Understanding TBI

Part 2: Brain injury impact on individuals' functioning

Traumatic Brain Injury Model System Consumer Information

The Rocky Mountain Regional Brain Injury System

Craig Hospital
3425 So. Clarkson St.
Englewood, CO 80113
303-789-8344

For more information:
Craig Hospital
Nurse Advice Line
1-800-247-0257

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A traumatic brain injury interferes with the way the brain normally works. When nerve cells in the brain are damaged, they can no longer send information to each other in the normal way. This causes changes in the person's behavior and abilities. The injury may cause different problems, depending upon which parts of the brain were damaged most.

There are three general types of problems that can happen after TBI: physical, cognitive and emotional/ behavioral problems. It is impossible to tell early on which specific problems a person will have after a TBI. Problems typically improve as the person recovers, but this may take weeks or months. With some severe injuries changes can take many years.

Structure and function of the brain

The brain is the control center for all human activity, including vital processes (breathing and moving) as well as thinking, judgment, and emotional reactions. Understanding how different parts of the brain work helps us understand how injury affects a person's abilities and behaviors.

Left vs. Right Brain

- The brain is divided into two halves (hemispheres). The left half controls movement and sensation in the right side of the body, and the right half controls movement and sensation in the left side. Thus, damage to the right side of the brain may cause movement problems or weakness on the body's left side.
- For most people, the left half of the brain is responsible for verbal and logical functions including language (listening, reading, speaking, and writing), thought and memory involving words.
- The right half is responsible for nonverbal and intuitive functions such as putting bits of information together to make up an entire picture, recognizing oral and visual patterns and designs (music and art), and expressing and understanding emotions.

Brain Areas & Associated Functions

The brain is made up of six parts that can be injured in a head injury. The effect of a brain injury is partially determined by the location of the injury. Sometimes only a single area is affected, but in most cases of TBI multiple areas have been injured. When all areas of the brain are affected, the injury can be very severe.

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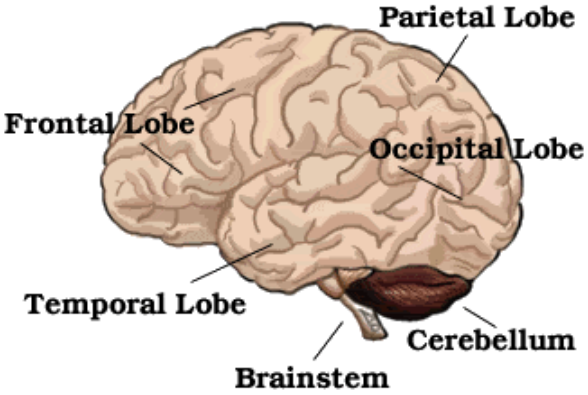

Six parts	*Functions*
Brain Stem	▪ Breathing ▪ Heart Rate ▪ Swallowing ▪ Reflexes for seeing and hearing ▪ Controls sweating, blood pressure, digestion, temperature ▪ Affects level of alertness ▪ Ability to sleep ▪ Sense of balance
Cerebellum	▪ Coordination of voluntary movement ▪ Balance and equilibrium ▪ Some memory for reflex motor acts
Frontal Lobe	▪ How we know what we are doing within our environment ▪ How we initiate activity in response to our environment ▪ Judgments we make about what occurs in our daily activities ▪ Controls our emotional response ▪ Controls our expressive language ▪ Assigns meaning to the words we choose ▪ Involves word associations ▪ Memory for habits and motor activities ▪ Flexibility of thought, planning and organizing ▪ Understanding abstract concepts ▪ Reasoning and problem solving
Parietal Lobe	▪ Visual attention ▪ Touch perception ▪ Goal directed voluntary movements ▪ Manipulation of objects ▪ Integration of different senses
Occipital Lobes	▪ Vision
Temporal Lobes	▪ Hearing ability ▪ Memory acquisition ▪ Some visual perceptions such as face recognition and object identification ▪ Categorization of objects ▪ Understanding or processing verbal information ▪ Emotion

Physical Problems

Most people with TBI are able to walk and use their hands within 6-12 months after injury. In most cases, the physical difficulties do not prevent a return to independent living, including work and driving.

In the long term the TBI may reduce coordination or produce weakness and problems with balance. For example, a person with TBI may have difficulty playing sports as well as they did before the injury. They also may not be able to maintain activity for very long due to fatigue.

Cognitive (Thinking) Problems

- Individuals with a moderate-to-severe brain injury often have problems in basic cognitive (thinking) skills such as paying attention, concentrating, and remembering new information and events.
- They may think slowly, speak slowly and solve problems slowly.
- They may become confused easily when normal routines are changed or when things become too noisy or hectic around them.
- They may stick to a task too long, being unable to switch to different task when having difficulties.
- On the other hand, they may jump at the first "solution" they see without thinking it through.
- They may have speech and language problems, such as trouble finding the right word or understanding others.
- After brain injury, a person may have trouble with all the complex cognitive activities necessary to be independent and competent in our complex world. The brain processes large amounts of complex information all the time that allows us to function independently in our daily lives. This activity is called "executive function" because it means "being the executive" or being in charge of one's own life.

Emotional/Behavioral Problems

Behavioral and emotional difficulties are common and can be the result of several causes:

- First, the changes can come directly from damage to brain tissue. This is especially true for injuries to the frontal lobe, which controls emotion and behavior.
- Second, cognitive problems may lead to emotional changes or make them worse. For example, a person who cannot pay attention well enough to follow a conversation may become very frustrated and upset in those situations.
- Third, it is understandable for people with TBI to have strong emotional reactions to the major life changes that are caused by the injury. For example, loss of job and income, changes in family roles, and needing supervision for the first time in one's adult life can cause frustration and depression.

Brain injury can bring on disturbing new behaviors or change a person's personality. This is very distressing to both the person with the TBI and the family. These behaviors may include:

- Restlessness
- Acting more dependent on others
- Emotional or mood swings
- Lack of motivation
- Irritability
- Aggression
- Lethargy (sluggishness)
- Acting inappropriately in different situations
- Lack of self-awareness. Injured individuals may be unaware that they have changed or have problems. This can be due to the brain damage itself or to a denial of what's really going on in order to avoid fully facing the seriousness of their condition.

Fortunately, with rehabilitation training, therapy and other supports, the person can learn to manage these emotional and behavioral problems.

More in the Understanding TBI series

- Understanding TBI, Part 1: What happens to the brain during injury and in early stage of recovery from TBI?
- Understanding TBI, Part 3: The recovery process
- Understanding TBI, Part 4: The impact of a recent TBI on family members and what they can do to help with recovery

Source

Our health information content is based on research evidence and/or professional consensus and has been reviewed and approved by an editorial team of experts from the TBI Model Systems.

Authorship

Understanding TBI was developed by Thomas Novack, PhD and Tamara Bushnik, PhD in collaboration with the Model System Knowledge Translation Center. Portions of this document were adapted from materials developed by the University of Alabama TBIMS, Baylor Institute for Rehabilitation, New York TBIMS, Mayo Clinic TBIMS, Moss TBIMS, and from *Picking up the pieces after TBI: A guide for Family Members,* by by Angelle M. Sander, PhD, Baylor College of Medicine *(2002)*.