PROJECT ENLIST

Military Guidebook

For Servicepeople, Patients and Caregivers

Table of Contents

01 Introduction

Welcome to the Military Guidebook for Patients and Caregivers. If you or a loved one is currently serving or has served in the military and has recently experienced a concussion, (also known as mild traumatic brain injury or mTBI) has lingering concussion symptoms, or is concerned about Chronic Traumatic Encephalopathy (CTE), please know that you are not alone. Help is available. This guidebook provides practical information and resources to equip military patients, caregivers, and families with tools and resources to support themselves or a loved one.

How to Use This Guidebook

This guidebook begins with general information about concussions, Post-Concussion Syndrome (PCS), also known as persistent post-concussion symptoms (PPCS), and Chronic Traumatic Encephalopathy (CTE). It then delves into more detailed areas, including symptoms, treatments, military service and exposure, communicating with medical and mental health providers, caregiving, and resources for creating the best health plan for you or your loved one.

While this resource is designed for patients and caregivers, the information it contains may also be useful for medical and mental health providers or anyone interested in learning more about brain injury in the military.

Note: The views expressed in this guidebook are those of the authors and do not necessarily represent the official policy or position of the Canadian Armed Forces, Veterans Affairs Canada, or any other government agency. For specific information, please contact the relevant agency.

02 Understanding Brain Injury

Brain injury is a broad topic, and in this section, we aim to provide you with specific information on concussions, Post-Concussion Syndrome (PCS), also known as persistent post-concussion symptoms (PPCS), Chronic Traumatic Encephalopathy (CTE), and other implications of brain trauma. This includes terminology you might encounter when discussing your history of brain injury with friends, family, and healthcare providers.

It's crucial to remember that the impacts of brain injuries can be extensive, often leading to physical, behavioural, cognitive, and/or sleep symptoms. It's also important to distinguish that a concussion is not the same as PCS or CTE. Recognizing these differences will help you communicate effectively with you or your loved ones' doctors about symptoms and how to best manage and treat them.

Lastly, not everyone with a history of repetitive head impacts or nonconcussive impacts will develop CTE. While these impacts are the only known cause of the disease, it's important to note that symptoms of CTE are not exclusive. Exposure to these impacts can lead to other brain changes that are treatable.

What is a Concussion?

A concussion is a form of traumatic brain injury (TBI) caused by a bump, blow, or jolt to the head or body, causing the head and brain to move rapidly back and forth [1]. This rapid movement can cause brain tissue to change shape, stretching and damaging brain cells. Additionally, chemical and metabolic changes within these brain cells impair their function and communication. Consequently, these alterations in the brain can lead to symptoms affecting an individual's thinking, learning, behaviour, and sleep patterns [2].

Concussions are categorized as "mild" Traumatic Brain Injuries (mTBI). While they are typically not life-threatening, the effects of concussions can be life-altering and warrant serious consideration for long-term health.

For more information, visit the Concussion Legacy Foundation Canada's What is a Concussion? page.

What is Post-Concussion Syndrome (PCS)?

Recovering from a concussion involves your brain cells returning to normal function by rebalancing levels of chemicals such as sodium and calcium, inside and outside of the cells. This process requires a significant amount of energy, so it's important to conserve energy during recovery. When properly managed, the majority of concussion symptoms resolve within a couple of weeks. However, over-exertion during recovery can cause symptoms to persist for months or even years.

A significant percentage (estimates vary between 10-30%) of concussion patients suffer from concussion symptoms persisting beyond the typical recovery period [3]. In cases where symptoms last longer than one or two months, doctors may diagnose persistent post-concussion symptoms (PPCS), also known as Post-Concussion Syndrome (PCS). Patients with PPCS can experience concussion-like symptoms at rest or in response to too much physical or cognitive activity, often forcing them to withdraw from their usual physical, professional, and social lives. While some changes may last for months or years, symptoms can and do eventually improve with the right support and treatment.

What is CTE?

Chronic Traumatic Encephalopathy (CTE) is a degenerative brain disease found in athletes, military Veterans, and others with a history of repetitive brain trauma. CTE is caused in part by repeated traumatic brain injuries (TBI), which include concussions and non-concussive impacts. Experts believe that in CTE, a structural protein in neurons called tau misfolds and malfunctions. This malfunction causes adjacent proteins to misfold, setting off a chain reaction where the malfunctioning tau slowly spreads throughout the brain, killing brain cells. Currently, CTE can only be definitively diagnosed through an autopsy after death. While CTE has been diagnosed in individuals as young as 17, symptoms typically do not appear until years after the onset of head impacts.

What is “Nonconcussive” Impact?

To understand what a nonconcussive impact is, we first need to understand what a concussion is. Simply put, concussions are traumatic brain injuries (TBIs) that alter brain function, leading to symptoms or observable signs. These symptoms occur because the brain is shaken violently enough to damage brain cells, impairing their proper function.

Nonconcussive hits, also known as sub-concussive hits, are impacts to the head or body that do not produce symptoms or observable signs of concussion. Scientific evidence indicates that nonconcussive impacts can be more severe than concussive impacts and can cause unnoticed changes in brain function and microscopic changes to brain structure, detectable only through sophisticated tests.

Mental Health Impacts

It's common for concussion patients to experience new or worsening mental health challenges such as increased emotional sensitivity, irritability, difficulty falling or staying asleep, anxiety, or depression. These symptoms are real, and discussing them with a medical or mental health provider is important.

Recent research has shown troubling links between concussions, mental health problems, and suicide:

A 2018 Harvard University review showed that study subjects with a history of concussion were twice as likely to die by suicide and were at much higher risk of suffering from suicidal ideation or attempted suicide [4].

Delayed recognition and treatment of concussions can increase these risks and worsen the outcomes. Accessing proper care in the days and weeks following injury is crucial for improving short- and long-term recovery.

In 2022, a study conducted by Children's Hospital of Eastern Ontario (CHEO) on over 448,000 youth found that those diagnosed with a concussion were 40% more likely to develop novel mental health disorders compared to those diagnosed with an orthopaedic injury [5].

Military Exposure and Brain Injury

Traumatic Brain Injury (TBI) is the signature wound of modern warfare, with up to 35% of Canadian Armed Forces members and Veterans living with the impacts of concussion [6]. Research efforts focusing on TBI, PTSD, and CTE are among the most crucial for Veterans and families experiencing the effects of these injuries.

Between 2000 and 2024, more than 505,000 American service members were diagnosed with a TBI and 22% of Canadian Veteran respondents to the LASS 2019 Survey reported experiencing a physical health condition related to the central nervous system, including migraines, dementia, and TBI effects [7] [8]. In the short-term, Veterans exposed to TBI are at higher risk for depression, anxiety, cognitive impairment, substance abuse, violence, and suicide [9]-[11]. Concussions have also been shown to increase the risk of novel psychiatric disorders in young people. In a study of hospital readmission data, research showed that at the time of a concussion, only 1.4% of patients diagnosed with a concussion report suicidal ideation. At 180 days after the concussion, this rate more than triples to 4.7% [12]. This finding is supported by a study conducted on American service members. In 2023, a study conducted on more than 860,000 service members demonstrated those with a history of military-identified TBI had significantly higher rates of developing novel mental health disorders than those without a history of TBI [13].

Long term consequences have also been reported following exposure to brain trauma. A study of more than 350,000 Veterans found a single concussion is associated with double the risk of being diagnosed with dementia [14]. Additionally, a separate study of more than 325,000 Veterans found a single concussion is associated with a 56% increased risk of being diagnosed with Parkinson's disease [15].

Research has shown that repetitive head impacts put a person at higher risk for major depressive disorder, panic disorder, PTSD, generalized anxiety disorder, long-term brain damage, and neurodegeneration, including chronic traumatic encephalopathy (CTE) [16]-[18]. CTE is associated with progressive cognitive impairment, neurobehavioural dysregulation, motor impairment, sleep disorders, and psychiatric disorders like depression, anxiety, and apathy [19].

More recently, imaging research has demonstrated white matter alterations and other structural and functional changes following repeated TBI exposure, including low-level blast (LLB) exposure experienced by breachers and military instructors, among others [20]-[23].

Military service involves activities that put service members at risk for traumatic brain injuries and repetitive head impacts (RHI). High- and low-level blast, breaching, combat training, artillery, sports participation, falls, motor vehicle accidents, and airborne training are among the better-known service-related exposures to RHI and TBI [17]-[19] [24]-[26]. Despite the range of activities that place service members at risk for TBI, 60% of reported military TBIs come from explosive blasts, considered a high-level blast (HLB), 80% of which are classified as mild traumatic brain injury (mTBI) [27].

Although substantial research has focused on the effects of exposure to HLB, particularly the development of TBI and PTSD, less research has focused on the effects of low-level blast (LLB) exposure. More evidence has emerged in recent years, especially on breachers. HLB refers to overpressure from incoming munitions (i.e. IEDs), whereas LLB refers to overpressure from outgoing munitions, such as those generated when firing certain weapons. Both HLB and LLB pose substantial threats to health and overall well-being of service members, as exposure has been associated with several health conditions including TBI, PTSD, and CTE [17] [18] [24] [28] [29].

Recent research has demonstrated that exposure to LLB is also associated with adverse health outcomes, including problems with cognition, communication, hearing, behaviour, anxiety, substance abuse, fatigue, and more. Occupations with greater exposure to LLBs were associated with a 39% greater risk of tinnitus in those early in their careers (1-7 years) and 42% greater risk of tinnitus in those in their mid-career (7-10) years. Occupational risk was associated with a 57% increase in risk of being diagnosed with PCS. The longer a service member spent in a high-risk occupation, the greater the risk of PCS [18].

3 Main Mechanisms of Injury to Consider:

How blast waves affect troops:

1 Blast Exposure:

- To our weapons
- To enemy weapons
- Breaching

2 Acceleration and Deceleration Injuries:

- Armoured personnel carriers
- Parachuting
- G-force for pilots, especially fighter pilots
- Navy on board Rigid Hull Inflatable Boats (RHIB) and special operations Coxswain

3 Direct Impact Injuries:

- Any hit to the head
- Close-quarter combat training
- Unarmed combat training
- Falling on obstacle courses
- Military sports

03 Currently Serving

Resources for Active-Duty Military, Primary Reserve, & Canadian Rangers

For service members, the primary resource for medical care is the Base Medical Officer, Care Delivery Unit (CDU), or the health services unit at your home military base. Depending on your needs, you may also be referred to a civilian healthcare provider within the provincial healthcare system.

Schedule an appointment with the CDU or Medical Officer at your base to discuss your history of brain injury, and any symptoms you think might be related. They will conduct a medical assessment and may prescribe treatments to address your symptoms. If necessary, they might refer you for further evaluation or treatment with a civilian specialist, such as a certified care provider, Neurologist, Physiotherapist or Occupational Therapist, or to a specialized clinic for traumatic brain injuries (TBI) within the provincial healthcare system.

Tip: Record Your Exposure

Keep a journal of every time you went to the range and how many rounds you fired. When you're releasing, this will be important information to have and know. In addition to the number of times you went to the range and the rounds fired, we recommend recording any event that resulted in head impacts, acceleration, deceleration, or blast exposure - any events that are a perpetual mechanism of injury. Having this information available if and when you start to experience symptoms will help your care team better serve you and create a plan tailored to your unique experiences.

Questions to Ask When Releasing

- Ask for a copy of your medical file.
- When talking to the doctor:
  - **Disclose anything you're feeling**. The more information given on your file, the better. It is beneficial to have everything from your service documented in the event that you need it for future claims.
  - **Explain the type of exposure you've had** and where it occurred in your career. If you kept a journal, bring it along.
  - **Discuss** your diagnosed concussions, injuries you suspect were concussions but went undiagnosed, and your exposure to repetitive head impacts.
  - **Use plain language** and avoid using diagnoses unless you were formally diagnosed with an injury previously by the CDU. Instead, describe your exposure history, the mechanism of injury, and any symptoms you experienced afterward.

For additional resources (articles and videos), please see the Appendix for a comprehensive list.

Have you ever experienced any of these symptoms? If so, you should mention this in your Part 1 and Part 2 medical release.

1 Cognitive

- Confusion
- Slowed thinking
- Difficulty focusing or concentrating
- Forgetfulness
- Trouble finding words or communicating
- Short-term memory loss

2 Mood/Behaviour

- Anxiety
- Depression
- Increased sadness
- Irrational anger
- Irritability
- Social withdrawal

3 Sleep

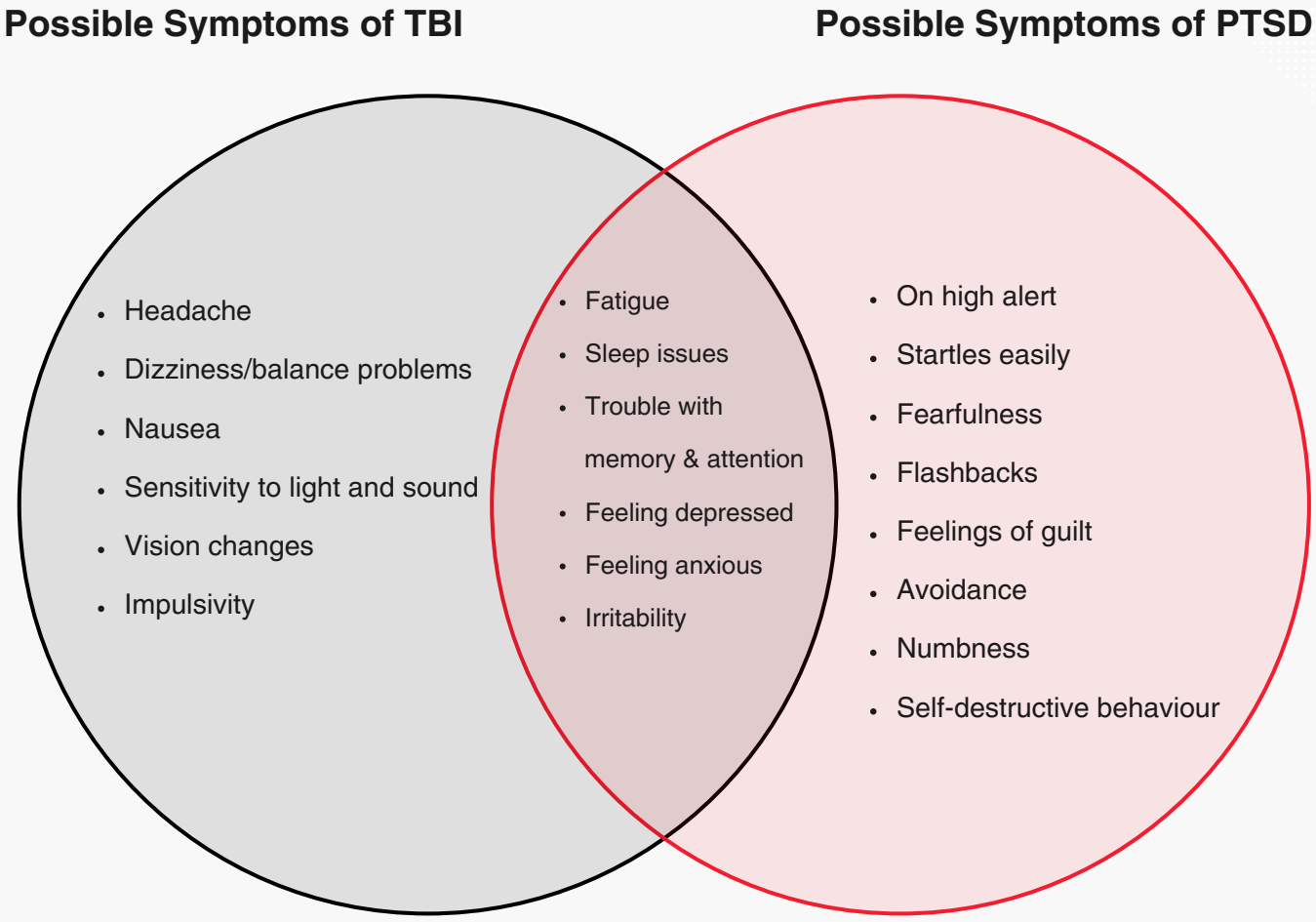
- Inconsistent sleep patterns
- Sleeping more than usual
- Sleeping less than usual
- Trouble falling or staying asleep

4 Somatic (Physical)

- Headache
- Dizziness/light-headedness
- Nausea
- Sensitivity to light or noise
- Blurry vision or double vision
- Hearing issues
- Fatigue or extreme tiredness
- Balance issues
- Changes in appetite
- Changes in sex drive

Overlapping TBI and PTSD Symptoms

TBI often co-occurs with Post-Traumatic Stress Disorder (PTSD), leading to frequent comorbidity and significant symptom overlap [30]. In a large survey of U.S. military personnel returning from Iraq, 16% of troops who suffered a bodily injury reported having PTSD, while 44% of those who had suffered a TBI reported having PTSD [25].



04 Resources for Retired Service Members

Resources for Military Veterans

As a military Veteran or caregiver of a Veteran, there are a few questions for you to consider before seeking care. First and foremost, determine whether you may have been exposed to brain injury during service and if this could be contributing to your symptoms. As mentioned in the previous section, many possible symptoms of TBI overlap with PTSD, and providing additional context to your provider may improve your treatment outcomes. Secondly, assess whether you have a formal diagnosis on your file before filing a claim.

Questions to ask yourself:

1. Were you exposed to blasts, head injuries, or other events that could have led to a brain injury?
2. Have you been diagnosed with PCS or another brain injury?
3. Are the injuries/events noted in your medical file?
    a. *If not, or you're unsure, are you seeing a doctor now who could complete your medical questionnaire?*
4. Have you started a VAC claim? Would you like some help with the application or appeal?
    a. *If you haven't applied, want assistance, or were denied previously, the Legion can support you.*
5. Do you want help with reviewing your VAC file?
    a. *The Legion is always happy to review your VAC file and see if they can advise you of other benefits you may not be receiving or aware of, such as tinnitus, additional pain and suffering, VIP services, consequential conditions, reassessments for other conditions, etc. For more information about how the Royal Canadian Legion can support you, please see Assistance with VAC.*

If you are enrolled with Veterans Affairs Canada (VAC) and the condition you are seeking treatment for has already been recognized by VAC as being related to service, your first point of contact for healthcare services is your family doctor or a VAC-approved healthcare provider.

If you have questions about your health coverage or VAC's treatment benefits program, call 1-866-522-2122 or request an appointment with VAC. You can also contact Medavie Blue Cross.

If VAC has not already recognized the condition, you must submit a claim (or appeal if your claim has been denied). For assistance with claims, please see **Assistance with VAC below.**

Assistance with VAC

The Royal Canadian Legion offers support and assistance for serving and retired CAF and RCMP members and their families in accessing disability benefits, programs, and services from Veterans Affairs Canada (VAC).

The Legion's Professional Command Service Officers assist at the provincial and national level with:

- Preparing and submitting disability claims
- Providing information and advice about available VAC programs and benefits
- Offering professional advice and assistance in accessing other programs and benefits
- Supporting through the claims process, from the initial application to the Request for Reconsideration with the Veterans Review and Appeal Board.

To access this resource, contact your local Command Service Officer or the OBH Support Line.

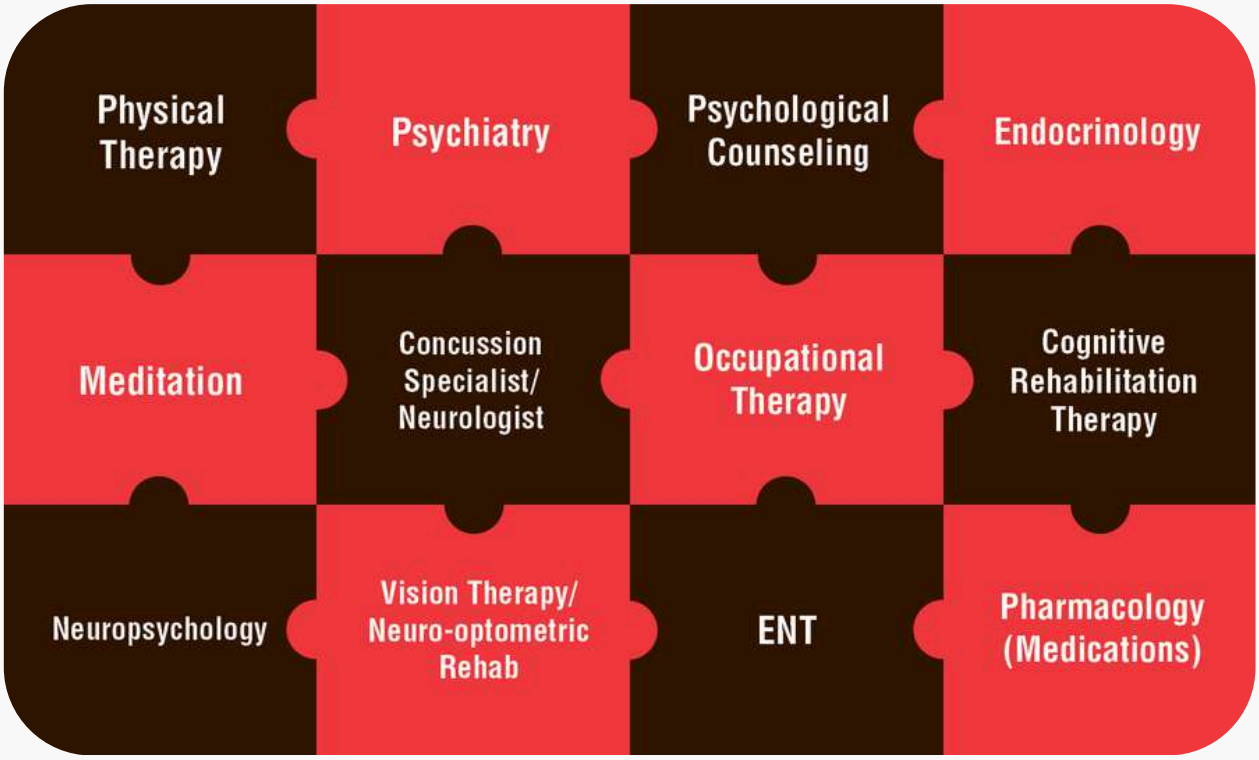
Whether you are a Legion member or not, all services Professional Command Legion Service Officers provide are free.

If you were diagnosed 15-20 years ago, we recommend reapplying and getting a reassessment. A reassessment will help you better align with rehabilitation services you may not currently be receiving or aware of, and provide access to PCVRS and case managers for a smoother transition. For support, contact your local Command Service Officer or the OBH Support Line.

05 Building a Foundation of Medical and Mental Health Support

Establishing a foundation of medical and mental health providers for monitoring and treatment is crucial for recovering from any injury. This is equally important when recovering from a concussion, Post-Concussion Syndrome (PCS), or managing suspected Chronic Traumatic Encephalopathy (CTE). No two brain injuries are exactly alike and similarly, no two recovery journeys are identical.

Setting appropriate expectations for recovery is important. Brain injury symptoms can have many causes, so a medical provider may recommend multiple treatments. Some treatments can take weeks to show noticeable improvements, emphasizing the importance of patience and observation. You or your loved one may need to try multiple therapies before finding one that works, making persistence key.



Here's the good news: concussion symptoms, even persistent post-concussion symptoms (PPCS), also known as Post-Concussion Syndrome (PCS), can and do improve over time with appropriate care and accommodations. Care for PPCS often involves collaboration across an interdisciplinary team to address symptoms. Consulting with the patient's primary care physician or a concussion specialist is recommended to determine the most suitable treatments to pursue.

Similarly, symptoms that may be from suspected CTE can also be managed and show improvement over time. If you are concerned that you or your loved one has CTE, it is crucial to build a foundation of care with knowledgeable medical and mental health professionals.

Build your care team by starting with evaluations and assessments. Use the information gained from testing and guidance from clinicians to decide on next steps, such as specialist referrals, targeted treatment approaches, and long-term support.

The journey may feel overwhelming at times. Remember, you are not alone, and help is available. This section provides information on how to start, what to know, and where to find evidence-based options.

Types of Medical and Mental Health Providers

The providers listed below can generally be relied upon for assessments, evidence-based treatment practices to address lingering concussion symptoms or support navigating challenges associated with concussion recovery and suspected CTE. While this list is not exhaustive and does not include all the multidisciplinary providers who may be part of a comprehensive care team, it offers a foundation of knowledge to build upon.

Provider Type	Function	Relevant Specializations
Athletic Therapist		
A certified and licensed healthcare professional who practices in the field of sports medicine.	Recognize and evaluate injuries. Provide first aid or emergency care. Develop and carry out rehabilitation programs for injured athletes. Plan and implement comprehensive programs to prevent injury and illness among athletes.	• Injury prevention • Initial assessment • Safe return to play
	Case Manager	
A plan developer and coordinator to connect clients to the services they need. **Other titles:** Care Coordinator Nurse Case Manager Transition Manager Patient Navigator Patient Care Facilitator Patient Services Manager	Reduce chaos and confusion to help you focus on recovery or caregiving.	• Advocacy and mediation • Appointment reminders • Connection to resources • Insurance coverage navigation • Medical record transfers

Provider Type	Function	Relevant Specializations
Clinical Psychologist		
A PhD or PsyD educated, licensed mental health professional qualified to do counselling and psychotherapy, perform psychological testing, and provide treatment for mental disorders.	Evaluate, diagnose, and treat behavioural, emotional, and mental health disorders through cognitive behavioural therapy (CBT), psychoanalytic therapy, etc.	• Adjustment issues • Behavioural problems • Emotional & psychological problems • Intellectual, cognitive, & neurological conditions • Interpersonal or social problems & dysfunction
Neurologist		
A medical doctor with specialized training in managing disorders of the brain and nervous system.	Treat disorders of the brain, spinal cord, nerves, and muscles.	• Behavioural dysregulation • Blood panels • CT/MRI scans • Headaches & Seizures • Neurologic assessments • Sleep problems • TBI-mTBI/concussion • Neurodegenerative Diseases
Neuro-Ophthalmologist		
A medical doctor who specializes in neurology and ophthalmology, a specialty of medical and surgical eye care.	Diagnose and treat visual problems related to the nervous system (vision problems that do not necessarily come from the eyes themselves).	• Broad medical or surgical options • Eye training • Neuro-Optometric Rehabilitation referrals • Rehabilitation therapy • Vision therapy
Neuro-Optometrist		
An optometrist with an additional year of training to specialize and work in vision therapy and neuro-optometry.	Evaluate visual strength, eye movements, double vision, sensory motor integration, field of view, accommodation, and binocular function. Stimulate parts of the brain not functioning to their highest potential following a brain injury.	• Corrective lenses • Eye training • Neuro-Optometric Rehabilitation therapy • Vision therapy

Provider Type	Function	Relevant Specializations
Neuropsychologist		
A licensed clinical psychologist specializing in how the brain affects behaviour.	Administer cognitive and emotional tests. Provide treatment plans based on assessment.	• Clinical psychotherapy • Neuropsychological assessments of cognitive function
Occupational Therapist		
A health professional who specializes in activities of daily living.	Assess patient needs and help patients develop, recover, improve, and maintain the skills needed for daily living and working by the adaptation of movement, improving motor skills, hand-eye coordination, or learning to do tasks in new ways.	• Adaptive equipment recommendations for home life • Cognitive rehabilitation • Safe return-to learn/play/work • Vestibular therapy • Vision therapy
Peer Support Specialist		
Someone with lived experience and some training who can provide social and emotional support throughout the recovery process.	Provide support and help navigating the caregiver or recovery process.	• Community connection • Emotional support • Problem solving brainstorms
Physiotherapist		
A health professional who specializes in movement disorders and graded exercise exposure.	Provides services that help restore body function, improve mobility, relieve pain, and prevent or limit permanent physical disabilities from an injury.	• Headaches • Neck pain • Physical rehabilitation • Vestibular rehabilitation • Vision therapy

Provider Type	Function	Relevant Specializations
General Practitioner (GP)		
A medical doctor who practices general healthcare and addresses a wide variety of health concerns. **Other titles:** Family Practice Physicians Internal Medicine Physicians Clinical Nurse Practitioners Physician Assistants	Coordinates ongoing care of all your family member's general medical needs.	• Care coordination and centralization • First-line care/guidance • Assessment/evaluation • Medication • Medication management • Referral to specialists
Psychiatrist		
A medical doctor specializing in preventing, diagnosing, and treating mental illness.	Assess the mental and physical aspects of psychological problems.	• Medication management • Medication
Social Worker		
A Registered Social Worker (RSW) is trained to evaluate and treat mental illnesses.	Trained in psychotherapy and helps individuals deal with mental health and daily living problems.	• Case management • Patient & family advocacy • Psychotherapy/counselling • Resource facilitation
Speech Language Pathologist (SLP)		
A health professional who specializes in language and communication who may further specialize in addressing the communication and cognitive challenges that can arise after a TBI.	Provides assessment and targeted interventions for attention, processing, memory, problem-solving, executive functions, word-finding, language comprehension, and challenges in expressing thoughts clearly.	• Adaptive technologies for work or school • Cognitive therapy • Memory training • Patient/family education • Re-establishing communication

Note for suspected CTE: Age variations in CTE symptoms

Younger individuals often encounter a cluster of behavioural issues, including anxiety, depression, rage, and sleep disturbances. Their cognitive challenges primarily involve short-term memory loss and difficulty in executive functions, which disrupt their daily living and normal activities.

Experts now believe that these symptoms are not primarily driven by CTE in most cases, if CTE is present at all. Instead, these symptoms are more likely to be related to suffering multiple concussions, or they could be unrelated to head impact history. That means these symptoms are not progressive and they should be treatable.

Older patients often present with progressive cognitive impairments similar to Alzheimer's disease, with pronounced memory deficits and a decline in cognitive abilities over time. These symptoms can pose significant complications in diagnosis, as they closely mimic other neurodegenerative conditions.

There are not many providers familiar with CTE because medical education and training are still catching up with the latest research. If you are struggling to find the right doctor, reach out to the OBH Support Line for recommendations in your area.

In general, look for clinicians specializing in brain disorders involving thinking, mood, and behavioural difficulties such as a cognitive or behavioural neurologist, neuropsychiatrist, neuropsychologist, or physiatrist. Because CTE is a neurodegenerative disease, a clinician who understands disorders such as Alzheimer's disease, dementia, and related conditions may be a good option.

Younger individuals in their 20s and 30s with a history of concussions may be best served by an expert in concussion or TBI. Experts believe that symptoms sometimes attributed to CTE in younger people may instead be caused by other consequences of head impacts, including damage to the white matter of the brain and vascular changes.

Evidence-Based Treatment Practices

The treatments listed in this section are supported by evidence in peer-reviewed scientific studies. While this list is not exhaustive, it provides a broad overview of options frequently used to manage concussion symptoms. If you or a loved one are considering therapies not listed below, it may be worthwhile to review supporting evidence and weigh the potential benefits against potential risk, time, and cost.

Treatment	Symptoms Targeted	Typical Providers
Cognitive Behavioural Therapy (CBT)		
A psychological therapy frequently used to treat mood and behaviour.	• Anxiety • Depression • Impulsivity	• Clinical Psychologist • Mental Health Counsellor • Occupational Therapist • Social Worker
Cognitive Rehabilitation Therapy (CRT)		
Also known as cognitive therapy. A goal-oriented rehabilitation approach to address functional cognitive skills. Not the same as Cognitive Behavioural Therapy (CBT).	• Attention • Cognitive decline • Communication • Concentration • Dizziness • Executive functioning • Fatigue • Headache • Information processing • Language • Memory • Sensory sensitivities • Sleep • Vision impairment • Word-finding skills	• Neuropsychologist • Occupational Therapist (trained in CRT for head trauma) • Speech-Language Pathologist (trained in CRT for head trauma)
Endocrinology		
Specifically, neuroendocrine assessment of pituitary function to determine if an initial TBI has caused hormonal imbalance.	**Treatment-resistant:** • Brain fog • Depression • Fatigue • Listlessness	• Endocrinologist • Neuroendocrinologist

Treatment	Symptoms Targeted	Typical Providers
Exertional Therapy		
Performing light aerobic activity in a controlled and monitored environment.	• Balance • Fatigue • Fear of activity/re-injury • Sensory sensitivities	• Athletic Therapist • Physiatrist • Physiotherapist
Mindfulness/Meditation		
A practice where an individual uses a technique, such as meditation, to train attention and awareness to achieve mental clarity and emotional stability. A primary goal of this practice is to achieve greater awareness of one's internal experience and accept one's internal emotional or physiological state.	• Anxiety • Attention deficits • Sleep disturbances	• Mental Health Counsellor • Occupational Therapist • Speech Language Pathologist • Apps: Calm, Headspace, Insight Timer, CBT-i Coach
Neuropsychology		
A branch of psychology focused on how the brain and nervous system influence a person's cognition and behaviour.	• Anxiety • Concentration • Depression • Impulsivity • Memory • Motor function • Multitasking • Word finding	• Neuropsychologist
Occupational Therapy (OT)		
The therapeutic use of everyday activities to help patients develop, recover, improve, and maintain the skills needed for daily living and working.	• Communication • Concentration • Dizziness • Executive function • Fatigue • Headache • Language • Memory loss • Processing speed • Sensory sensitivities • Sleep • Vision impairment	• Occupational Therapist • Occupational Therapy Assistant

Treatment	Symptoms Targeted	Typical Providers
Otolaryngology (ENT)		
Physicians that are trained to treat patients with diseases and disorders of the ear, nose, throat and related structures of the head or neck.	• Dizziness • Extreme noise sensitivity • Tinnitus (ringing in the ears) • Vertigo or balance issues	• Otolaryngologist/ENT
Physiotherapy		
Physical medicine and rehabilitation designed to promote recovery through means of exercise, manual therapy, and modalities.	• Balance issues • Fatigue • Headaches • Motor function • Neck/shoulder pain for whiplash injury	• Athletic Therapist • Physiatrist • Physiotherapist • Physiotherapist Assistant
Psychiatry		
The medical specialty devoted to the diagnosis, prevention, and treatment of mental health disorders. Psychiatrists assess both the mental and physical aspects of psychological problems.	• Anger/Rage • Depression • Detachment from reality (psychosis) • Paranoia • Personality changes • Sustained hyperactivity (mania)	• Psychiatrist
Vestibular Therapy		
A wide range of techniques including habituation exercises, gaze stability training, and balance training.	• Headaches • Balance problems • Persistent dizziness • Vertigo	• Audiologist • ENT • Neurologist • Physiatrist • Physiotherapist
Vision Therapy		
A range of techniques designed to help retrain specific aspects of the visual system including eye teaming, visual processing, and visual-vestibular coordination.	• Blurry vision • Convergence insufficiency • Dizziness/balance • Double vision & eye strain • Headaches & nausea • Peripheral vision • Sensitivity to light • Sensitivity to motion	• Neuro-Ophthalmologist • Neuro-Optometrist • Occupational Therapist • Physiatrist • Physiotherapist

Talking With Your Doctor

One of the first things a medical or mental health provider will ask for is a summary of your prior concussion history. Coming prepared for the first appointment will help streamline this process. It can be a challenge, especially if you're experiencing memory issues as a result of your concussion.

Start with Diagnosed Concussions

If you've been formally diagnosed with a concussion, be prepared to provide as much information as possible about those incidents. This will assist the physician understand your concussion history, predict your recovery trajectory, and provide necessary treatment options.

- **When did it happen?**
  - Know the dates or time frames when the injury occurred.
- **Cause of injury?**
  - Was it from combat, training, or another incident?
- **Symptoms experienced?**
  - Describe what symptoms you had (e.g. headache, dizziness, nausea)
- **Severity of symptoms?**
  - Were your symptoms mild, moderate, or severe?
  - Did they impact your ability to perform duties?
- **Did symptoms change over time?**
  - Consider how symptoms progressed and if they lasted longer than expected.

Severity Matters

It's important to remember not all concussions are equal, and the severity of past concussions may be more important than the total number. It can be overwhelming to go over a history of concussions, but focusing on severity can help organize your thoughts.

If you are unsure, two strong indicators of severity are:

- Duration of symptoms: The longer symptoms last, the more severe the concussion typically was.
- Impact on daily living: The degree to which symptoms affected your daily activities or ability to function. If symptoms kept you from performing regular duties or training, that is significant information.

Timing of Injury Matters, Too

The interval between head injuries is important, as re-injury during recovery can cause major complications. Sustaining two concussions one week apart is different than two concussions a year apart, even if they are of similar severity. Organizing a timeline with all past concussions for your doctor to reference when developing an appropriate plan for returning to duty or long-term concussion management plan can help. Provide a list of all your concussions, including the dates and circumstances, so the doctor can assess your recovery progress and needs.

Consider Undiagnosed Concussions

Just because a concussion isn't formally diagnosed does not mean it didn't happen. After recounting the diagnosed concussions, consider other head injuries that have occurred and resulted in symptoms discussed here. Think of any incidents where you might have experienced symptoms but didn't seek medical attention, including "bell ringers" or "dings" often experienced in training or combat. These may have been missed at the time but could still contribute to your current symptoms.

Don't forget to include injuries from:

- Military exposure (e.g. blasts, combat-related head injuries, accidents in the field or on base)
- Sports and recreational activities (e.g., training, accidents)

9 Treatment and Management Strategies for Suspected CTE

The treatment and management of CTE vary from case to case. However, research suggests managing suspected CTE with therapies and then, if necessary, pharmacology as well. Below are 9 things to consider in disease management [32].

1 Exercise

Physical exercise is used to treat memory disorders, stroke, PCS, and serious brain injuries. Physical exercise, particularly aerobic exercises, can improve outcomes in patients with suspected CTE. Studies suggest that aerobic rehabilitation may enhance cerebral blood flow regulation and support brain growth and adaptability. Patients are encouraged to participate in aerobic exercise for at least 30 minutes a day, five days a week.

2 Diet

A healthy diet, particularly the Mediterranean Diet, is beneficial for neurodegenerative diseases like CTE. For more information about nutrition, see our Nutrition Guidelines section.

3 Cognitive Rehabilitation

Cognitive therapy is important, particularly in the early stages of CTE. It focuses on improving attention, memory, and executive functions using cognitive exercises, workbooks, and real-life activities. Cognitive rehabilitation helps patients adapt to cognitive impairments and teaches strategies to compensate for function loss.

4 Mood/Behaviour Therapy

For patients with prominent mood disorders (e.g. depression, anxiety) or behavioural symptoms (e.g. impulsivity, irritability), therapy is essential. Cognitive Behavioural Therapy (CBT) is recommended to address maladaptive thought patterns and behaviour. Mindfulness practices, meditation, and relaxation techniques can also help manage anxiety and emotional regulation.

5 Mindfulness

Mindfulness techniques can improve attention and emotional regulation. Regular practice can strengthen self-efficacy, reduce feelings of helplessness, and enhance overall well-being. Mobile apps and in-person classes are commonly used, with older patients benefiting from guided meditation.

6 Occupational–Ocular Therapy (OOT)

Visual disturbances such as blurred or double vision can be particularly challenging for CTE patients, especially when reading or using computers. Occupational-ocular therapy addresses these issues with visual exercises, compensatory strategies, and the use of larger print, tinted glasses, and prisms to improve visual processing and coordination.

7 Vestibular Therapy (VRT)

Vestibular rehabilitation therapy is beneficial for patients experiencing balance issues, dizziness, or vertigo due to inner ear dysfunction. It involves eye-tracking exercises, postural and gait training, and home-based exercises. VRT can help desensitize the brain to the miscommunication from the inner ear, improving symptoms over time.

8 Motor Therapy

Physical therapy is used to treat motor symptoms such as ataxia, rigidity, and neck pain. It focuses on improving range of motion, strength, posture, and balance through corrective exercises. This therapy helps patients maintain mobility and reduce symptoms of Parkinsonism-like features.

9 Endocrine Assessment

Hormonal imbalances caused by damage to the pituitary gland due to repetitive head trauma are assessed through blood tests. If deficiencies are found in hormones like cortisol, testosterone, or growth hormone, they can be corrected with hormonal supplementation, leading to symptom improvement.

Note: If your provider is interested in learning more about managing suspecting CTE, please have them reach out to the OBH Support Line. We can provide them with information about managing suspected CTE.

Nutrition Guidelines

Diet can be a helpful consideration during concussion recovery, as nutrition can impact brain function. Consult a qualified medical provider or registered dietician for individualized guidance to support recovery. Outlined below are general guidelines based on the current understanding of how dietary choices may impact recovery. Additional in-depth explorations of nutrition and concussion recovery can be found through organizations such as UCLA Health and Brain Injury Canada, or watch this video with Registered Dietician Olivia Brooks. If you're in Ontario and would like to connect with Olivia, please contact the OBH Support Line.

Consider a Mediterranean Diet: Evidence suggests that the Mediterranean Diet positively impacts overall brain health and may aid concussion recovery. This diet emphasizes minimally processed foods, such as fish, nuts, seeds, whole grains, and leafy green vegetables, while avoiding large quantities of red meats.

Maintain general awareness of blood sugar levels: Evidence suggests maintaining stable blood sugar levels supports recovery [33]. For most individuals, eating regular meals every 3-4 hours helps prevent hypoglycaemia (low blood sugar) and ensures a consistent supply of glucose that your brain needs. During the healing process, there is an increased demand for glucose. Stable blood sugar helps support the healing process of the brain after a concussion. To help keep our blood sugar stable, it's important to pair foods that are mainly composed of simple sugars (i.e. fruits, white grains, etc.) with foods that contain slower-digesting nutrients (i.e. fibre, fat, protein). Examples of snacks: apple + peanut butter, crackers + cottage cheese, trail mix (nuts and dried fruit), and smoothies with Greek yogurt and fruit.

Monitor hydration: Adequate water intake supports overall well-being and contributes to an effective recovery process. Smoothies and soups/stews are also a great way to get nutrients and hydrate, and can be especially helpful with a low appetite because they can be packed with lots of nutrients.

Limit	Examples of	Substitutions for
Alcohol	• Wine • Beer • Liquors (e.g. vodka, whisky) • Cocktails • Alcohol-infused beverages	• Water, still or sparkling • Naturally flavoured water, (e.g. lemon, cucumber)
“Naked” Sugars	• Table sugar • High-fructose corn syrup • Artificial sweeteners • Honey • Cane sugar • Agave • Sweetened beverages (e.g. soda, sweet tea) • Sweetened yogurt	• Naturally flavoured water, (e.g. lemon, cucumber) • Coffee unsweetened (small amounts) • Apples • Fruits • Peanut butter, unsweetened • Cocoa, unsweetened • Greek yogurt, unsweetened
Caffeine	• Coffee (regular) • Energy drinks • Pop (cola some root beers) • Matcha • Chocolate (hot chocolate, chocolate bars *if avoiding caffeine entirely exacerbates symptoms, limit intake to mornings only so as not to disturb sleep.	• Herbal tea • Decaffeinated green or black tea, unsweetened (or smaller amounts of regular • Decaffeinated coffee, unsweetened (or smaller amounts of regular)

Additional Health Considerations

Gut Microbiome Composition: The “gut microbiome” is a term used to describe the millions of bacteria in the intestinal tract, which can impact many bodily functions. The gut microbiome can be influenced by the food and other substances we consume and meal consumption patterns such as timing. Taking steps to ensure a healthy, diverse gut microbiome can support overall health as we learn more about how it influences many facets of our health. Studies exploring disturbances in the microbiome and their influence on neurotransmitter production are ongoing and could lead to work that would explore the relationship between gut microbiome and concussion recovery [36].

Vitamins and Supplements: The most suitable application of vitamins and supplements is to complement a healthy diet by targeting specific nutrient deficiencies determined by a healthcare professional (i.e. doctor, nurse, registered dietician, pharmacist). This is done by conducting simple blood tests to assess levels of essential nutrients such as vitamin D, vitamin B-6, vitamin B-12, iron, magnesium, zinc, copper, and omega-3 fats [37]. If deficiencies are identified, healthcare professionals can offer guidance on appropriate dosages and recommend any necessary nutritional or lifestyle adjustments.

Overall, there is a need for more high-quality research on nutrition and concussion recovery in humans.

06 Being a Caregiver & Advocate

Supporting Someone After Brain Injury

Offering validation is a great place to start. This means believing what your loved one tells you about their symptoms and experiences. Living with a complex, invisible injury is difficult enough, but when you doubt your loved one's symptoms or imply that they are making them up, it can be devastating. Giving your loved one genuine validation and support can be more meaningful and beneficial to their recovery than you realize.

Here are additional ways to support your loved one:

- Help talk through the emotional challenges of the injury and let them know you see how challenging recovery can be.
- Be an advocate for them at school, in sports, and with medical and mental health providers.
- Prepare for the impact the injury can have on the whole family.
- Build a support team and realize you can't do it alone as a caregiver.

Preparing for Setbacks

Brain injury recovery is not always a direct path, and no two brain injuries are the same. Setbacks from symptom resurgence can be disheartening. Without a set timeline for recovery, it can be hard to know if you or your loved one is making progress. It can be even more difficult when improvements seem to appear one day and vanish the next. Try to remain patient and know setbacks are normal.

Here are some strategies to keep in mind:

- Set and stick to a routine but adjust as needed
- Provide support for fluctuating emotions and personality
- Track symptoms and explore additional evidence-based treatment options

Communicating with Your Loved One

Many patients have trouble with interpersonal communication after a concussion or brain injury. It's important to keep this in mind as you work with your loved one and continue to support them through this recovery journey. These tip sheets from Brainline and MIT offer helpful strategies for maintaining clear and effective communication.

Advocating for Your Loved One

Ensure Appropriate Screening

Ensure screening is conducted by an appropriate healthcare professional within the Canadian Armed Forces (CAF) healthcare system. For active-duty personnel, screening and assessment, such as using approved protocols, should be performed by the Base Medical Officer, Care Delivery Unit (CDU), or health services unit. For additional support, contact the applicable military medical unit or consult with a civilian healthcare provider referred by the CAF.

For Veterans, it is important to ensure that screening and assessments are conducted by qualified healthcare professionals. Screenings should be performed by healthcare providers approved by Veterans Affairs Canada (VAC), such as doctors, psychologists, or physiotherapists, depending on their specific needs. Veterans can contact their VAC case manager to ensure they are connected with the appropriate professionals who can carry out these assessments.For additional support and guidance additional support Veterans or their loved ones can also reach out to the OBH Support Line for assistance in navigating their care options.

Confirm that screening is conducted by an appropriate healthcare professional. For help identifying an appropriate medical professional, please consult with your doctor or reference the **Types of Medical and Mental Health Providers table**.

Common Health Professionals Covered by Veterans Affairs Canada

Obtaining a referral to a concussion or brain injury specialist may require patience and persistence. Encourage your CAF loved one to discuss their symptoms and military service history with their base medical team to request a referral to a concussion or brain injury specialist. If deemed necessary, referrals to neurologists, physiotherapists, or occupational therapists, may be issued to ensure they receive appropriate treatment and support.

For Veterans, specialized care can be accessed through Veterans Affairs Canada (VAC). VAC covers a wide range of health professionals who can address diverse medical needs. Contacting their assigned VAC case manager for a referral to the appropriate specialists based on their needs is crucial to ensure they receive the necessary care and support. The case manager will assist in coordinating the services and resources required to address their specific health concerns. Veterans or their loved ones may also contact the OBH Support Line for personalized assistance in dealing with the effects of brain injury, choosing the right doctor, managing lingering concussion symptoms, or navigating other related concerns.

To explore options, Veterans can log in to their Member Services Site via Medavie Blue Cross or use the "Find a Health Professional" tool to locate VAC-approved specialists.

Discuss Recommended Guidelines with Healthcare Providers

Ensure these plans align with CAF medical policies and any additional resources available through Veterans Affairs Canada (VAC).

Secure Medical Records

Active-duty Canadian Armed Forces (CAF) members are encouraged to request their medical records directly from their base's medical unit. For Veterans registered with Veterans Affairs Canada (VAC), medical records can be accessed through their My VAC Account or by contacting Medavie Blue Cross.

For more detailed or specific records, you can submit an Access to Information and Privacy (ATIP) request online. Ensure you have written consent or proof of legal authority if requesting records on your loved ones' behalf.

For guidance on health record disclosure, consult provincial or territorial privacy laws. Consider establishing power of attorney, a medical proxy, or a substitute decision-maker for streamlined decision-making if your loved one has difficulties with memory or decision-making.

Respectful Communication
Strive to maintain trust with your loved one and foster an atmosphere of respect in medical conversations by keeping them involved in conversations about their health. Adapt your communication style to accommodate any difficulties they may have and avoid speaking as if they are not present.

Ask Questions and Document Answers
If your loved one is struggling with energy levels or cognitive function, it can be helpful for you to actively participate in medical appointments by posing relevant questions and diligently recording responses. This will maintain a clear overview of your loved one's medical journey and track their care plan.

Engage with a Case Manager
Work with a VAC Case Manager to navigate complex advocacy processes and access additional resources. Their VAC assigned Case Manager can help coordinate care and provide guidance tailored to Veteran healthcare needs. You may also contact the OBH Support Line for personalized support.

Stay Organized
Maintain a binder, folder, or digital record to organize medical records, care plans, and other important documents. This system will streamline communication with healthcare providers and ensure quick access to critical information when needed.

07 Self-Care

What is Burnout?

Burnout is a state of physical, emotional, or mental exhaustion, accompanied by decreased motivation, lowered performance, and negative attitudes toward oneself and others.

Signs & Symptoms

Physical

- Feeling tired and drained most of the time
- Lowered immunity, frequent illnesses
- Frequent headaches or muscle pain
- Change in appetite or sleep habits

Emotional

- Sense of failure and self-doubt
- Feeling helpless, trapped and defeated
- Detachement, feeling alone in the world
- Loss of motivation
- Increasingly cynical and negative outlook
- Decreased satisfaction and sense of accomplishment

Behavioural

- Withdrawing from responsibilities
- Isolating from others
- Procrastinating, taking longer to get things done
- Using food, drugs or alcohol to cope
- Taking frustrations out on others
- Skipping work or coming in late and leaving early

Look After Yourself

Setting aside time for self-care is an essential part of navigating the challenges of managing a concussion, persistent post-concussion symptoms (PPCS), or suspected CTE, whether you're a patient or a caregiver. Taking care of yourself is crucial for your well-being.

As a patient, recognizing the importance of self-care is key to your overall recovery and well-being. This could mean taking a "break" from focusing on recovery by making time for things you enjoy, provided symptoms are minimal or tolerable. For caregivers, dedicating time to self-care is equally vital. The demands of providing support and understanding can be emotionally taxing, making it essential for caregivers to recharge.

Put your healthcare needs first and reach out if you need help. Prioritize activities that build your physical, emotional, mental, and spiritual energy, such as:


Regular exercise


Mental health counselling


Meditation


Mindfulness


Reading


Listening to music


Cooking

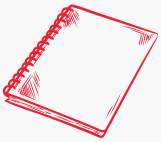

Rest & relaxation


Healthy diet


Socialization


Getting good sleep


Engaging in hobbies


Journaling


Seeking support & help


Establishing & maintaining boundaries


Spending time in nature

Self-Advocacy for Patients

As a **patient**, effective self-advocacy is crucial.

Here are recommendations to empower you in advocating for yourself:

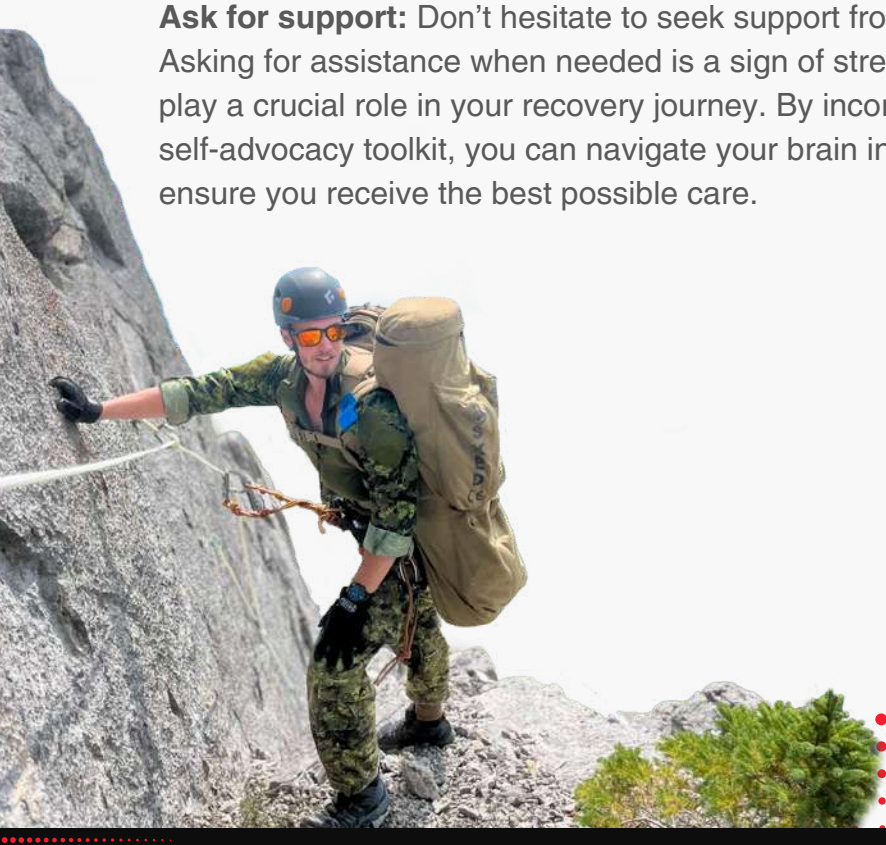
Learn the basics of brain injury: Understanding your injury, symptoms, and treatment options equips you to advocate effectively by being well-informed about your own healthcare journey.

Find the right providers: Optimal care comes from medical and mental health providers with specialized knowledge in brain injuries. Refuse to compromise; seek professionals experienced in concussions and those you trust. For recommendations, visit the OBH Support Line for guidance on providers in your area.

Know your rights: Being aware of your rights as a patient ensures you receive fair and appropriate treatment. Health and privacy laws vary by province/territory, with specific regulations governing patient rights and protections. Familiarize yourself with your province/territory laws to advocate for the care you deserve. Consider reaching out to your local Brain Injury Association for support.

Set Expectations: Establishing clear needs and boundaries in your school, work, or healthcare interactions can maintain your comfort throughout your recovery by creating a shared understanding. Communicate your limits to contribute to respectful and effective relationships.

Ask for support: Don't hesitate to seek support from friends, family, or support groups. Asking for assistance when needed is a sign of strength, and a supportive network can play a crucial role in your recovery journey. By incorporating these practices into your self-advocacy toolkit, you can navigate your brain injury journey with confidence and ensure you receive the best possible care.



Self-Advocacy for Caregivers

As a **caregiver**, advocating for your loved one and yourself is crucial.

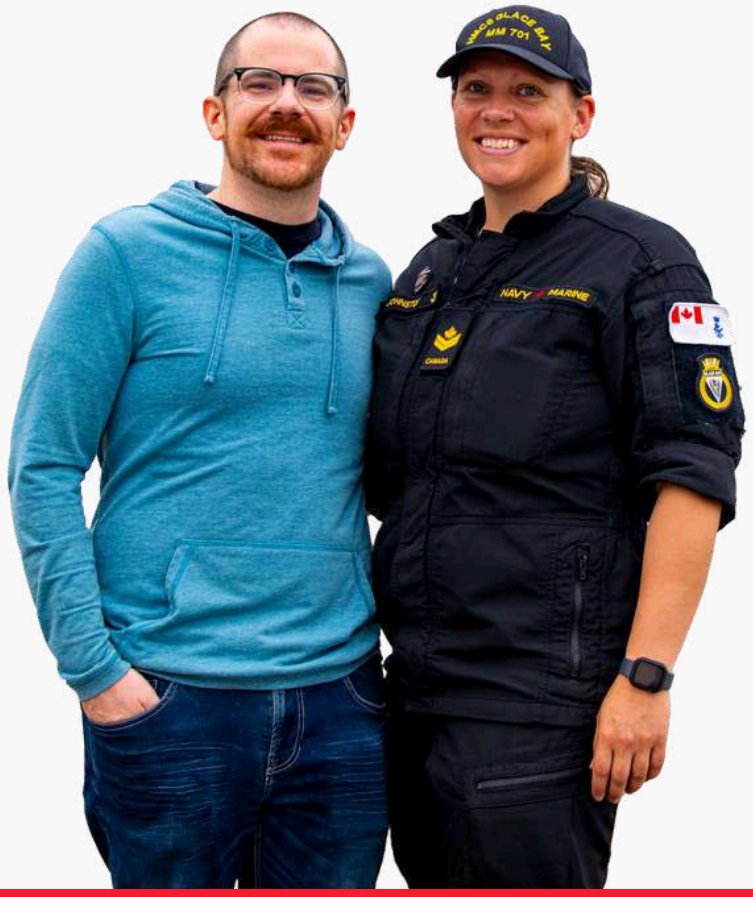
Here are recommendations on how to effectively advocate for yourself:

Learn the basics of brain injury: Understanding the facts about brain injuries and symptoms enables you to empathize with your loved one. This knowledge forms a foundation for providing better support and can highlight the steps you can take to minimize the impact these injuries can have on your close relationships.

Explore family resources: Inquire with medical and mental health providers about available resources for your family. This may involve seeking family counselling, exploring respite care options, and accessing additional support services. Understanding and utilizing these resources can contribute to the well-being of both you and your loved one.

Explore financial resources: Brain injuries often bring additional financial challenges, from medical expenses to necessary home accommodations. Your local MFRC and Legion have resources that can alleviate some of the economic burdens associated with the care your loved one requires.

By incorporating these strategies into your approach, you not only enhance your ability to support your loved one but also prioritize your own well-being as a caregiver.



Creating a Support Network

It is crucial to create a caring and supportive network of loved ones, friends, medical professionals, and others that patients and caregivers can rely on during their recovery. Engage in regular discussions with those you can trust and find reliable people who can provide support for needs that will emerge. Transparency about your experiences is key. Additionally, consider expanding your support network to include community groups or online forums where you can connect with others facing similar challenges. Examples of these resources are provided later in this section.

Creating a Resource Toolbox

A resource toolbox is your go-to list of supportive services and organizations that you can quickly access. It is always helpful to know who you can reach out to for additional support, guidance, information, and resources when times get tough. If you or your loved one needs help, do not hesitate to reach out.

The table below is an example list:

Organization	Contact
Suicide Crisis Helpline	Dial 988 Text 988
Suicide.ca (Quebec)	1-866-277-3553
Ground Support For Veterans - Crisis Line	1-888-228-3871
Boots on the Ground 24/7 Peer Support	1-833-677-2668
Veterans Affairs Canada (VAC) Assistance Services *available 24/7*	1-800-268-7708
Canadian Centre on Substance Use and Addiction Helplines	Addiction Treatment Helplines
ShelterSafe Domestic Violence Helplines	Provincial/Territorial Lines
Government of Canada Family Violence Resources	Provincial/Territorial Resources
Government of Canada Mental Health Support Resources	Provincial/Territorial Resources
Canadian Mental Health Association (CMHA)	Find your CMHA
Operational Stress Injury Social Support (OSISS)	1-800-883-6094
BSO Legion OSI	Email: membership.bso.osi@gmail.com Learn more
Family Information Line available 24/7	1-800-866-4546
Operation Brain Health OBH Support Line	OBH Support Line

CLFC Military Programs

The Concussion Legacy Foundation Canada (CLFC) offers various support opportunities throughout the country. These opportunities include virtual Zoom peer support groups, 1:1 connections with peers, a virtual walking challenge, and our new Operation Brain Health App.

To enroll in our 1:1 program or to learn more about the programs listed below, patients and caregivers can reach out through the OBH Support Line.

Operation Brain Health OBH Support Line: Operated by the CLF HelpLine, the Operation Brain Health OBH Support Line supports current and former serving members and their families.

CLFC Zoom Support Groups: CLFC's support groups allow you to connect with other patients and caregivers across the country via Zoom. Register here. We also offer specific groups for former and currently serving military Veterans. Information on those groups is included here.

CLF 1:1 Peer Support Connection: CLF's Peer Support Connection program offers 1-on-1 partnerships with trained volunteers who understand the unique challenges of experiencing a concussion and having persistent symptoms or being a caregiver for someone with PPCS or suspected CTE. Volunteers are caregivers who have navigated similar challenges and want to give back to the brain-injured community by sharing what their own journey taught them.

Operation Brain Health Support Groups: Provide a safe space for serving and non-serving Veterans to share experiences, ask questions, find resources, and connect with others. You can view available dates and times and register for a group here.

Participate in Research: Concussion Legacy Foundation Canada is proud to collaborate with the Canadian Concussion Centre (CCC) and the Brain Health Imaging Centre at the Centre for Addiction and Mental Health to advance critical research in Canadian athletes and on TBI, PTSD, and CTE in military Veterans through Project Enlist Canada.

To participate in future research or simply show your support, join the CLF Research Registry.

Operation Brain Health

The goals of Operation Brain Health are to:

1. **Improve the daily lives of those within the Veteran community** who are navigating the effects of traumatic brain injury (TBI)
2. **Increase awareness** about concussions and related long-term health conditions among Veterans.
3. **Increase accessibility to research** initiatives seeking to address these long-term effects in Veterans.

Operation Brain Health promotes healthy brain habits, built on 4 pillars: physical activity, nutrition, rest, and cognitive reserve.

Operation Brain Health Field Manual Videos:

- Making Incremental Change
- Start Simple
- Falling Forward
- Creating Motivation
- Accountability
- General Meditation
- Corrective Exercise Session 1 with Connor McDavid
- Exercise and Brain Injury Recovery
- Brain Health and Nutrition
- How to Optimize Your Brain Health

Operation Brain Health App: The mission statement and guiding principle of the Operation Brain Health app is “Go for a walk, tap a button.” The app is a self-management tool to help users make incremental changes and build cognitive reserve. At its core, its purpose is to track the habits and behaviours of Veterans to encourage and motivate them to partake in healthy habits.

Download the Operation Brain Health App from the App Store or Google Play.

Operation Brain Health Strava Group: The mission of the OBH Strava group is to create a community to support Veterans' brain health through daily walks. The #TeamUpWalk initiative, part of the Operation Brain Health program, encourages Veterans to take a daily walk to improve their mental and physical well-being. By joining the group, you'll connect with a community of Veterans across Canada, share your progress, and receive support and encouragement.

The Operation Brain Health (OBH) Strava group can be accessed here.

08 Additional Support & Resources

Additional Resources for Veterans, Caregivers, and Families

If you'd like to speak to a mental health professional, the VAC Assistance Service provides free and confidential support for all Veterans, former RCMP members, their families, and caregivers. Call 1-800-268-7708.

In addition, several national organizations provide support to Veterans and their families.

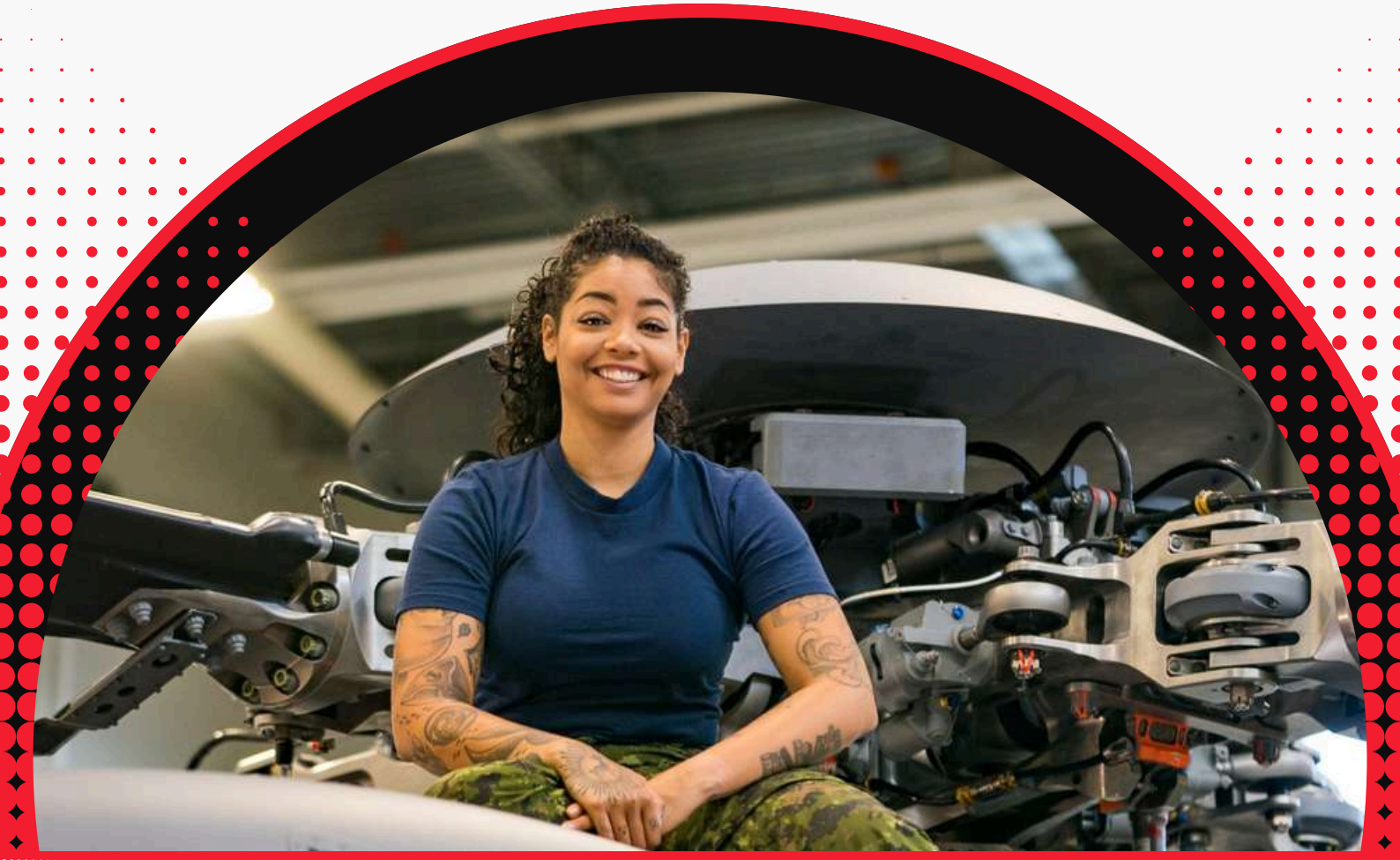
- The Royal Canadian Legion
- True Patriot Love Veteran Hub
- Military Career Transition
- Wounded Warrior Project Canada
- Canadian Forces Income Support (CFIS)
- Support Our Troops
- Canadian Forces and Morale
- Legion Fund Financial Assistance
- Veterans and Everyday Heroes
- Can Praxis
- Helping Heroes Heal
- Project Trauma Support
- Veteran Family Journal
- Veteran Family Telemedicine program
- VFP Transition Program
- Military Family Resource Centres (MFRCs)
- Family Peer Support - (OSSIS)
- Operational Stress Injury Resource for Caregivers
- HOPE Program
- Strongest Families Institute
- Carers Canada
- Caring for caregivers

09 Conclusion

Navigating symptoms related to brain injury is a profoundly challenging, overwhelming, and complex journey for both patients and caregivers. Whether you are trying to find initial support, advocating continuously for yourself or your loved one, or preparing for the long-term impact of persistent symptoms, the journey demands organization, patience, compassion, and resourcefulness. One of the most valuable resources for patients and caregivers is to find and hold on to hope.

Hope propels us through our toughest challenges. It instills the belief that a better future is possible, inspiring us to take action. Hope has the power to alleviate depression and improve mental health. It is a crucial component of recovery for those struggling with concussion symptoms and can be shared, fostering a supportive community.

Remember, you are not alone. This guidebook provides a wealth of resources designed to offer recommendations, support, and guidance. Reach out when you need help, and lean on the support networks available to you. By staying informed, advocating for the right care, and prioritizing self-care, you can navigate the journey of brain injury recovery with resilience and hope. Keep the life-source of hope alive - it's not just an aspiration, but a critical part of the healing process.



Acknowledgements

This guidebook was made possible by the generosity and dedication of experts, volunteers, and patients and caregivers with lived experiences.

The Concussion Legacy Foundation Canada would like to thank the following individuals and organizations for their support in the creation of this guidebook:

- True Patriot Love Foundation
- The Royal Canadian Legion
- Veterans Affairs Canada
- Concussion Legacy Foundation Canada Donors

What is the Concussion Legacy Foundation Canada?

The Concussion Legacy Foundation Canada (CLFC) is a registered Canadian charity (83245441 RR 0001) with collaborators in the United States, Australia, and the United Kingdom. It was founded by Tim Fleiszer to help address and solve the concussion crisis in Canada. CLFC's mission is to advance the study, treatment, and prevention of the effects of brain trauma and associated mental health implications in Canadian athletes, military personnel, youth, and other at-risk groups.

What is Project Enlist Canada?

Project Enlist Canada is a military focused initiative under the oversight of the Concussion Legacy Foundation Canada. Project Enlist Canada encompasses all military programs provided by the Concussion Legacy Foundation Canada.

Our flagship research program aims to serve as a catalyst for critical research on traumatic brain injury (TBI), chronic traumatic encephalopathy (CTE), and Post-Traumatic Stress Disorder (PTSD) in military Veterans and service members. TBI due to blast injuries or other service-related causes is a significant issue in the military community, and Project Enlist Canada aims to accelerate the development of effective treatments and diagnostic tests for these conditions. By encouraging participation in research, Project Enlist supports the women and men who courageously serve our nation.

Through Operation Brain Health, our military education and support program, we aim to provide Canadian Veterans and their caregivers with the tools to manage their symptoms and improve their quality of life **today**. Operation Brain Health includes several sub-programs and initiatives to help Veterans and their caregivers learn more about their symptoms, find knowledgeable healthcare providers, connect with peers, and improve lifestyle factors associated with brain health.

10 Appendix & Helpful Templates

Symptom Log

How to Put Together Your Concussion History

Noteworthy Findings about TBIs

The CDC estimates that there are about 3 million TBI-related emergency department (ED) visits, hospitalizations, and deaths in the United States each year. The leading cause of all TBI-related ED visits is falls, which account for 48% of visits. Another leading cause is blunt trauma accidents, including being struck by or against an object, and sports-related injuries. Injuries from a variety of sources – including vehicular accidents, abuse, and blast exposure – can also cause concussions to occur [38].

Traumatic brain injuries (TBI) are a significant public health concern in Canada. By 2031, TBI is expected to be among the most common neurological conditions affecting Canadians, along with Alzheimer's disease and other dementias, and epilepsy [39].

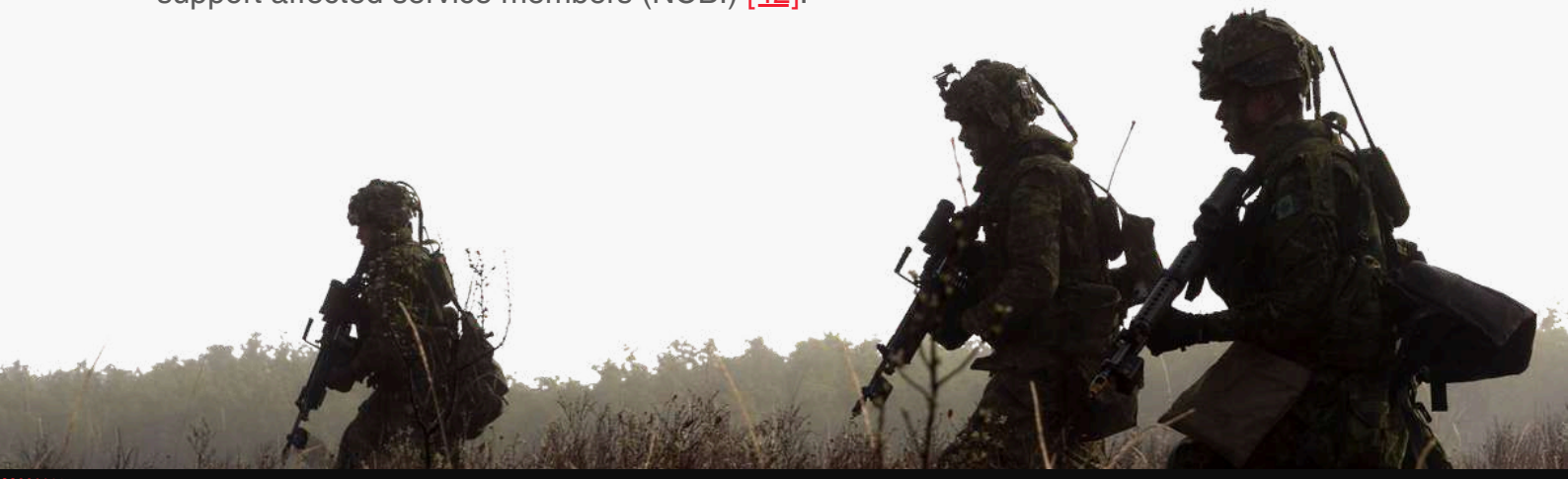
Concussions, a common form of TBI, makeup around 74% of all reported TBIs across all ages [40].

Brain injury has been identified as a risk factor for Alzheimer's disease and other dementias in men, and epilepsy in both sexes [39].

Other Noteworthy Findings about TBI in the Military

Prevalence and Causes of Deployment-Related mTBI in Military Personnel
Deployment-related mild traumatic brain injury (mTBI) is a significant health issue among military personnel. Studies estimate that the prevalence of deployment-related mTBI ranges from 4.4% to 23%, particularly among individuals with heavy combat exposure (PMC) [41].

Approximately 25% of Canadian Armed Forces (CAF) personnel with deployment-related mTBI report experiencing three or more post-concussive symptoms (PCS) six months after injury, suggesting potential long-term effects (NCBI). Deployment-related mTBI also significantly impacts fitness-for-duty, emphasizing the need for targeted interventions to support affected service members (NCBI) [42].



Canadian Armed Forces and TBI Prevalence

Research highlights the high prevalence of traumatic brain injuries (TBIs) among CAF personnel. Persistent TBIs are notably associated with chronic pain conditions in active-duty and Veteran soldiers [43]. CAF service members also face higher rates of mild TBIs and psychosocial risk factors, such as mental health diagnoses, sleep disturbances, alcohol consumption, and post-concussion symptoms, compared to Canadian civilians [44].

Co-Occurrence of TBI and PTSD

The co-occurrence of TBI and Post-Traumatic Stress Disorder (PTSD) can result from the same or separate traumatic incidents, further complicating recovery for military personnel. Integrated behavioural health interventions, which combine various therapeutic approaches, show promise in addressing co-occurring mental health diagnoses in this population (PMC) [44].

Cognitive Impacts and Blast Exposure

Deployment-related TBI independently affects cognitive performance, particularly in attention and processing speed, regardless of PTSD. Blast exposure significantly exacerbates cognitive deficits associated with deployment TBI, particularly in tests of attention (PMC) [45].

TBI and Long-Term Health Outcomes

Military Veterans with TBI are diagnosed with dementia 1.5 to 1.8 years earlier than those without TBI, with an average diagnosis occurring 3.6 years post-injury. This underscores the need for early intervention and monitoring following TBI [46].

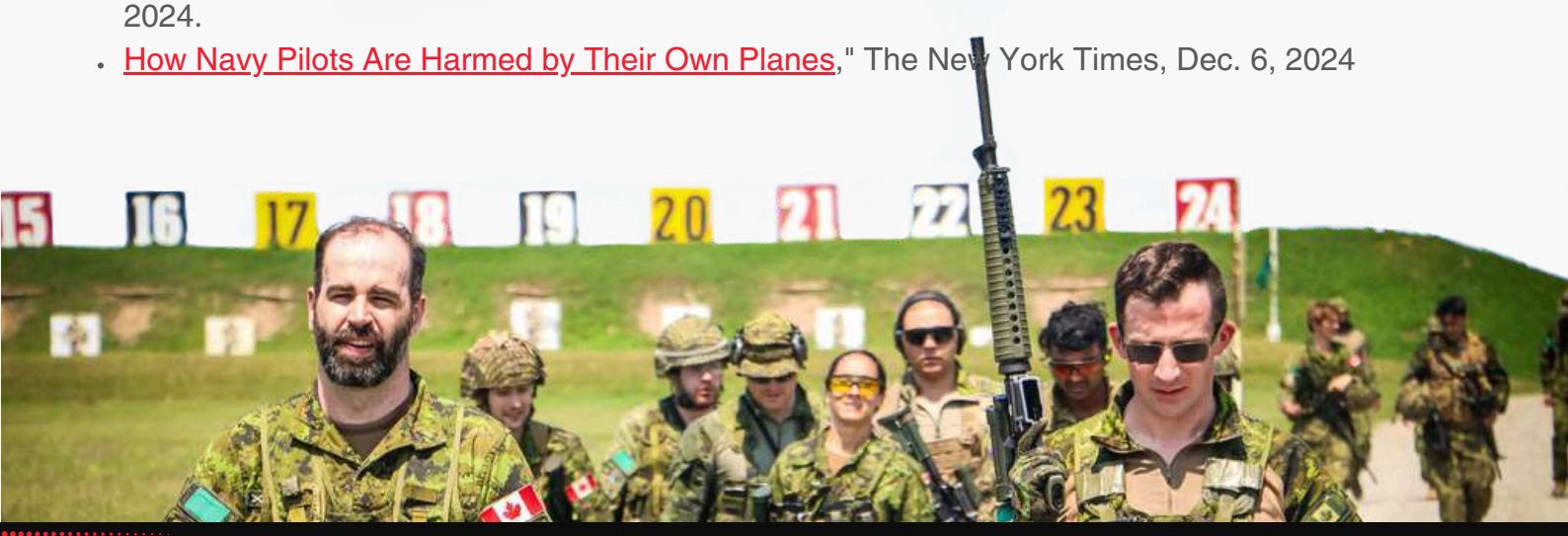
Repetitive mTBI in military personnel is linked to chronic traumatic encephalopathy (CTE), a neurodegenerative condition associated with tau protein accumulation. CTE has been documented in Veterans exposed to explosive blasts and other repetitive brain trauma during combat, training, or sports participation [17].

Chronic Traumatic Encephalopathy and Military Veterans

CTE has been documented in military Veterans, particularly those who experienced repetitive mild traumatic brain injury (mTBI) from activities such as combat, training exercises, and participation in sports [47].

Military TBI in the Media

- The toll on a sniper's brain - Legion Magazine
- Help for those living with concussion - Legion Magazine
- Researchers investigating head trauma in the Canadian military want veterans to 'pledge their brain' - CTV News
- Project Enlist seeks veterans to pledge to donate their brains - Canadian Military Family Magazine
- U.S. Troops Still Train on Weapons With Known Risk of Brain Injury, The New York Times, Nov. 26, 2023
- A Secret War, Strange New Wounds, and Silence From the Pentagon," The New York Times, Nov. 5, 2023. Updated Mar. 15, 2024 -
- The Army Said Tank Blasts Don't Harm Troops. His Case Raises Doubts," The New York Times, Dec. 21, 2023. -
- Five Takeaways From a Times Investigation of Artillery Blast Exposure," The New York Times, Nov. 5, 2023.
- Pattern of Brain Damage Is Pervasive in Navy SEALs Who Died by Suicide," The New York Times,
- Pentagon Starts Outreach Program on Blast Risks From Weapons Use," The New York Times, Dec. 13, 2023.
- How U.S. Troops Were Harmed By Firing Their Own Guns," The New York Times, Nov. 13, 2023.
- Signs of Brain Injury in Mortar Soldiers: 'Guys Are Getting Destroyed'," The New York Times, May 2, 2024. Updated May 3, 2024
- Bill in Congress Would Force Action on U.S. Troops' Blast Exposure," The New York Times, Apr. 9, 2024.
- Pentagon Data Shows High Suicide Rates Among Troops Exposed to Blasts," The New York Times, July 31, 2024
- Chronic Brain Trauma Is Extensive in Navy's Elite Speedboat Crews," The New York Times, Nov. 12, 2024.
- Top-Gun Navy Pilots Fly at the Extremes. Their Brains May Suffer," The New York Times, Dec. 8, 2024.
- Our Reporter on How Blast Waves Can Injure the Brain," The New York Times, June 30, 2024
- Defense Bill Orders Military to Take New Action on Brain Injury," The New York Times, Dec. 15, 2024.
- How Navy Pilots Are Harmed by Their Own Planes," The New York Times, Dec. 6, 2024



11 Reference and Sources

[1] CDC. (2024, May 16). Concussion Basics. HEADS UP. https://www.cdc.gov/heads-up/about/index.html

[2] Centers for Disease Control and Prevention, "mTBI Management Guideline," 29 4 2024. [Online]. Available: https://www.cdc.gov/traumatic-brain-injury/hcp/data-research/index.html

[3] S. Polinder, M. C. Cnossen, R. G. L. Real, A. Covic, A. Gorbunova, D. C. Voormolen, C. L. Master, J. A. Haagsma, R. Diaz-Arrastia, and N. von Steinbuechel, "A Multidimensional Approach to Post-Concussion Symptoms in Mild Traumatic Brain Injury," Frontiers in Neurology, vol. 9, Article 1113, 2018. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC6306025/

[4] M. S. Fralick, H. A. Thiruchelvam, B. Mamdani, M. J. Colantonio, M. E. Klein-Geltink, & T. A. Redelmeier, "Association of Concussion With the Risk of Suicide: A Systematic Review and Meta-analysis," JAMA Neurology, 2019. [Online]. Available: https://jamanetwork.com/journals/jamaneurology/fullarticle/2712851

[5] A.-A. Ledoux, R. J. Webster, A. E. Clarke, D. B. Fell, B. D. Knight, W. Gardner, P. Cloutier, C. Gray, M. Tuna, and R. Zemek, "Risk of Mental Health Problems in Children and Youths Following Concussion," JAMA Network Open, vol. 5, no. 3, e224320, 2022. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/35254429/

[6] The Royal Canadian Legion, "Legion Donates $75,000 to Fund Concussion Awareness, Research and Recovery in the Veteran Community," Legion News, Dec. 20, 2021. [Online]. Available: https://www.legion.ca/news/2021/12/20/legion-donates-$75-000-to-fund-concussion-awareness-research-and-recovery-in-the-veteran-community

[7] Defense Health Agency. DOD Numbers for Traumatic Brain Injury Worldwide. Available online: https://health.mil/Reference-Center/Reports/2024/12/30/2024-Q2-DOD-Worldwide-Numbers-for-TBI

[8] Veterans Affairs Canada. Well-being of Canadian Regular Force Veterans, Findings from LASS 2019 Survey. 2020. Available online at: https://publications.gc.ca/collections/collection_2020/acc-vac/V3-1-7-2020-eng.pdf

[9] M. J. Moore, E. Shawler, C. H. Jordan, and C. A. Jackson, "Veteran and Military Mental Health Issues," StatPearls, StatPearls Publishing, 2023. [Online]. Available: https://www.ncbi.nlm.nih.gov/books/NBK572092/

[10] D. L. Chin and J. E. Zeber, "Mental Health Outcomes Among Military Service Members After Severe Injury in Combat and TBI," Military Medicine, vol. 185, no. 9-10, pp. e1489–e1495, 2020. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/31889174/

[11] A. N. Clausen, H. C. Bouchard, K. A. Welsh-Bohmer, and R. A. Morey, "Assessment of Neuropsychological Function in Veterans With Blast-Related Mild Traumatic Brain Injury and Subconcussive Blast Exposure," Journal of the International Neuropsychological Society, vol. 28, no. 10, pp. 1051–1065, 2022. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/34262512/

[12] S. Shahrestani, A. M. Ballatori, A. Ton, X. T. Chen, A. Zargarian, A. K. Chan, B. A.Strickland, A. Brunswick, A. Micko, and G. Zada, "Demographic-Dependent Risk of Developing Severe Novel Psychiatric Disorders After Concussion," Journal of Neurotrauma, vol. 38, no. 14, pp. 1945–1953, 2021. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/33678007/

[13] L. A. Brenner, J. E. Forster, J. L. Gradus, T. A. Hostetter, C. A. Hoffmire, C. G. Walsh, M. J. Larson, K. A. Stearns-Yoder, and R. S. Adams, "Associations of Military-Related Traumatic Brain Injury With New-Onset Mental Health Conditions and Suicide Risk," JAMA Network Open, vol. 6, no. 7, e2326296, 2023. [Online]. Available: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2807787

[14] D. E. Barnes, A. L. Byers, R. C. Gardner, K. H. Seal, W. J. Boscardin, and K. Yaffe,"Association of Mild Traumatic Brain Injury With and Without Loss of Consciousness With Dementia in US Military Veterans," JAMA Neurology, vol. 75, no. 9, pp. 1055–1061, 2018. [Online]. Available: https://jamanetwork.com/journals/jamaneurology/fullarticle/2679879

[15] R. C. Gardner, A. L. Byers, D. E. Barnes, Y. Li, J. Boscardin, and K. Yaffe, "Mild TBI and risk of Parkinson disease: A Chronic Effects of Neurotrauma Consortium Study," Neurology, vol. 90, no. 20, pp. e1771–e1779, 2018. [Online]. Available: https://www.neurology.org/doi/10.1212/WNL.0000000000005522

[16] L. E. Goldstein, A. M. Fisher, C. A. Tagge, X.-L. Zhang, L. Velisek, J. A. Sullivan, C. Upreti, J. M. Kracht, M. Ericsson, M. W. Wojnarowicz, et al., "Chronic Traumatic Encephalopathy in Blast-Exposed Military Veterans and a Blast Neurotrauma Mouse Model," Science Translational Medicine, vol. 4, no. 134, 2012. [Online]. Available: https://www.science.org/doi/10.1126/scitranslmed.3003716

[17] A. C. McKee and M. E. Robinson, "Military-related traumatic brain injury and neurodegeneration," Neurobiology of Disease, vol. 72, pp. 9–19, 2014. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1552526014001319?via%3Dihub

[18] J. N. Belding, R. Englert, J. Bonkowski, and C. J. Thomsen, "Occupational Risk of Low-Level Blast Exposure and TBI-Related Medical Diagnoses: A Population-Based Epidemiological Investigation (2005–2015)," PLOS ONE, vol. 16, no. 3, e0247873, 2021. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC8700773/

[19] D. I. Katz, C. Bernick, D. W. Dodick, J. Mez, M. L. Mariani, C. H. Adler, M. L. Alosco, L. J. Balcer, S. J. Banks, W. B. Barr, et al., "National Institute of Neurological Disorders and Stroke Consensus Diagnostic Criteria for Traumatic Encephalopathy Syndrome," Neurology, vol. 101, no. 2, pp. 76-87, 2023. [Online]. Available: https://www.neurology.org/doi/10.1212/WNL.0000000000011850.

[20] S. Kim, J. Ollinger, C. Song, S. Raiciulescu, S. Seenivasan, A. Wolfgang, J. K. Werner, and P. H. Yeh, "White Matter Alterations in Military Service Members With Remote Mild Traumatic Brain Injury," JAMA Network Open, vol. 7, no. 4, p. e248121, 2024. [Online]. Available: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2817808

[21] P.-H. Yeh, S. M. Lippa, T. A. Brickell, J. Ollinger, L. M. French, and R. T. Lange, "Longitudinal Changes of White Matter Microstructure Following Traumatic Brain Injury in U.S. Military Service Members," J. Neurotrauma, vol. 39, no. 15-16, pp. 1073–1085, 2022. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC9185378/

[22] R. Glikstein, G. Melkus, E. P. de Oliveira, M. L. Brun-Vergara, B. A. Schwarz, T. Ramsay, T. Zhang, and C. Skinner, "Five-Year Serial Brain MRI Analysis of Military Members Exposed to Chronic Sub-Concussive Overpressures," Front. Neurol., vol. 15, 2024. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC11645495/

[23] K. G. Solar, M. Ventresca, R. Zamyadi, J. Zhang, R. Jetly, O. Vartanian, S. G. Rhind, and B.T. Dunkley, "Repetitive Subconcussion Results in Disrupted Neural Activity Independent of Concussion History," Front. Neurol., vol. 15, 2023. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC11495223/

[24] L. E. Goldstein, A. M. Fisher, C. A. Tagge, X.-L. Zhang, L. Velisek, J. A. Sullivan, C. Upreti, J. M. Kracht, M. Ericsson, M. W. Wojnarowicz, et al., "Chronic Traumatic Encephalopathy in Blast-Exposed Military Veterans and a Blast Neurotrauma Mouse Model," Sci. Transl. Med., vol. 4, no. 134, 2012. [Online]. Available: https://www.science.org/doi/10.1126/scitranslmed.3003716

[25] C. W. Hoge, D. McGurk, J. L. Thomas, A. L. Cox, C. C. Engel, and C. A. Castro, "Mild Traumatic Brain Injury in U.S. Soldiers Returning from Iraq," N. Engl. J. Med., vol. 358, no. 5, pp. 453-463, 2008. [Online]. Available: https://www.nejm.org/doi/full/10.1056/NEJMoa072972

[26] H. Terrio, L. A. Brenner, B. J. Ivins, J. M. Cho, K. Helmick, K. Schwab, K. Scally, R. Bretthauer, and D. Warden, "Traumatic Brain Injury Screening: Preliminary Findings in a US Army Brigade Combat Team," J. Head Trauma Rehabil., vol. 24, no. 1, pp. 14-23, 2009. [Online]. Available: https://journals.lww.com/headtraumarehab/abstract/2009/01000/traumatic_brain_injury_screening__preliminary.3.aspx

[27] R. S. Bell, A. H. Vo, C. J. Neal, J. Tigno, R. Roberts, C. Mossop, J. R. Dunne, and R. A. Armonda, "Military Traumatic Brain and Spinal Column Injury: A 5-Year Study of the Impact Blast and Other Military Grade Weaponry on the Central Nervous System," J. Trauma, vol. 66, no. 4 Suppl, pp. S104-S111, 2009. [Online]. Available: https://journals.lww.com/jtrauma/abstract/2009/04001/military_traumatic_brain_and_spinal_column_injury_.13.aspx

[28] M. R. Galarneau, S. I. Woodruff, J. L. Dye, C. R. Mohrle, and A. L. Wade, "Traumatic Brain Injury During Operation Iraqi Freedom: Findings from the United States Navy–Marine Corps Combat Trauma Registry," J. Neurosurg., vol. 108, no. 5, pp. 950–957, 2008. [Online]. Available: https://thejns.org/view/journals/j-neurosurg/108/5/article-p950.xml

[29] S. J. Wolf, V. S. Bebarta, C. J. Bonnett, P. T. Pons, and S. V. Cantrill, "Blast Injuries," The Lancet, vol. 374, no. 9687, pp. 405–415, 2009. [Online]. Available: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)60257-9/abstract

[30] J. P. Hayes, "PTSD and TBI Comorbidity," PTSD Research Quarterly, vol. 30, no. 2, National Center for PTSD, 2019. [Online]. Available: https://www.ptsd.va.gov/publications/rq_docs/V30N2.pdf

[31] M. Besemann, Mild Traumatic Brain Injury in the Canadian Armed Forces: Defining the Problem, Mitigating the Risk, Chief of Military Personnel, National Defence Canada, PowerPoint presentation.

[32] R. Cantu and A. Budson, "Management of Chronic Traumatic Encephalopathy," Expert Review of Neurotherapeutics, vol. 19, no. 11, pp. 1015–1023, 2019. [Online]. Available: https://www.tandfonline.com/doi/10.1080/14737175.2019.1633916

[33] UD. A. B. R. &. D. N. M. Godoy, "Glucose control in acute brain injury: does it matter?," Current opinion in critical care, pp. 120-127, 2016.

[34] K. G. Solar, M. Ventresca, R. Zamyadi, J. Zhang, R. Jetly, O. Vartanian, S. G. Rhind, and B.T. Dunkley, "Repetitive Subconcussion Results in Disrupted Neural Activity Independent of Concussion History," Front. Neurol., vol. 15, 2023. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC11495223/

[35] K. G. Solar, M. Ventresca, R. Zamyadi, J. Zhang, R. Jetly, O. Vartanian, S. G. Rhind, and B.T. Dunkley, "Repetitive Subconcussion Results in Disrupted Neural Activity Independent of Concussion History," Front. Neurol., vol. 15, 2023. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC11495223/

[36] M. A. Krakovski, N. Arora, S. Jain, J. Glover, K. Dombrowski, B. Hernandez, H. Yadav, and A. K. Sarma, "Diet-Microbiome-Gut-Brain Nexus in Acute and Chronic Brain Injury," Frontiers in Neuroscience, vol. 16, Article 1002266, 2022. [Online]. Available: https://www.frontiersin.org/articles/10.3389/fnins.2022.1002266/full

[37] K. Saadatmand, S. Khan, Q. Hassan, R. Hautamaki, R. Ashouri, J. Lua, and S. Doré, "Benefits of Vitamin D Supplementation to Attenuate TBI Secondary Injury?" Translational Neuroscience, vol. 12, no. 1, pp. 1–11, 2021. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/34992852/

[38] "Traumatic Brain Injury-related Deaths by Age Group, Sex, and Mechanism of Injury: 2018-2019," Centers for Disease Control and Prevention, 2020.

[39] Public Health Agency of Canada, "Mapping Connections: An Understanding of Neurological Conditions in Canada," Ottawa, 2014. [Online]. Available: https://www.canada.ca/en/public-health/services/reports publications/mapping-connections-understanding-neurological-conditions.html

[40] Government of Canada, "Traumatic Brain Injuries: Data Blog," Health Infobase, 2024-09-05. [Online]. Available: https://health-infobase.canada.ca/brain-injuries/

[41] B. G. Garber, C. Rusu, and M. A. Zamorski, "Deployment-Related Mild Traumatic Brain Injury, Mental Health Problems, and Post-Concussive Symptoms in Canadian Armed Forces Personnel," Canadian Journal of Psychiatry, vol. 59, no.+ 11, pp. 531–539, 2014. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC4243369/

[42] B. G. Garber, C. Rusu, M. A. Zamorski, and D. Boulos, "Occupational Outcomes Following Mild Traumatic Brain Injury in Canadian Military Personnel Deployed in Support of the Mission in Afghanistan: A Retrospective Cohort Study," BMJ Open, vol. 6, no. 5, e010780, 2016. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC4861116/

[43] M. J. Seager, "An Examination of the Relationship Between Persistent Traumatic Brain Injuries and Chronic Pain Conditions in Active-Duty and Veteran Soldiers: Results from the Canadian Armed Forces Members and Veterans Mental Health Follow-up Survey," Master's thesis, University of Manitoba, Winnipeg, Canada, 2020. [Online]. Available: https://mspace.lib.umanitoba.ca/items/d3a4b028-ef21-4ce2-9bef-40e50f048e55

[44] C. Jones, A. Pike, and S. Brémault-Phillips, "Brain Bootcamp: Pre–Post Comparison Findings of an Integrated Behavioural Health Intervention for Military Members with Reduced Executive Cognitive Functioning," Journal of Military, Veteran and Family Health, vol. 4, no. 1, pp. 5–15, 2018. [Online]. Available: https://www.ualberta.ca/en/rehabilitation/media-library/faculty-site/research/himarc/jmvfh20180005.pdf

[45] S. L. Martindale, A. S. Ord, and J. A. Rowland, "Influence of Blast Exposure on Cognitive Functioning in Combat Veterans," Journal of Neurotrauma, vol. 38, no. 17, pp. 2390–2399, 2021. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC8363214/

[46] D. E. Barnes, A. L. Byers, R. C. Gardner, K. H. Seal, W. J. Boscardin, and K. Yaffe, "Association of Mild Traumatic Brain Injury With and Without Loss of Consciousness With Dementia in US Military Veterans," JAMA Neurology, vol. 75, no. 9, pp. 1055–1061, 2018. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC6143113/

[47] T. D. Stein, V. E. Alvarez, and A. C. McKee, "Chronic Traumatic Encephalopathy: A Spectrum of Neuropathological Changes Following Repetitive Brain Trauma in Athletes and Military Personnel," Alzheimer's Research & Therapy, vol. 6, Article 4, 2014. [Online]. Available: https://alzres.biomedcentral.com/articles/10.1186/alzrt234