

# TRAUMATIC BRAIN INJURY

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## **Brain Injury Association of New York State**

10 Colvin Avenue

Albany, NY 12206-1242

Telephone: (518) 459-7911 • Fax: (518) 482-5285

Family Help Line: (800) 228-8201

E-mail: [info@bianys.org](mailto:info@bianys.org) • Web Site: [www.bianys.org](http://www.bianys.org)

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**the  
first  
steps**

**Traumatic Brain Injury (TBI)** is called the “signature wound” of Operation Enduring Freedom and Operation Iraqi Freedom. If your family member was exposed to a blast, was in a vehicle crash, or had his or her head hit or jolted while on duty, he or she might have a brain injury.

Often, this type of injury goes undiagnosed and untreated. You may not see any symptoms of a brain injury for months after the injury has occurred. Changes in behavior and mood, sleep patterns, and the ability to concentrate or remember things may become apparent as time passes. These changes can have long-term consequences for you and your family. Learning how the brain might have been affected by a traumatic brain injury will give you important information for diagnosis and treatment.

**You are not alone.** Every 23 seconds someone in the United States sustains a brain injury - over 1.5 million people each year. An estimated 5.3 million Americans - a little more than 2% of the population - currently live with disabilities resulting from brain injury. It is estimated that each year one million people are treated for traumatic brain injury and released from the hospital. And, 80,000 Americans experience the onset of long-term disability following traumatic brain injury annually.

**Each brain injury is unique.** To make this guide most useful, much of the information it provides is broad in scope. It is important that you learn specifically what type of brain injury your family member has sustained, and the specific symptoms/treatments that are associated with that type of injury.

**This booklet will help you answer the following questions:**

- What is brain injury?
- What do I look for in cases of mild brain injury?
- What are the long-term symptoms of brain injury?
- How do I best work my way through the medical system?
- Where can I turn to for help?

This booklet is a starting point in answering your questions. There are resources listed at the end which can provide you with more detailed information.

## **FIRST STEPS...**

As a family member or friend confronted with the traumatic brain injury of a loved one you probably have never experienced what you are now going through. You may have never heard the term “traumatic brain injury.” You may feel confused and scared, and not know what to do or what questions to ask.

Some of the first questions to come to mind may be:

- What is happening?
- Is my family member conscious?
- What are his or her chances for survival?
- Will my family member be "normal"?
- When will my family member be "better"?
- How long will this go on?
- What will life be like?
- Who can help?
- What are our benefits?
- What can I do?
- Who can answer my questions?

## **FOCUS ON YOUR LOVED ONE...**

Information regarding survival and quality of life generally doesn't become clear for at least 48-72 hours post injury, when swelling in the brain begins to subside. Even then, information may be incomplete. Take this time to focus on your loved one. Start keeping a journal and write down your thoughts, feelings, observations, and questions as you think of them. Write down the answers you receive from the professionals involved in his or her treatment so that you can look back at them later. The journal can also help you see the progress of your family member's healing process over time. Sometimes when you are in the middle of a situation, it is difficult to see improvements. A journal can assist you in seeing these changes.

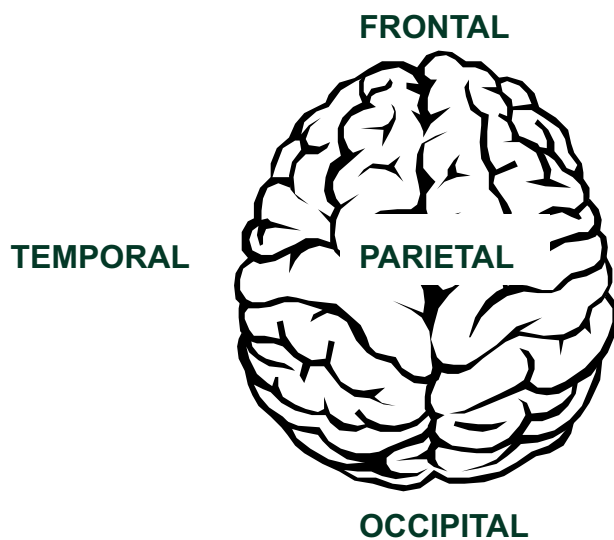
## **IMPORTANT PEOPLE TO KNOW ABOUT**

Because traumatic brain injury is complex, there may be many different professional disciplines involved in the treatment of your loved one.

Some of the professionals who may be involved include:

- **Intensivist** - *physician who specializes in treating and managing a critically ill or injured individual in an Intensive Care Unit.*
- **Neurosurgeon** - *physician trained to care for all types of brain problems and perform brain surgery as needed.*
- **Neurologist** - *physician who specializes in the nervous system and its disorders.*

- **Neuropsychologist** - *specialist who evaluates the cognitive (or thinking) functions of the individual following brain injury. Neuropsychologists generally are involved in the treatment process further down the road, after the individual has stabilized.*
- **Physical Therapist, Occupational Therapist, Speech Therapist** - *professionals involved in the rehabilitation process after the individual has been medically stabilized.*
- **Physiatrist** - *physician who specializes in physical medicine and the rehabilitation process. A physiatrist may also coordinate the rehabilitation team.*
- **Plastic Surgeon** - *surgeon who repairs or replaces malformed, injured, or lost organs and tissues. This physician does cosmetic surgery to correct physical defects as a result of injury.*
- **Family Physician** - *if in the area, can sometimes act as a liaison to the family and provide the family with needed information in a more personal manner.*



## WHAT IS BRAIN INJURY?

One of the complexities about brain injury is that no two brain injuries are alike. The following is a brief description of the anatomy of the brain and the "types" of brain injury. It will give you general information about the brain and brain functioning.

### ANATOMY OF THE BRAIN

The brain is the body's control center. It governs and regulates all of our bodily functions, as well as how we think, act, and talk. Damage to any area of the brain can change one or many aspects of who and what we are.

The brain is divided into several distinct sections, each of which has its own particular job to do. Our daily physical, emotional, and intellectual functioning is maintained and delivered through a complex and truly remarkable process that all starts with the brain.

The parts of the brain that are important for you to know about include:

- I. **Cerebellum** - *coordinates movement and balance*
- II. **Brain Stem** - *responsible for consciousness, alertness, and other body functions. The brain stem is the region of the brain that controls the very basic functions of survival - breathing, heart rate, wakefulness, muscular tone, and reflexes. It is located at the base of the brain and is connected to the spinal cord. The brain stem also serves as the conduit of information that is necessary for adequate functioning of all other areas of the brain. Injury to the brain stem can be brief, prolonged, or permanent, and therefore will have*

differing effects on the observed functioning of the individual.

III. **Cerebrum** - controls thought processes. This is the largest part of the brain. It is divided into two hemispheres, joined by a band of nerve fibers (*corpus callosum*). Each hemisphere has four lobes, each of which has specific functions:

- A. **Frontal Lobe** - governs movement, judgment, reasoning abilities, personality, motivation, initiation, and inhibition (the ability to restrain emotions or behavior)
- B. **Temporal Lobe** - governs memory and the ability to understand language
- C. **Parietal Lobe** - governs sensations and awareness of spatial relationships, such as judging distance between two objects
- D. **Occipital Lobe** - governs visual perception, or how the brain interprets what the eyes see



## TRAUMATIC BRAIN INJURY

Traumatic brain injury (TBI) refers to an *acquired brain injury* in which an external blow to the head has caused damage to the brain.

In the military, causes of TBI may include: exposure to blasts from improvised explosive devices (IED), grenades, rocket propelled grenades (RPG) or landmines; bullet or shrapnel injuries; or proximity to an explosion.

### OPEN HEAD INJURY

An **open head injury** is a **visible** assault to the head that may result from a gunshot wound, shrapnel, an accident, or an object going through the skull into the brain. This type of injury is more likely to damage a specific area of the brain.

### CLOSED HEAD INJURY

A **closed head injury** occurs under a number of circumstances, for example, when there is a blow to the head such as what might happen in a motor vehicle crash, a fall, or from exposure to a blast.

The brain is suspended in cerebral spinal fluid inside the skull. When the skull hits a stationary object, the brain may bounce back and forth inside the skull, causing damage to the brain where it comes in contact with the skull. The brain may also turn on its axis (the brain stem), causing localized (focal) or widespread (diffuse) damage.

Blast injuries are injuries that result from the complex pressure wave generated by an explosion. The explosion causes an instantaneous rise in pressure over atmospheric pressure that creates a blast overpressurization wave. Primary blast injury occurs from an interaction of the overpressurization wave and the body with differences occurring from one organ system to another.

In a blast, brain injuries can also occur by other means such as impact from blast-energized debris, the individual being physically thrown, burns and/or inhalation of gases and vapors.

Closed head injuries are the most common type of brain injuries, often causing both focal and diffuse damage at the same time. Diffuse brain trauma can occur when the nerve fibers throughout the brain stem and into the brain are stretched or distorted.

Some terms used to describe closed head injuries include:

- **Contusions** are injuries that bruise a portion of the brain.
- **Concussion** literally means "to be shaken violently." It is usually caused by a blow to the head by an external force. Concussions may cause a temporary loss of consciousness, but, **there does not have to be any loss of consciousness to sustain a concussion.** A concussion may also result in an alteration of mental state (i.e., being confused or dazed). A concussion may cause a mild or moderate brain injury.
- **Coup-contrecoup** describes contusions that are both at the site of the impact and on the complete opposite side of the brain. This occurs when the force impacting the head is great enough not only to cause a contusion at the site of impact, but also to move the brain and cause it to slam into the opposite side of the skull, causing the additional contusion.
- **Acceleration-deceleration injury** is an injury caused when the head is driven forward and backward with such force

that the brain bounces back and forth against the skull, resulting in both focal and diffuse injuries.

Many nerve cells will eventually return to normal functioning. Other nerve cells may be permanently damaged; they may function abnormally, or become totally nonfunctional.

There is also evidence suggesting that the effects of repeated concussions are cumulative. With repeated minor traumas, the severity of the damage increases, because of an increase in the number of these damaged nerve cells.

## SECONDARY DAMAGE TO THE BRAIN

The brain can suffer further injury when the brain swells inside the skull. Fluid accumulates, causing pressure to increase and impinge on delicate brain tissue. Delayed bleeding from damaged blood vessels can similarly injure the brain. Preventing secondary damage is the primary medical challenge during the initial period following brain injury.

## OTHER TYPES OF ACQUIRED BRAIN INJURIES

Other types of acquired brain injuries are caused by changes or problems within the brain itself. These problems can occur for many reasons. Some examples of these types of brain injuries are:

- **Anoxia / Hypoxia** - When the brain is deprived of oxygen, as in the case of near drowning incidents or asphyxiation, brain cells are damaged.
- **Tumors** - A tumor in the brain may cause injury to the surrounding brain tissue. Neurosurgical removal of the tumor is usually performed. The surgical process may result in changes to the brain.

- **Stroke or "cerebrovascular accident (CVA)"** - A sudden and often severe impairment of the body brought on by a disruption in the flow of blood to the brain. When the blood fails to get through to parts of the brain, the oxygen supply to those areas is cut off, and the affected brain cells die. The interruption of blood flow can be caused by the blockage of an artery in the brain or neck. A stroke can also be caused by the bursting of a section of the artery wall in the brain with subsequent bleeding into the surrounding tissue.

- **Spontaneous bleeding** - Bleeding within the brain can occur by weak blood vessels (aneurysm) or arterial venous malformations. High blood pressure or rare bleeding disorders can trigger the bleeding as well. A subdural hemorrhage (bleeding within the outside lining of the brain) or an intracranial hemorrhage (bleeding within the brain) are examples of terms used to describe this type of bleeding.

- **Infections or metabolic disorders** - There are many types of infections and metabolic changes (chemical or biological reactions) in the body that can affect brain functioning. For example, a virus may attack the brain, causing injury to the brain tissue. An overdose of drugs or a sudden chemical change because of failure of a body organ are examples of metabolic changes that can injure brain tissue.

## WHAT TO WATCH FOR...

### IMMEDIATE SYMPTOMS OF BRAIN INJURY

#### MILD BRAIN INJURY

If an injured person returns home with a mild brain injury, family should:

- check his or her pupils (black centers of the eyes) to be sure they are the same size
- awaken him or her several times during the night to assess his or her level of consciousness or disorientation; continue to check to be sure pupils are the same size
- respond to complaints of feeling nauseated by giving liquids or a light meal until nausea goes away.
- **Remember! A concussion without loss of consciousness may cause mild or moderate brain injury.**

*Notify your physician if you become aware of any of the following symptoms or behaviors:*

- complaints of a severe headache
- difficulty awakening
- restlessness, irritability, or aggression
- vomiting more than twice
- trouble speaking
- blurred vision
- complaints of weakness in arms or legs
- neck pain
- convulsions, strange movements, or unusual episodes of staring
- losing consciousness or needing time to sleep
- unequal pupils



## LONG-TERM SYMPTOMS OF BRAIN INJURY

Individuals with mild brain injury or a concussion may be discharged or sent home with little or no information about the potential long-term effects of brain injury. As the brain heals and the swelling subsides, the cells in the swollen area can begin to function again. Select areas of the brain will be fine, while other areas may be affected in some way. A person may do well in one activity, but have difficulty with another.

The following are physical changes or problems that may occur after brain injury:

- bladder and bowel problems
- dizziness/vertigo
- fatigue
- headaches
- weakness on one side of the body (arm, leg, or facial weakness)
- difficulty sleeping
- nausea/vomiting
- seizures
- spasticity/clumsiness or poor coordination
- difficulty with swallowing
- change in sight (double vision)
- change in sense of smell or taste
- change in speaking ability - slowness, difficulty with word finding

The following are emotional and behavioral changes or problems that may occur after brain injury:

- aggression, irritability (short-tempered or easily frustrated)
- egocentricity
- restlessness
- sexual disinhibition or lack of sexual desire
- impulsive behavior
- anxiety
- depression
- difficulty controlling emotions
- loss of social networking, feelings of isolation
- decreased ability to cope with unexpected events

The following are cognitive changes or difficulties that may occur after brain injury:

- concentrating or paying attention
- making decisions
- solving problems
- judgment
- memory for new information
- speed of processing
- following directions or completing a task
- processing of visual or verbal information



If the individual with the injury experiences any of these symptoms, seek professional help. These symptoms can be permanent. Any one of these changes can have considerable impact both on the individual and his or her family and friends. It is extremely important that the professionals you work with are familiar with brain injury.

In cases of mild brain injury or repeated injuries, symptoms may not appear immediately. If any of the above symptoms present themselves down the road, even years later, talk to a professional who can help you understand what is happening.

### **POST-TRAUMATIC STRESS DISORDER**

**Post-traumatic stress disorder (PTSD)** can occur as the result of exposure to events that involve actual or threatened death, intense fear, or feeling helpless. Military personnel may have been exposed to these events daily.

Common symptoms of PTSD include feeling irritable, having sleep problems, feeling jumpy, feeling detached, having trouble concentrating, being unable to recall details of the trauma, reliving the trauma, or being disconnected from emotion.

These symptoms could also be indicative of a TBI. It is not unusual for people to experience both diagnoses. The differences are often subtle.

It is important to try to differentiate between PTSD and TBI because the treatments differ. If any of these symptoms present themselves, seek professional help.

## **SUPPORT**

The Brain Injury Association of New York State can help you obtain information about brain injury, rehabilitation, programs and services, as well as provide a sympathetic ear and shoulder for support. Through its toll-free Family Helpline, you will be connected with a knowledgeable individual, and a network of chapters and support groups throughout the state. The number is **1-800-228-8201**, **[www.bianys.org](http://www.bianys.org)** or e-mail at **[info@bianys.org](mailto:info@bianys.org)**.

The Traumatic Brain Injury Training and Military Veterans Services Project is a collaboration between the Brain Injury Association of New York State and the NYS Department of Health. The project provides information about traumatic brain injury and support for military personnel returning to New York State from Iraq and Afghanistan and their families, and training for providers about traumatic brain injury.

One of the major programs of the Association is the Family Advocacy, Counseling and Training Services (FACTS) program. FACTS Coordinators are individuals knowledgeable about brain injury who can help the family through stages of brain injury recovery. FACTS Coordinators are located throughout the state and are able to provide free services to individuals (and their families) who have sustained a brain injury prior to age 22. Some of the services FACTS Coordinators provide are support, advocacy, and information and linkage with state and local systems, such as Supplemental Security Income (SSI) and Medicaid.

## **Resources:**

### **Brain Injury Association of New York State**

10 Colvin Avenue  
Albany, New York 12206-1242  
(518) 459-7911 • 1-800-228-8201  
E-mail: [info@bianys.org](mailto:info@bianys.org)  
[www.bianys.org](http://www.bianys.org)

### **National**

### **United States Department of Veterans Affairs**

[www.va.gov](http://www.va.gov)

### **U.S. Department of Veterans Affairs Health Benefits Service Center**

1-877-222-VETS (1-888-222-8387)  
<http://www.appc1.va.gov/health/>

### **Brain Injury Association of America**

(703) 761-0750  
[www.biausa.org](http://www.biausa.org)

### **National Brain Injury Information Center**

(800) 444-6443

### **Defense and Veterans Brain Injury Center**

#### **Walter Reed Army Medical Center**

(202) 782-6345 • (800) 870-9244  
E-mail: [info@dvvbic.org](mailto:info@dvvbic.org)  
[www.dvvbic.org](http://www.dvvbic.org)

### **Army Behavioral Health**

[www.behavioralhealth.army.mil](http://www.behavioralhealth.army.mil)

### **Iraq and Afghanistan Veterans of America**

(212) 982-9699  
[www.iava.org](http://www.iava.org)

### **New York State**

### **New York State Department of Health Veterans' Health Information Clearinghouse**

<http://www.health.state.ny.us/nysdoh/veterans>

### **New York State Division of Veterans' Affairs**

1-(888) VETS NYS (1-888-838-7697)  
[www.veterans.state.ny.us](http://www.veterans.state.ny.us)

### **New York State Division of Military and Naval Affairs**

(518) 786-4500  
[www.dmna.state.ny.us](http://www.dmna.state.ny.us)

### **Veterans' Administration Health Care Links for New York State Military**

VISN-2 (upstate NY)  
[www.va.gov/visns/visn02](http://www.va.gov/visns/visn02)

### **VISN-3 (NYC, Long Island, New Jersey)**

[www.va.gov/visns/visn03](http://www.va.gov/visns/visn03)

## **More about the Brain Injury Association of New York State**

The Brain Injury Association of New York State is a statewide non-profit membership organization that advocates on behalf of individuals with brain injury and their families, and promotes prevention. Established in 1982, the Brain Injury Association of New York State provides education, advocacy, and community support services that lead to improved outcomes for children and adults with brain injuries and their families. The Brain Injury Association of New York State also offers a toll-free family helpline, chapters and support groups throughout the state, prevention programs, resources and support programs for veterans and their families, LEARNet educational resource, mentoring programs, a speakers' bureau, and an information clearinghouse of videos, publications, books, periodicals and other resource materials. The Association plays a central role in the development of public policy on the state and local level. The Brain Injury Association of New York State is the state affiliate of the Brain Injury Association of America.