the symptoms?

Although concussions are an invisible injury, their common signs and symptoms impact many different aspects of daily living. These may only be apparent to someone who knows you well and may be missed by acquaintances or strangers.

Most signs and symptoms can be clustered into common categories:

- **emotional** - easily angered or upset; feeling nervous or anxious; lack of interest in activities; feelings of sadness
- **mental** - fatigue; confusion/disorientation; difficulty thinking clearly/problem solving/finding words; memory problems; poor attention
- **physical** - blurred vision; eye tracking, teaming or focusing issues; light sensitivity, headache or head pressure; nausea; dizziness; imbalance, visually induced

dizziness (sensitivity to visually busy environments)

- **sleep disturbances** - trouble staying awake; difficulty falling asleep; disrupted sleep patterns; restlessness

How is it diagnosed?

Unlike measuring heart rate or blood pressure, there is no device that measures a concussion objectively. Concussions must be diagnosed based on symptoms reported by the individual as well as the history of the precipitating event. Symptoms might not be immediate – it may take few days before they start to show up. Standardized imaging, such as CT scanning or MRI, often does not show a concussion.

Many people still think you need to have lost consciousness to have a concussion. This is not true and can be a diagnostic stumbling block. The lack of an objective way to measure the symptoms associated with a concussion is also a challenge. Health care practitioners may differ in opinion as to what they consider a concussion and how it is diagnosed. Encountering these different approaches is an extra challenge for those experiencing concussion symptoms. In addition, concussion research is proceeding rapidly, and new information sometimes does not quickly reach health care practitioners.

How is it treated and managed?

Treatment immediately after a concussion

A period of real rest for 24 to 48 hours immediately after the injury is recommended. Real rest means napping in a quiet, low-stimulus environment.

Normal activities should be put on hold. Real rest does not include going to work, school, using technology or doing chores.

As long as your level of consciousness is not deteriorating, being awakened every few hours after a concussion is unnecessary – sleep after a concussion is good for the brain.

It is also important to seek medical attention by visiting a primary care physician to make sure you are medically stable.

If the concussion took place at work or in a motor vehicle accident it is especially important to have your symptoms documented by a physician; this documentation is critical for any insurance claim and monitoring your history.

Dangerous signs related to concussion during the first 24-48 hours

If you have any of the symptoms listed below during the first 24-48 hours after sustaining your injury, seek medical attention right away – call 911 or go to the nearest hospital emergency department:

- one pupil larger than the other
- extreme drowsiness or inability to wake up
- headache that gets drastically worse quickly
- slurred speech, weakness, numbness, or decreased coordination
- repeated vomiting or nausea, convulsions or seizures (shaking or twitching)
- unusual behaviour, increased confusion, restlessness or agitation
- loss of consciousness (passed out/knocked out) – even a brief loss of consciousness should be taken seriously

Treatment 48 hours after a concussion

After the period of real rest, reintroduce cognitive and physical activity slowly while staying below symptom-exacerbation thresholds (challenge the symptoms but don't pass the threshold).

Challenging the threshold means allowing symptoms to increase overall slightly but making sure the symptoms return back to baseline level within 30 minutes to an hour of rest. If symptoms remain high after this period of rest, it is likely you have pushed it too far.

Slow resumption of physical activity means gradually reintroducing activities of daily living such as light housework and simple grocery shopping. It does NOT include more vigorous activities such as hiking or running. In one to two weeks, visit your primary care physician for reassessment. Brain rest is a crucial part of concussion recovery. Resting your brain can be a tough concept to adhere to in our fast and connected world.

Brain rest in the initial stages of recovery

This includes activities such as: meditating, mindfulness or breathing exercises; listening to quiet music; lying down, napping or sleeping; having a bath; and taking a slow walk.

Brain rest does NOT include activities such as: using a computer for two hours straight; multi-person conversations; using a cell phone; going to the mall, busy grocery stores or movie theatres; watching TV; driving; or exercising.

Not all concussions present in the same way

Concussions often follow a number of main presentations. The form of primary presentation affects treatment. Main presentations include:

- **Physiologic**
Returning to activity or exercise causes significant problems. Anything that changes the heart rate or blood pressure, from walking or running to bending over and getting up off the ground, may cause concussion symptoms to increase.
Exertion therapy done with a kinesiologist, exercise rehabilitation specialist or physiotherapist may be helpful. Psychiatrists, physicians who specialize in physical medicine and rehabilitation may also be of help.
- **Cervicogenic (neck-related)**
Changes to the neck muscles as a result of injury can cause many of the concussion symptoms. Stiffness in the neck, difficulty moving or rotating the neck and/or ongoing neck pain may occur.
Hands-on work on the neck including massage therapy, chiropractic treatments and/or physiotherapy may be beneficial. Retraining the perception system in the neck, for example through laser-beam training, may help reteach

the neck where it is in space.

- **Migraine**
Migraine symptoms and triggers need to be under control and well managed.
- **Affective**
Psychological and emotional components, such as depression, need to be considered.
- **Vestibular** (balance mechanism in inner ear)
A concussion can cause direct injury to the vestibular apparatus in the inner ear. Or it can disrupt the brain's ability to integrate signals from three main sensor systems: vestibular (inner ear balance mechanism), visual, and proprioceptive (limb position) sensations. Working with a certified vestibular therapist may be beneficial.
- **Ocular (visual)**
Visual issues, such as posttraumatic vision syndrome, taking in information, light sensitivity, or sensitivity to motion near the face, cause problems. A vestibular therapist, neuro-ophthalmologist or a developmental optometrist may be able to help.

It takes a team to treat a concussion

Concussions may result in a large number of symptoms, some primary and some secondary. A team approach to treatment often works best. It may take some time and persistence to find out what approach is the best fit for you, your main problems and recovery goals. The Ontario Neurotrauma Foundation outlines guidelines to choosing the right practitioner, as well as identifies post-concussion symptoms. Those with cognitive problems may find it helpful to work with:

- **Physicians who specialize in brain injury**
- **Occupational therapists (OT) specializing in concussions**
Their skill set includes dealing with issues such as word finding, memory, sleep, planning and return to activities of daily living or work.
- **Neuropsychologists**
Help with the problem-solving component,

either through cognitive behavioural therapy (CBT) or other exercise tools.

- **Speech and language pathologists**
Help with difficulty recalling words, memory, hearing in noisy environments and processing issues. They often work within the team of the OT and neuropsychologist.
- **Audiologists**
Help with the diagnosis and management of hearing and vestibular problems, such as hearing loss, tinnitus, sensitivity to sounds, balance and dizziness disorders.
- **Clinical counsellors**
Help with anxiety and the emotional aspects of healing.
- **Social workers**
Help with a variety of home situations. For example, parents often take longer to recover because they have no down time.

Due to the varied nature of concussions, not all patients require all types of interventions from all providers; there is not one single course of treatment or recovery. All assessment and treatment need to be individualized.

Tips for living with a concussion

- pace and plan your week to space out activities you know are challenging
- break up challenging activities during the day so you don't have too many
- take "brain breaks"
- dim the brightness on mobile phones or using an app to change the light (blue or red light)
- use timers to limit activities
- set up a buddy system so you are checking in on symptoms

- use earplugs, headphones and sunglasses – but in moderation
- try relaxation/mindfulness apps

What to expect in the future

Factors that might lengthen recovery
Some factors may begin to cross over with concussion symptoms or make your symptoms worse. If you have already had several concussions, for example, it is not unusual for recovery to take longer.
Discuss these factors with your healthcare professional to make sure that you are on the right path towards recovery.

Factors that might lengthen recovery include:

- previous concussion
- history of migraines
- learning disabilities or ADHD
- depression or anxiety
- age
- visual and vestibular (inner-ear balance mechanism) abnormalities
- sleep abnormalities

Post-Concussion Syndrome (PCS)

Most concussions resolve within the first three months. About 15–30% of concussions do not resolve spontaneously, however, and result in post-concussion syndrome (PCS). These individuals experience persistent ongoing concussion symptoms.

PCS may include the previously listed emotional, mental, physical and sleep disturbance symptoms as well as:

- social withdrawal or isolation

- erratic emotional responses out of proportion to the situation, including intense fearfulness, anxiety and worrying
- balance problems
- difficulty in busy environments (for example malls, grocery stores, big-box retailers)
- difficulties with patterns or visually busy scenes (for example patterned carpets, windshield wipers or moving hands)
- poor memory
- speech difficulties
- dysregulation of heart rate, blood pressure (exercise intolerance)

Sources

View sources used for this handout:
<https://bit.ly/3ivTUFq>

Handout updated January 2021.

If you find the information in this handout helpful, we ask for your help in return. The cause of supporting those affected by balance and dizziness disorders with ad-free, up-to-date, evidence-based information written for Canadians needs you. Please become its champion – [donate to Balance & Dizziness Canada](#).

This handout is intended as a general introduction to the topic. As each person is affected differently, speak with your health care professional for individual advice.

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