



CONCUSSION/MILD TRAUMATIC BRAIN INJURY:  
A WHOLE BODY CONDITION



**RE-CONNECTING THE PIECES:**

A GUIDE TO UNDERSTANDING SYMPTOMS AND  
RECOVERY STRATEGIES FOR PATIENTS AND FAMILIES

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**YOUR FIRST ACTION WHEN DIAGNOSED WITH A CONCUSSION/MTBI SHOULD BE TO SEEK HELP.**

The following help guide is intended to provide the patient and families with **EDUCATION, instruction and direction** in the rehabilitation of concussion/mild traumatic brain injury (mTBI) and persistent post concussion symptoms (PPCS). Throughout this guidebook the terms concussion and mTBI are used interchangeably.

**SEEK IMMEDIATE MEDICAL HELP IF ANY OF THE SIGNS LISTED BELOW ARE OBSERVED FOLLOWING A HEAD INJURY:**

Headache worsening	Very drowsy, can't be wakened
Seizures (convulsions or fixed stare)	Repeated or forceful vomiting
Unusual behavioral change	Slurred speech
Unsteadiness or clumsiness	Weakness or numbness in arms/legs
Blurred vision or unequal pupils	Blood or fluid coming from ears or nose

**DISCLAIMER**

- This information is best utilized in conjunction with health professionals experienced in concussion/mTBI management.
- As individuals' symptoms and progress are variable, management may need to be individualized.

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## WHAT IS A CONCUSSION/mTBI?

- Concussions are mild traumatic brain injuries (mTBI), occurring with an impact or jolt to the head or body, and are often not revealed by standard structural neuro-imaging such as MRI or CT scans.
- Concussions typically result in short lived, gradually resolving neurologic impairment, and like a snowflake no two brain injuries are the same.
- Concussions result in a set of clinical symptoms with some symptoms showing up later, and may or may not have included a loss of consciousness.
- The aftermath of a concussion is believed to be a chemical problem where nerve cells are damaged through stretching and twisting resulting in a chemical release and subsequent local brain/nerve depression.
- Concussions can lead to common feelings of confusion, feeling dazed and/or a loss of memory (amnesia) around the time of injury.
- Following a concussion, it can take time for nerve cells to re-establish normal function, so avoid symptom provocation while they recover.
- Altered brain blood flow quickly follows a concussion, as do changes in brain energy consumption, so avoid over exerting yourself as your brain is in an energy crisis.
- 20-30 % of your daily calorie intake is used by your brain, but reduced brain blood flow leads to brain energy demands exceeding their supply, so pace yourself.

“Knowledge is power to a brain injured person” – Larry Jameson

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## WHAT IS A CONCUSSION/mTBI?

- Early concussion management can help recovery. The longer one's brain is adapting to negative changes the longer it will take to rehabilitate out of them.
- All concussions should be taken seriously as your brain is the most important real-estate in your body. Recovery strategies are more effective when introduced early.
- The rate of recovery varies from person to person; 80-90% recover within 7-10 days. A minority, however, may experience what's best referred to as persistent post concussive symptoms (PPCS).
- Recovery may be slower in individuals who have had previous concussions, in older individuals, in adolescents or those who have problems with pain, anxiety or depression.
- After an initial period of restfulness, gradual return to activities of daily living (ADLs) and appropriate brain retraining exercises are often helpful in conjunction with symptom reduction strategies.
- When gradually returning to ADLs or in starting brain-training exercises, it is important to be aware of your tolerance limits. Tasks or activities should be brief initially for 5-10 mins and then progressed depending on symptoms.
- It is helpful when returning to activity to pace yourself, which may involve alternating brain stimulation/activity with brain breaks (e.g. closing your eyes and/or deep breathing to recharge) and not allowing yourself to get overwhelmed

With education, practice and determination, you can overcome what's holding you back.

## WHAT ARE THE COMMON SYMPTOMS OF A CONCUSSION/mTBI?

A number of common symptoms occur following a concussion and although troublesome, they should improve with time and proper management.

### Common Symptoms Include:

PHYSICAL	BEHAVIOURAL/EMOTIONAL	THINKING/MEMORY (COGNITIVE)
Headache	Sleep more or less than usual	Difficulty thinking or concentrating
Nausea or vomiting	Drowsiness or fatigue	Memory problems
Dizziness or light headedness	Trouble falling/staying asleep	Trouble expressing thoughts
Imbalance	More emotional	Confusion
Changes in vision (double, blurry)	Irritable or anxious	Feeling mentally foggy
Sensitivity to light or noise	Depressed or sad	Trouble finding words

- These symptoms are not typically an indication of permanent brain damage or medical complications; they simply reflect short-lived neurologic impairment.
- It is important to be informed and aware of common symptoms, as they are indicative of a brain injury that hasn't yet fully recovered.
- Recovery is most effective when symptom exacerbation is avoided.

*Give your self all the time you need to heal, and avoid putting yourself on a time-table.*

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## HOW DOES CONCUSSION/mTBI AFFECT MY BRAIN?

- The below intimately linked systems and structures are all generally involved in varying degrees following a concussion/mTBI.
- Each system is unique and collectively is involved in everything we do from our ability to think and focus, our behaviors and emotions, to our physical state and perception of the world around us.
- It is important to keep in mind that in rehabilitation, improvements in brain training and function are mostly restricted to the specific tasks or activities performed and do not significantly generalize to other tasks or activity specific dysfunctions.

### VESTIBULAR SYSTEM

- Motion and gravity detector
- Assists with head and body posture
- Stabilizes eyes when in motion

### VISUAL SYSTEM

- Eye control (tracking, focusing and reading)
- Vision (central and peripheral sight)

### CEREBELLUM

- Coordination and Balance



### SOMATOSENSORY SYSTEM

- Joint and muscle receptors

### LIMBIC SYSTEM

- Emotions

### BRAIN STEM

- Autonomic functions (heart rate, blood pressure, breathing and digestion)

### NECK

- Axis for head movement
- Sensory connections to vestibular and visual system

**CEREBRUM** is the large part of the brain that fills the skull:

Left Hemisphere: Language, math, computation, reading, verbal memory, word recall

Right Hemisphere: Creative thinking, humor, simple math, musical talent

*While your brain is unique, your brain injury is also unique*

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## GETTING BETTER

### GET HELP, DON'T WAIT

- While close to 90% of patients suffering a concussion will recover in the first 7-10 days, some go on to develop persistent symptoms for unknown reasons. Often the earlier that appropriate advice is given the better the outcome.
- Following a concussion it is common to have symptoms associated with the eyes, balance, dizziness or headaches. In addition to restful patterns of activity while avoiding symptom provocation, useful treatment options may include:
  - **Vestibular rehabilitation therapy**, which is a specialized branch of physiotherapy that aims to re-establish normal integration of sensory input from ears, eyes, joint and muscle receptors.
  - **Manual therapy** to the neck can help relieve soft tissue and joint issues that may relate to headaches, dizziness and neck pain.
  - **Graded exercise**, which aims to restore cardiovascular function, improve posture, muscle endurance, strength and mobility.
  - **Medication**, taken as prescribed by your Doctor.
  - **Management from other multi-disciplinary health care practitioners** is often best when they have experience in concussion/mTBI management. Health practitioners that may be useful may include, but are not limited to:
    - GP, physiotherapists, audiologists, ear-nose-throat specialists, otologist, optometrists, psychologists, psychiatrists, occupational therapists, neurologists, speech and language therapists, social workers and counselors, chiropractors, osteopaths, cranio-sacral therapists and massage therapists.

“If you fail to plan, you are planning to fail” – Benjamin Franklin



## GETTING BETTER

### REST AND RELAXATION

- it is important to take it easy and PACE yourself following a head injury. Returning to physical and mental activity too quickly and/or ignoring symptoms could make symptoms worse and lengthen your recovery time.
  - Complete rest exceeding 3 days is generally not helpful and alternatively can be problematic, as can too much activity. Rather a “restful pattern of activity” throughout the day is best: initially with reduced physical and mental exertion below symptom onset.
  - Reduce physical activities such as exercise and mental activities (e.g. watching TV, reading, playing video games or using phones) until symptoms are no longer provoked.
  - Reduce work/school demands, computer use, reading/studying and exposure to loud music until tolerated. In some cases you may need to stop altogether for the short term.
  - Gradual resumption of pre-injury activities should begin as soon as tolerated (e.g. walking, general house-hold tasks) with the exception of activities that have head injury exposure risk and where symptoms are exacerbated.
  - Find a relaxing activity that is calming and enjoyable and/or learn to meditate.
  - Feeling tired with less energy is common so do not push beyond your limit, rather pace yourself. Be aware your limits will be different than pre-injury.
  - Tiredness or pushing through fatigue can exacerbate your symptoms.

“You have brains in your head. You have feet in your shoes. You can steer yourself any direction you choose” – Dr. Seuss

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## GETTING BETTER

### MINDFULNESS MEDITATION

- Best described as the process of mentally focusing on being in the present moment. This has proven to be an effective tool to help people with cognitive and behavioral issues after concussion/mTBI.
- With meditation of all kinds, from chanting to visual imagery, people can make peace with their new self.
- If truly living in the present moment, you can let go of the past and the future; they no longer have a hold on you, which is incredibly freeing.
- When you can learn to be present and aware of your thoughts, feelings, emotions, and sensations and by paying attention to your breathing, you can calm down your mind, and from there you can find a place to learn, to know that you have a choice to let judgments go, and to respond rather than react.
- The “gift of mTBI” is described by some as a new perspective on their life and their place in the world. Like a blind person whose other senses become more acute, a person with mTBI often develops a deeper intuition, a keener awareness about the world and the people around them.
- You will question whether you are able to function as you once did, but part of the process is to learn to accept new limitations, while knowing in your heart that some limitations are temporary.
- Healing doesn't mean becoming exactly who you once were, but coming to terms with what you once had and didn't have then moving forward with life; a process of learning to begin again.
- With love and support there is hope, and from hope there is possibility no matter how dire the situation.

*“The secret of change is to focus all of your energy, not on fighting the old, but on building the new” – Socrates*

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## GETTING BETTER

### MINDFULNESS MEDITATION

#### Three Minute Breathing Space

Use this quick meditation whenever you need to have a “Brain Break” or settle yourself into awareness of the present moment.

#### Step 1: Becoming Aware

Try sitting up straight in a chair with feet lightly resting on the ground if possible. Closing your eyes, bring your awareness to your inner experience. Ask yourself:

- What is my experience right now?
- What thoughts are going through the mind?
- What feelings are here?
- Are there any sensations of tightness or stiffness?

#### Step 2: Gathering

As best you can, redirect your focus to your breathing, the feeling of the belly moving in and out, the belly expanding as the breath flows in, and falling back when the breath flows out. Follow the breath all the way in, and all the way out, using the breath to anchor yourself in the present moment.

#### Step 3: Expanding

Now breathe into the whole body so you’re expanding your awareness. Sense your body as a whole. Breathe in and out, feeling the whole body rise and fall with each inhalation and exhalation. Take in your whole body and your facial expression, just as it is.

Adapted by Melissa Felteau from Williams, M., Teasdale, J., Segal, Z., Kabat-Zinn, J. (2007) The Mindful Way Through Depression. New York: Guilford Press

For further information on mindfulness, visit Jon Kabat-Zinn’s website at [www.mindfulnesscds.com](http://www.mindfulnesscds.com). The App Headspace, described on the resource page may also be helpful.

“Forget all the reasons why it wont work and believe the one reason why it will” – Unknown

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## GETTING BETTER

### SLEEP HYGIENE

- Sleep is a natural stage of rest that affects our daily function as well as our physical and mental well-being. It is critical following a head injury that you get good restorative sleep every night as it is a function of a strong recovery.
  - Extra sleep may be necessary in the days immediately following a head injury, but 6-8 hours of sleep every night is optimal.
  - Lack of sleep and fatigue can increase all of your symptoms and slow down your progress.
  - Allow at least 1 hour before bedtime to unwind. Best to avoid stimulating activities such as TV, computer use and phone.
  - Reserve bedroom for sleep and intimate time only, avoid computer, TV or phone use.
  - Wait until you feel the signs of sleepiness (yawning, eyelids drooping) before trying to sleep.
  - Go to bed only when sleepy in a dark, cool and quiet space/bedroom. Going to bed when feeling wide awake only leads to prolonged wakefulness and further associates the bed and bedroom with insomnia rather than sleep.
  - If unable to fall asleep or go back to sleep within 15-20 mins, get out of bed and go into another room and choose a quiet and relaxing activity that does not trigger symptoms, then go back to bed when you feel sleepy.
  - Aim to go to bed and wake up the same time every morning regardless of the amount of sleep obtained.
  - Limit daytime napping, but if you have to sleep, do so for no longer than 20 minutes and earlier (before noon) rather than later.
  - Avoid consumption of caffeine and sugar within 4-6 hours of sleeping and heavy meals late in evening.

“The road to success is always under construction” – Lily Tomlin

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## GETTING BETTER

### NUTRITION

- The following nutritional advice is not intended to be a substitute for other professional advice. It is, however, important to note that what we eat affects our brain and that consuming select nutrients can influence neural function.
  - A healthy diet following head injury is highly beneficial as the brain consumes approximately 20-30% of our daily caloric intake, but when injured the reduced brain blood flow leads to an **‘energy crisis.’**
  - Eat small meals (GRAZE) every 3-4 hours to maintain blood sugar levels and keep snacks with you through the day to boost energy when needed.
  - Try to stick to a regular schedule of eating as the body does best when it’s in a routine.
  - Eat a healthy balance of protein (fish, lean meats, nuts and eggs), healthy fats and oils and carbohydrates (e.g. fresh fruits, grains, vegetables).
  - Avoid a diet high in saturated fat and sugar (junk food).
  - Develop shopping lists and shop when it is least crowded at the grocery store.
  - Ensure you are well fed before physical or mental activity in order to meet adequate brain energy needs as this will lead to good decisions and reduced brain strain.
  - Drink roughly 3 liters (~13 cups) for men and 2.2 liters (~9 cups) for women (Mayo Clinic).

“You are what you eat.” – Jean Anthelme Brillat-Savarin

Garbage in garbage out.

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## GETTING BETTER

### NUTRITION

Useful dietary management strategies that have been suggested to enhance and protect mechanisms of the brain include, but are not limited to:

Nutrient	Effect on Cognition and Emotion	Food Source
Omega 3-fatty acids (eg.DHA)	Basis for treatment of mood disorders, improved cognition and reducing decline	Fish (salmon), flax seed, chia, kiwi fruit, walnuts
Curcumin	Improved cognitive function and reduce cognitive decay	Turmeric (curry spice)
Flavonoids	Cognitive enhancement	Cocoa, green tea, Ginko tree, dark chocolate
Vitamin D	Preserving and improving cognition	Mushrooms, soy milk
Vitamin E		Avocado, nuts, olives, spinach
Vitamin C		Citrus fruits
Vitamin B		Shell fish, fish, liver, red meat, cheese, eggs, etc.
Iron	Normalizes cognitive function	Red meat, fish, poultry, lentils
Probiotics	Helps with digestion and brain health	Yogurt
Coenzyme Q 10	Necessary for basic function of cells	Meat, poultry, fish, nuts, fruits and vegetables
Phosphatidly Serine	Helps with memory	Tuna, chicken, turnkey, beef, etc.
*GPC	Helps with mental processes	Cheese, yogurt, chicken

\* glycerophosphocholine

The difference between a brain that is resourceful and functioning well and one that isn't is only a 100 milli-seconds of brain speed.

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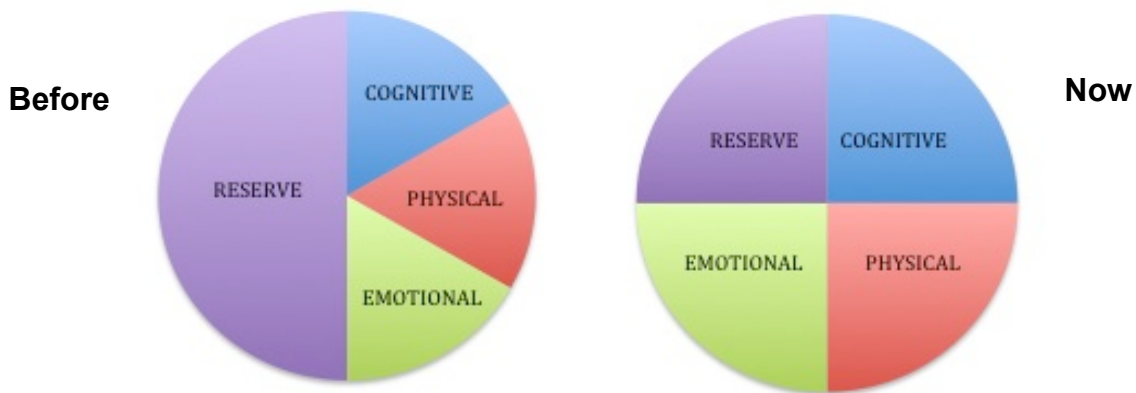
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## GETTING BETTER

### ENERGY CONSERVATION

- Following a head injury most people find they have less energy, causing everyday situations requiring physical, cognitive and/or emotional stamina to be exhausting.
- Energy allocation is also affected, as represented in the ENERGY PIE:



- Everything now requires a little more energy than before, with less energy in reserve.
- If we liken energy resources to money in the bank, then energy conservation is like being on a budget.
  - You manage your energy by making deposits and withdrawals based on requirements and if you empty your energy bank before noon, for example, you will not have enough for the rest of the day.
  - Fortunately while some tasks withdraw from your brain bank account, others deposit (i.e. meditating, eating/drinking, resting, relaxing).

“Planning is bringing the future into the present so that you can do something about it now” – Alan Lakein

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## GETTING BETTER

### ENERGY CONSERVATION

- **PRIORITIZE, PLAN & PACE**
  - Make lists of what you need and gather items before you start (e.g. while cooking)
  - Minimize physical effort when able ie sit to work and push rather than pull
  - Include activities in your day that bring you pleasure and add to your energy bank
  - Use energy wisely and write things down that you may need to remember later
  - Take time each evening to plan the next day/week
  - List activities and schedule tasks that need to be done with rest breaks
  - Spread harder tasks over the week, give yourself plenty of time to do each task
  - Balance activities with rest breaks, alternate heavy and light tasks and physical, cognitive and emotional demands
  - Start with 5-10 minute “micro breaks” every hour. This means stopping your cognitive or physical effort or removing yourself from your busy, stimulating environment and going to a quiet place
  - Routines are important and repeating tasks in the same sequence are encourage.

The human brain is an amazing and flexible organ. This is one of the many reasons why the brain can be rehabilitated following an injury.

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## GETTING BETTER

### RETURN TO ACTIVITY

- Always return to learn if in school and/or work before return to play.
- In the early days following a concussion/mTBI, rest is important and only light activities such as short walks are recommended.
- After an initial period of rest (reduced physical and mental activity), which is different for adults and children, your health care practitioner may incorporate regular light cardio exercise into the recovery plan.
- There is strong evidence that for persistent post concussion symptoms monitored aerobic/cardio exercises can reduce symptoms and hasten recovery.
- If symptoms, headache, nausea or dizziness increase during exercise **STOP**; you pushed too hard and need to reduce the effort next time.
- Start with light aerobic exercise, such as walking, stationary bike, elliptical or treadmill, twice a week then increase to 5-7 days a week as symptoms allow.
- Start gradually, working up to 20-30 minutes duration with the ultimate goal of working at 75-85% of your heart rate max ( $220 - \text{age} \times .75$ ) while staying below symptom onset.
- Avoid sports or jarring activities or exercise that requires high-level balance early on to minimize the risk of re-injury.
- A gradual approach to return to sport is strongly suggested in consultation with an experienced concussion medical professional.

“All improvement in memory consist of one’s habitual method of recording facts” – Dr. William James

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## RETURN TO LEARN/WORK

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6
<b>Restricted Cognitive Activity</b> <ul style="list-style-type: none"> <li>cognitive rest at home (no work or school)</li> <li>restricted cognitive activities (i.e., schoolwork, reading, texting, video games, computer)</li> </ul>	<b>Gradual Reintroduction of Cognitive Activity</b> <ul style="list-style-type: none"> <li>add cognitive activities starting with 5-15 minutes at a time. Build to 60 minutes per session without a break</li> </ul>	<b>Homework at Home</b> <ul style="list-style-type: none"> <li>start with 20 minute sessions (i.e. reading, computer use: writing or answering email)</li> <li>build to equivalent of half days (3-4 hours)</li> </ul>	<b>School/Work Part Time</b> <ul style="list-style-type: none"> <li>attend only quieter classes, avoid loud noise initially</li> <li>no gym or tests</li> <li>start with half days and work to full</li> <li>start with short homework blocks</li> </ul>	<b>Full Days of School/Work</b> <ul style="list-style-type: none"> <li>do less than 5 days if needed</li> <li>homework as tolerated</li> <li>limit with one test per day</li> <li>no gym class</li> </ul>	<b>School/Work Full Time</b> <ul style="list-style-type: none"> <li>resume full cognitive workload</li> </ul>
				<b>Work Up to Full Days of School/Work</b>	
Recovery	Add Cognitive Activity	Increase Stamina with Self Paced Activity	Begin Gradual Return to School/Work		
<b>Symptom free for 24 hours</b> <b>Yes:</b> begin stage 2 <b>No:</b> continue resting	Tolerates cognitive activity for 1 hour without a break <b>Yes:</b> move stage 3 <b>No:</b> return stage 1	Tolerates 3-4 hours of work at home <b>Yes:</b> begin stage 4 <b>No:</b> return stage 2	<b>Tolerates full day of school/work modifications</b> <b>Yes:</b> begin stage 5 <b>No:</b> return stage 3	Tolerates a full school/work day with normal work load <b>Yes:</b> return to full time work/school <b>No:</b> return stage 4	

**If symptoms re-appear or get worse at any stage, go back to previous stage for 24 hours**

(adapted from CATT BC Injury research and prevention unit)

## RETURN TO PLAY

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6
<b>No Sporting Activity</b> <ul style="list-style-type: none"> <li>• symptom-limited physical and cognitive rest</li> </ul>	<b>Light Aerobic Exercise</b> <ul style="list-style-type: none"> <li>• walking, swimming, stationary bike</li> <li>• no resistance training.</li> <li>• HR &lt; 70% of max</li> <li>• Vestibular rehabilitation</li> </ul>	<b>Sports Specific Exercise/drills</b> <ul style="list-style-type: none"> <li>• body weight exercises</li> <li>• skating, running, soccer, skiing/boarding with no jumping and reduced speed</li> <li>• no head impact or jarring activities</li> </ul>	<b>Non Contact Drills</b> <ul style="list-style-type: none"> <li>• resistance training</li> <li>• progress to complex training drills (e.g., increased speed and jumping in skiing/boarding)</li> </ul>	<b>Full Contact Practice</b> <ul style="list-style-type: none"> <li>• following Medical Clearance participate in normal training activities</li> </ul>	<b>Back In The Game</b> <ul style="list-style-type: none"> <li>• normal game play</li> </ul>
	<b>Increase Heart Rate</b>	<b>Add Movement</b>	<b>Exercise, Coordination, Cognitive Load</b>	<b>Restore Confidence, Assess functional Skills</b>	
<b>Recovery</b>					
<b>Symptom free for 24 hours</b> <b>Yes:</b> begin stage 2 <b>No:</b> Continue rest * if symptoms persist consult with experienced medical person for the next step	Symptom free for 24 hours <b>Yes:</b> begin stage 3 <b>No:</b> return stage 1	Symptom free for 24 hours <b>Yes:</b> begin stage 4 <b>No:</b> return stage 2	Symptom free for 24 hours <b>Yes:</b> begin stage 5 if also normal findings on SCAT 3 <b>No:</b> return stage 3	Symptom free for 24 hours <b>Yes:</b> return to play (stage 6) <b>No:</b> return stage 4	
<b>* If symptomatic after ~10 days post concussion for adults there is evidence that carefully monitored regular cardio exercise may help recovery. The same applies for children &lt;19 years old, but after a more conservative 4 weeks.</b>					

**If symptoms re-appear or get worse at any stage, go back to previous stage for 24 hours**

(adapted from CATT BC Injury research and prevention unit)

## RETURN TO PLAY

Criteria for moving to stage 5 are clearance and normal findings on Sports Concussion Assessment tool 3 (SCAT3). This can be found on CATT website under medical professionals and then under Assess (<http://physicians.cattonline.com/scat>).



Name: \_\_\_\_\_ Date/Time of Injury: \_\_\_\_\_ Examiner: \_\_\_\_\_  
 Date of Assessment: \_\_\_\_\_

### What is the SCAT3?

The SCAT3 is a standardized tool for evaluating injured athletes for concussion and can be used in athletes aged from 13 years and older. It superseded the original SCAT and the SCAT2 published in 2005 and 2009, respectively<sup>1</sup>. For younger persons, ages 12 and under, please use the Child SCAT3. The SCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool, Professional baseline testing with the SCAT3 can be helpful for interpreting post-injury test scores.

Specific instructions for use of the SCAT3 are provided on page 3. If you are not familiar with the SCAT3, please read through these instructions carefully. This tool may be freely copied in its current form for distribution to individuals, teams, groups and organizations. Any revision or any reproduction in a digital form requires approval by the Concussion in Sport Group.

**NOTE:** The diagnosis of a concussion is a clinical judgment, ideally made by a medical professional. The SCAT3 should not be used solely to make, or exclude, the diagnosis of concussion in the absence of clinical judgement. An athlete may have a concussion even if their SCAT3 is "normal".

### What is a concussion?

A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific signs and/or symptoms (some examples listed below) and most often does not involve loss of consciousness. Concussion should be suspected in the presence of any one or more of the following:

- Symptoms (e.g., headache) or
- Physical signs (e.g., unsteadiness) or
- Impaired brain function (e.g., confusion) or
- Abnormal behaviour (e.g., change in personality).

## SIDELINE ASSESSMENT

### Indications for Emergency Management

**NOTE:** A hit to the head can sometimes be associated with a more serious brain injury. Any of the following warrants consideration of activating emergency procedures and urgent transportation to the nearest hospital:

- Glasgow Coma score less than 15
- Deteriorating mental status
- Potential spinal injury
- Progressive, worsening symptoms or new neurologic signs

### Potential signs of concussion?

If any of the following signs are observed after a direct or indirect blow to the head, the athlete should stop participation, be evaluated by a medical professional and should not be permitted to return to sport the same day if a concussion is suspected.

Any loss of consciousness?  Y  N  
 "If so, how long?" \_\_\_\_\_  
 Balance or motor incoordination (stumbles, slow/abnormal movements, etc):  Y  N  
 Disorientation or confusion (ability to respond appropriately to questions):  Y  N  
 Loss of memory:  
 "If so, how long?" \_\_\_\_\_  
 "Before or after the injury?" \_\_\_\_\_  
 Blank or vacant look:  Y  N  
 Visible facial injury in combination with any of the above:  Y  N

### 1 Glasgow coma scale (GCS)

<b>Best eye response (E)</b>	
No eye opening	1
Eye opening in response to pain	2
Eye opening to speech	3
Eye opening spontaneously	4
<b>Best verbal response (V)</b>	
No verbal response	1
Incomprehensible sounds	2
Inappropriate words	3
Confused	4
Oriented	5
<b>Best motor response (M)</b>	
No motor response	1
Extension to pain	2
Abnormal flexion to pain	3
Flexion/Withdrawal to pain	4
Localizes to pain	5
Obeys commands	6
<b>Glasgow Coma score (E + V + M)</b>	<b>of 15</b>

GCS should be recorded for all athletes in case of subsequent deterioration.

### 2 Maddocks Score<sup>3</sup>

"I am going to ask you a few questions; please listen carefully and give your best effort."  
 Modified Maddocks questions (1 point for each correct answer)

What were we we at today?	0	1
Which half is it now?	0	1
Who scored last in this match?	0	1
What team did you play last week/game?	0	1
Did your team win the last game?	0	1
<b>Maddocks score</b>	<b>of 5</b>	

Maddocks score is valid for sideline diagnosis of concussion why and is not used for retail testing.

Notes: Mechanism of injury (**Tell me what happened?**):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Any athlete with a suspected concussion should be REMOVED FROM PLAY, medically assessed, monitored for deterioration (i.e., should not be left alone) and should not drive a motor vehicle until cleared to do so by a medical professional. No athlete diagnosed with concussion should be returned to sports participation on the day of injury.**

## GETTING BETTER

### STRESS MANAGEMENT

- **Stress** is defined as a condition or feeling you experience when you are experiencing a challenge or a demand, internal or external, that exceeds personal or social resources.
- Although stress is a normal response, efforts should be made to minimize this and pay attention to warning signs as stress can increase all your concussion symptoms and slow progress.

#### Warning signs of stress include:

#### COGNITIVE SYMPTOMS

- Constant worrying
- Poor judgment and memory problems
- Anxiety or seeing only the negative

#### EMOTIONAL SYMPTOMS

- Moodiness, irritability, agitation
- Feeling overwhelmed
- Sense of loneliness, isolation or depression

#### PHYSICAL SYMPTOMS

- Fatigue
- Headache, aches and pains, dizziness, nausea
- Rapid heart beat

#### BEHAVIOURAL SYMPTOMS

- Sleeping too much or too little
- Isolating from others, procrastinating, neglecting responsibilities
- Using alcohol or drugs, nervous habits

“Insanity is doing the same thing over and over again and expecting different results” – David Boswell

## GETTING BETTER

### STRESS MANAGEMENT

- **Stress management** refers to the practices, habits and environmental factors that can influence stress, which are essential in promoting good recovery. Examples include:

<p><b>Stay Healthy:</b></p> <ul style="list-style-type: none"> <li>• eat healthily, get enough sleep, keep active within tolerance, avoid alcohol, drugs, caffeine and tobacco.</li> </ul>	<p><b>Relax:</b></p> <ul style="list-style-type: none"> <li>• make time for fun and relaxation, i.e. play with a pet, go for a walk, work in the garden, listen to music, take a bath, write in a journal, spend time in nature.</li> </ul>
<p><b>Avoid Unnecessary Stress:</b></p> <ul style="list-style-type: none"> <li>• while not all stressors can be avoided, many can be eliminated.</li> <li>• establish priorities, learn how to say no, avoid stressful people and environments.</li> </ul>	<p><b>Alter Stressful Situations:</b></p> <ul style="list-style-type: none"> <li>• express feelings rather than bottling them up.</li> <li>• be willing to compromise, be assertive.</li> <li>• manage your time, stay organized and manage workload.</li> </ul>
<p><b>Realistic Thinking:</b></p> <ul style="list-style-type: none"> <li>• look at the big picture, adjust your expectations, focus on the positive.</li> <li>• avoid self-deflating thoughts.</li> </ul>	<p><b>Educate Others on Your Limitations:</b></p> <ul style="list-style-type: none"> <li>• I am not being lazy, I just need more rest than I used to.</li> <li>• My stamina fluctuates even though I look good on the outside.</li> <li>• Brain injury rehab can take a long time, sometimes measured in years, so please resist expecting me to be who I was.</li> <li>• Patience is the best gift you can give me.</li> </ul>

Meditation or gentle yin or restorative yoga can be helpful. Your doctor may also recommend consulting with a psychologist or counselor for further management.

“Remember that our worth and value are not wrapped up in what we can do. We are not human doings, but human beings” - Unknown

## GETTING BETTER

### AVOIDING SYMPTOMS

- Wear tinted glasses or visor but wean off when able, and earplugs if over-sensitive to light and/or sound.
- Use warm towel and gently press into eyes or place on neck if symptomatic.
- Expose yourself to natural light during the daytime where possible.
- When doing activities or projects you may need brain breaks to recharge for brief periods by closing your eyes or changing your activity by going for a walk, doing breathing exercises or listening to music.
- Alternating brain breaks and stimulation is termed "PACING" and it will often give your brain a boost in oxygen in a gentle way, which will accelerate recovery.
- Your ability to think, concentrate and remember things are also commonly affected and will improve over time, but strategies to help quickly improve in conjunction with brain training involve:
  - Reducing distractions in environment (i.e. turn TV off while communicating)
  - Limiting multi-tasking by performing one task at a time
  - Whenever possible working in a quiet environment
  - Making lists for yourself, saving brain energy by writing information down
  - Pre-planning activities and giving yourself more time than usual to complete tasks
- Monitor your heart rate with activity and daily tasks as it can be a good indicator of excess stress to your brain. While symptomatic, your heart rate will often not correlate well to your perceived level of exertion/effort. Your heart rate may be much higher than you realize despite not breathing hard. This can be damaging for your brain's healing.
  - There are a number of strategies to influence/reduce your heart rate such as meditation, breathing, visualization, relaxing, etc.

"Most of the important things in the world have been accomplished by people who have kept on trying when there seemed to be no hope at all"

– Dale Carnegie

## GETTING BETTER

### LIFESTYLE & ACTIVITIES OF DAILY LIVING

- Keeping to a daily routine is important especially if work, study or play are altered.
- Find other activities and tasks that make you feel good, while not exacerbating symptoms. Staying occupied is helpful so making a daily/weekly schedule of these tasks or activities and brain breaks can help recovery.

### DRIVING

- Do not drive for at least 24 hours following concussion, and only begin when you can concentrate and perform rapid eye movements and maintain focus.
- Return to driving should be gradual. Initially only drive when you are rested, when traffic is light and initially for short distances on familiar routes.

### WORK/STUDY:

- You may need to take time off work until your symptoms reduce so that you can concentrate and tolerate physical and visual tasks depending on your job. Some jobs may take longer than others to return to.
- Only return to work/school when the majority of symptoms have diminished and physical and cognitive endurance can be sustained through the day.
- Return to work/school should be on a graduated basis where hours and workload are reduced or modified. Prioritize, plan and pace.

### ALCOHOL & DRUGS

- Avoid drinking alcohol, or using recreational and non-prescribed drugs as these can make your symptoms worse.
  - Melatonin is a naturally occurring hormone that is available as an over the counter drug and may be helpful in restoring the sleep cycle for some people. It is important you speak to your doctor before taking.
  - For pain relief: take acetaminophen or acetaminophen/codeine for headaches (i.e. Tylenol) but avoid aspirin. It is important to speak to your doctor before taking.

“Perseverance is not a long race; it is many short races one after another”  
– Walter Elliot



## MANAGING COMMON HEAD INJURY SYMPTOMS

### HEADACHES:

- Do not take a sit and wait approach; headache management often requires lifestyle changes, exercise rehabilitation, and possibly medication.
  - **Lifestyle**: get proper sleep, conserve energy, manage stress and avoid triggers.
  - **Medication** may be required; speak with your doctor.
  - **Rehabilitation**: the neck can often play a large part in headaches following concussion and can significantly be helped with physiotherapy, massage or other treatment modalities.
  - **Wear sunglasses and ear-plugs** to control light and sound sensitivity.

### DIZZINESS:

- There can be a number of causes of dizziness following a concussion, which may include trauma to the balance organs in the ear, injury to the neck or changes to your vision.
- Take precautions to avoid falling or hitting your head and recognize movements that bring dizziness on. Use handrails when available and avoid ladders/heights.
- Vestibular rehabilitation therapy and manual therapy can be extremely helpful to reduce such symptoms.

“What is important is not what happens to us, but how we respond to what happens to us” – Jean-Paul Sartre

## MANAGING COMMON HEAD INJURY SYMPTOMS

### THINKING PROBLEMS:

- Difficulties with memory, concentration and attention are common post concussion; although these symptoms improve with time it does not make them any less annoying.
- **Practical strategies include:**
  - **B.R.A.I.N acronym:**
    - 1.) Be attentive: pay close attention and shut out other information as you relearn to record memories. Use all the five senses (vision, hearing, smelling, tasting and touching).
    - 2.) Repeat, repeat, repeat: being attentive brought information into your brain and repeating will help keep it there.
    - 3.) Associate: associating something new with something old can help maintain memories.
    - 4.) Imagine: look ahead as your brain was injured but you still have the ability to learn.
    - 5.) Never give up: you have a new brain - one that may think, dream and process a little differently. You have to be your own cheerleader and celebrate the successes rather than failures.

Reduce distractions in environment when concentrating and avoid noisy environments.

- Work on one task at a time and for critical tasks requiring more concentration, pick a time when your energy level is at its highest.
- Give yourself more time than usual.
- Record important information in a notebook, make lists, prioritize, plan and pace.
- Stay focused during conversations and maintain good eye contact. Repeat back or summarize important information that has been said.
- Keep important items such as car keys in designated places, use external cues to bring you back to a task (i.e. egg timer for cooking) or use appliances with automatic shut off.

“If your ship doesn’t come in, swim out to it” – Jonathan Winters

## MAINTAINING IMPROVEMENT & REDUCING RISK

- Neuroplasticity is the brain's ability to change itself and so the good news is the brain is trainable.
- One of the effects of training is through compensation, which relates to the brain's ability to generate new pathways or connections in response to brain injury or dysfunction.
- While new brain connections can be developed, injured brain pathways can remain, leading to a possible recurrence of previous symptoms later on due to stress, lack of sleep or unhealthy lifestyle habits to name a few.
- If symptoms return, they can once again be settled by the very exercises and management strategies that settled them previously.
- As in strength exercises, the gains made are often lost when you stop working out. The brain is no different so if you want to keep the gains then keep up a maintenance routine.
- Educate colleagues and team-mates and coaches about your injury so that you have the best support with returning to work and sport.
- Wear a seat belt and use correctly sized child seats for children.
- Wear a certified helmet that is well fitted for skiing, snowboarding, motorcycling, skating, kayaking, cycling, etc.
- Adhere to appropriate safety procedures and rules and use equipment relevant to the activity you are taking part in.

“The world breaks everyone and afterward many are strong at the broken places” – Ernest Hemmingway

## EDUCATING OTHERS ON YOUR LIMITATIONS

### WHAT YOU NEED TO KNOW ABOUT MY BRAIN INJURY:

- **Expectations:** brain injury rehab can take a long time, often being measured in months or years. It continues long after formal rehabilitation has ended. Please resist expecting me to be who I was, even though I look better.
- **Rest:** I am not being lazy, I now need more rest than I used to as I now more easily get physical and "brain fatigue." It is difficult and tiring for my brain to think, process and organize and fatigue makes it even harder to think.
- **Stamina:** even though I may look better on the outside, my stamina will fluctuate with some days being better than others. Cognition is a fragile function for a brain injury survivor and pushing too hard can lead to setbacks.
- **Memory:** know that not remembering does not mean I don't care.
- **Behavior:** behavior problems are an indication of my inability to cope with specific situations, not a mental health issue. I may be frustrated, in pain, overtired or there may be too much confusion or noise for my brain to filter.
  - **Rigid:** doing tasks in the same way and sequence is a rehabilitation strategy to help rebuild my brain. It's like learning the main roads before you can learn the short cuts.
  - **Repetition:** if I repeat actions, like checking to see if the doors are locked or the stove is turned off, I am not being obsessive compulsive. I am having trouble registering what I am doing in my brain, and repetitions help enhance my memory.
- **Sensitivity:** could be a result of the injury or may be a reflection of the extraordinary effort it now takes to do things. Tasks that were once automatic taking minimal effort now take much longer and require much more effort and are now huge accomplishments for me.

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## EDUCATING OTHERS ON YOUR LIMITATIONS

- **Patience:** is the gift you can give me, for example:
  - **Socially:** I am not trying to be difficult if I resist social situations. Crowds and loud sounds can quickly overload my brain as I no longer filter visual or noise simulation. Limiting my exposure is a coping strategy, not a behavioral problem.
  - **Pacing:** slowing down and alternating periods of activity with brain breaks allows me to work deliberately and at my own pace helping me rebuild my brain pathways. Rushing and multi-tasking can make this worse.
  - **Listening:** please listen to me with patience and try not to interrupt. Allow me to find my words and my thoughts in order to help me rebuild my language skills.
  - **Conversation:** If there is more than one person talking, I may seem uninterested in the conversation. It can be difficult for me to keep up with the different lines of discussion and it can be exhausting to piece it all together. I am not dumb or rude; my brain is simply getting overloaded.
    - If I say I need to stop, I need to stop NOW. This is not because I am avoiding the subject, it's just I need to process our discussion and "take a break" from all the thinking. I may be able to rejoin the conversation later and really be present for the subject and for you.
    - Please don't be condescending or talk to me like a child. I am not stupid, my brain is injured and it doesn't work as well as it used to.

I need cheerleaders now as I begin to recover, just like children do when they are learning and growing up. Please help me and encourage all my efforts. Please don't be negative or critical as I am doing the best I can.

Don't confuse Hope for Denial. We are learning more and more about the amazing brain and there are remarkable stories about recovery every day in the news. No one can know for certain what our potential is. We need HOPE to be able to employ the many, many coping mechanisms and strategies needed to navigate our new lives.

## WELLNESS CHECKLIST

For best individual management, **FOLLOW THESE STEPS:**

- GET HELP, DON'T WAIT:** do not take a sit and wait approach to treating your brain injury; there are many management strategies that can speed up your recovery.
- REST:** complete rest for greater than 3 days is not recommended; rather a restful pattern of activity throughout the day is best at below symptom onset.
- RELAXATION:** take time to yourself and find a soothing activity like fishing or mini golf, knitting, listen to light music or meditate or have a warm bath.
- MINDFULNESS:** by mentally focusing on being in the present moment and through breathing, you can calm your mind.
- SLEEP:** try to sleep and wake at the same time 7 days per week and get 6-8 hours/night. Rest during the day but try not to nap.
- NUTRITION:** eat 3 healthy meals a day and snacks when needed to keep energy up, drink lots of water; avoid caffeine, alcohol, salt, sugar and junk foods.
- PLANNING:** make lists and prioritize tasks, pace activities and allow more time to complete activities and take rest breaks (**prioritize, plan, pace**).
- ENERGY CONSERVATION:** brain energy needs often exceed supplies; it's normal to feel like you have to slow down so pace yourself. Balance activities with rest or brain breaks, i.e. close eyes and deep breathe for a minute or so.
- EXERCISE:** do light aerobic activity (e.g. walking, stationary bike, swimming, stretching) as there is evidence it can be helpful after the initial acute period. This is best done in a gradual manner while avoiding symptom exacerbation.
- AVOID SYMPTOMS:** it is essential that any rehabilitation strategies or activities (e.g. walking, house work, using phone or socializing) be performed with the goal of avoiding symptoms.
- STRESS MANAGEMENT:** have realistic expectations and don't put yourself on a time-table to recover. Think positively and focus on improvements and getting better rather than the challenges.
- ACTIVITIES OF DAILY LIVING:** build a structured daily routine and weekly schedule of activities (prioritize, plan and pace). Return to driving gradually when you can concentrate; work and school with reduced hours and workload when majority of symptoms have reduced.

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## ADDITIONAL INFORMATION & USEFUL RESOURCES

### USEFUL WEBSITES

Concussion Awareness training Tool (CATT) ([www.cattonline.com](http://www.cattonline.com))

Brainline – Preventing, Treating and Living with Traumatic Brain Injury (TBI)  
([www.brainline.org](http://www.brainline.org))

Moms Team – Complete Youth Sports Resource ([www.momsteam.com](http://www.momsteam.com))

Brainstreams – Concussion 101 (<http://www.brainstreams.ca/learn/injured-brain/concussion>)

Parachute: Preventing Injuries and Saving Lives  
<http://www.parachutecanada.org/injury-topics/topic/C9>

### USEFUL APPS

#### **Headspace**

Meditation made simple, a way of treating your head right. Using proven meditation and mindfulness techniques will show you how to train your mind for a healthier, happier, more enjoyable life.

**Details:** free, option for paid upgrade. Available on iPhone, Android, Google Play  
<https://www.headspace.com/headspace-meditation-app>

#### **mySleepButton**

The purpose of mySleepButton is to help you fall asleep. Just push the "Put Me to Sleep" button, follow the audio instructions and let yourself fall asleep.

**Details:** iPhone and iPad, free, view in iTunes App store  
<https://itunes.apple.com/ca/app/mysleepbutton-shuffle-your/id740251957?mt=8>

#### **Mindfulness Coach**

Practicing mindfulness means grounding yourself in the present moment. Mindfulness has been shown to be helpful for reducing stress and coping with unpleasant thoughts and emotions. Mindfulness Coach will help you practice mindfulness meditation

**Details:** Free, iOS devices, view in iTunes App store  
<https://itunes.apple.com/us/app/mindfulness-coach/id804284729?mt=8>

#### **HEADWays**

Concussion App – free concussion management app for iPhone & Android  
<https://itunes.apple.com/ca/app/headways/id738391144?mt=8ELEVATE>

#### **Elevate**

Elevate is a brain training app designed to improve focus, speaking skills, processing speed, and more. Each person is provided with his or her own personalized training program that adjusts over time to maximize results

**Device:** Free, option for paid upgrade. iOS Devices, view in iTunes App store  
<https://itunes.apple.com/ca/app/elevate-brain-training/id875063456?mt=8>

### **Lumosity**

Brain exercises targeting memory, attention, speed, flexibility, and problem solving. You can design your own personalized training, including "courses" with TBI- and/or PTSD-specific content.

**Details:** iOS, Web, Android, free or paid subscription available for advanced features

<http://www.Lumosity.com>

### **Awesome Memory**

Card game to help you improve your memory. All of the cards are laid face down on a surface and players take turns flipping two cards face up. The object of the game is to reveal pairs of matching cards. Similar to the traditional game of "concentration."

**Details:** iPad, free or paid version available for advanced levels and functionality.

<https://itunes.apple.com/us/app/awesome-memory/id384042217?mt=8&ign-mpt=uo%3D4>

### **iMazing**

Skill-based maze game where you must find your way through a challenging maze. Unlimited mazes created for you based on your skill level. Helps With: Problem Solving

**Details:** iOS, Free, view iMazing in the iTunes App store

<https://itunes.apple.com/us/app/imazing/id398036756?mt=8>

### **Matrix Game**

Helps you develop visual perception skills such as visual discrimination. It can also help you to develop attention and concentration, spatial orientation and principles of classification and categorization. Helps With: Problem Solving

**Details:** iOS, free or paid for advanced settings

<https://itunes.apple.com/us/app/matrix-game-3/id468021471?mt=8&ign-mpt=uo%3D4>

### **Audible**

Listen to books on your Android device. Great for people who have trouble reading or who retain information more effectively by listening. Helps With: Reading

**Details:** iOS, Android, free

<https://itunes.apple.com/ca/app/audiobooks-from-audible/id379693831?mt=8>

### **Breathe2Relax**

Portable stress management tool. The app is a hands-on diaphragmatic breathing exercise. Breathing exercises have been documented to decrease the body's "fight-or-flight" (stress) response, and help with mood stabilization, anger control, and anxiety management. Helps With: PTSD, Anxiety, Stress

**Details:** iOS, Android, free

<https://itunes.apple.com/ca/app/breathe2relax/id425720246?mt=8>

**For reference material used in this information booklet, please contact Back in Action Physiotherapy at 604 962 0555 or [info@backinactionphysiotherapy.com](mailto:info@backinactionphysiotherapy.com)**