CHAPTER 1

Background on Brain Injury

In this chapter, you will:

- Read about Alberta's definition of Acquired Brain Injury and how that affects which supports you will be able to access.
- Learn about the different parts of the brain, and how damage to that part of the brain is likely to affect you.

Acquired Brain Injury

This book is for all survivors of a brain injury and their families. An Acquired Brain Injury means you hurt your brain sometime after you were born, not before. Also, the damage must be the result of an injury or an illness, but not an illness that gets worse with time, like Alzheimer's disease or multiple sclerosis.

In Alberta, if you injured your brain when you were younger than 18 years old, you may be able to get supports through PDD (Persons With Developmental Disabilities). Call 310-0000 to ask for the number of the PDD

office nearest you. If your brain injury occurred when you were 18 years old or older, you are not eligible for supports from PDD, but we hope that this manual will help you find the supports you need.

Examples of Acquired Brain Injury include:

- traumatic brain injury, like a blow to the head or hitting one's head;
- brain tumours;
- brain infections, like meningitis and encephalitis;
- lack of oxygen, like what happens when someone almost drowns;
- strokes;
- violent shaking, as in Shaken Baby Syndrome or some whiplash injuries.

How Brain Damage Happens
Damage to the brain results from changes to the brain caused by injury or illness. Each injury or illness acts in different ways. Some common ways in which the brain can be damaged include:

- bruising;
- bleeding (also called a hematoma);
- brain swelling;
- fever;
- lack of blood or oxygen to the brain (also called hypoxia and anoxia);
- shearing or tearing of brain cells when the brain is rapidly moved back and forth or twisted around (also called Diffuse Axonal Injury);
- pressure inside the skull (called Increased Intracranial Pressure);
- objects taking up space in the brain (like tumours).

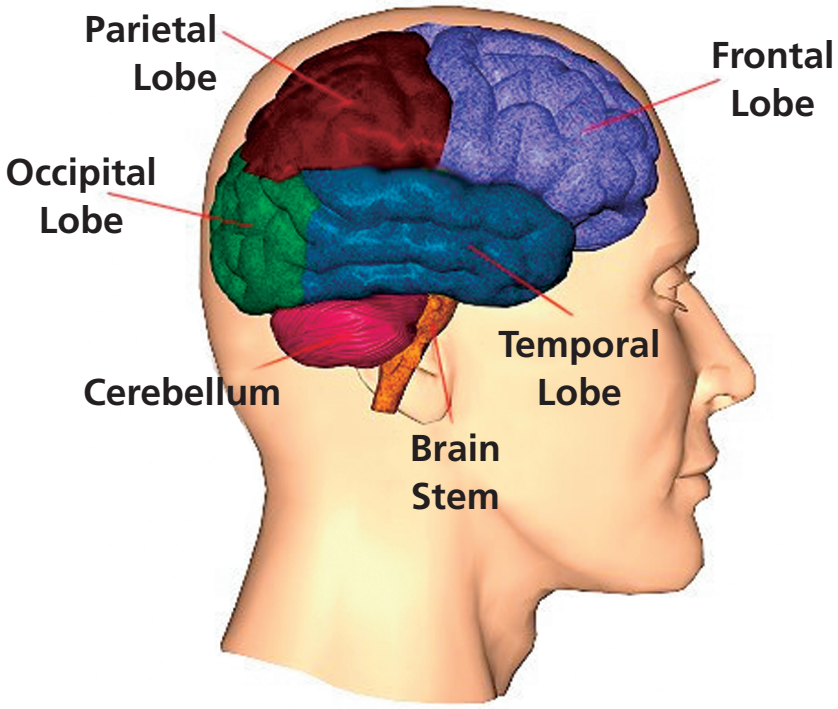
An acquired brain injury can lead to either local or diffuse damage. **Local damage** happens when only one or a few parts of the brain are hurt. If you are injured in this way, you would usually only notice a few changes. **Diffuse damage** happens when many parts of the brain are injured. If you have this type of damage, you would usually find many changes.

An example where either local or diffuse damage could occur is in a car crash. If a person's head hit the dash board and the brain hits the front of the skull it can be bruised or scraped. This damage is local because it happens only to the front of the brain.

A person can also have diffuse damage in a car crash. The brain is made up of millions of tiny cells. These cells connect the different parts of the brain to each other, but they are not very strong. In a crash where the brain moves rapidly back and forth, these brain cells are stretched and torn. This leads to tiny points of damage throughout the brain. This is an example of Diffuse Axonal Injury.

Parts of the Brain and How Injury Affects Them
Although we do not completely understand how the brain works, we know that different parts of the brain help you do different things. The following section includes descriptions of parts of the brain that are often talked about. These descriptions include where the part is, what it usually does, and what behaviours a person might see after it is damaged. Memory problems can occur with any type of brain injury.

Brain Map



Frontal Lobe

The part of the brain just behind your forehead is called the frontal lobe. It is further divided into front and back areas. The front is called the prefrontal area. This part of the brain helps a person do the following:

- plan and organize;
- solve problems;

- pay attention or shift attention;
- control impulses;
- get started on something;
- be aware of one's strengths and weaknesses;
- be aware of what others are thinking and feeling.

If you have an injury to this part of your brain, you might seem like a different person. You might appear more forward than before. Your activity level might drop. You may even sit back and do nothing, unless told to. Many survivors may have more trouble paying attention or focusing than before the injury or illness. Others complain that they cannot get organized. Tasks like planning parties and even deciding what to wear can become a chore after this type of injury. In many cases, the survivor of a pre-frontal lobe injury may not be aware of the changes they have gone through, or they may not realize how others are affected by these changes.

The back area of the frontal lobe includes the precentral and the premotor areas. They help to plan the movements of the body. Damage

to this part of the brain leads to problems starting and coordinating movements of arms, legs, and other body parts. Things like opening or closing your hands can take a lot of thought and effort after this kind of damage.

Temporal Lobes

Your temporal lobes are located along the sides of your head above your ears. This part of the brain helps you:

- understand things you hear;
- remember things you see and hear;
- feel emotion.

Your right temporal lobe helps you understand and remember visual things like pictures and faces, and identify sounds. Your left temporal lobe helps you to understand and remember words, talk, and do math. Both lobes help you feel emotion. If you have damage to this part of the brain you may be unable to speak, understand others, read, recognize faces, or do math. You may have memory problems. You might also have trouble controlling your emotions, especially anger.

Parietal Lobe
Behind your frontal lobe and between your temporal lobes is the parietal lobe. It is at the top of your head. This lobe is where information from sight, hearing, and touch are brought together. This area helps you:

- recognize how something feels (hard or soft, rough or smooth);
- know where your body parts are (my hand is on my lap);
- know where you are;
- coordinate seeing and moving (for example, hand-eye coordination);
- draw;
- read, write, and do math problems.

If you have damage to this lobe you might get lost easily, or you might have trouble reaching for things around you. You might not recognize your spouse's face, you may be unable to read a map, or draw a simple shape. You may also have problems with speaking, writing, reading, and doing math.

Occipital Lobe
Behind the parietal lobe, at the back of your brain, is the occipital lobe. This part of your brain helps you to understand things that your eyes see. Problems with blindness and recognizing everyday things, like a toaster or a lamp, result from damage to this lobe. If you have damage to this lobe, you may have trouble naming colors, shapes, and other things you see. You may also have blind spots; however, all of these problems are rare.

Cerebellum
Your cerebellum is at the very back and bottom of your brain. This part of your brain helps to make the movements of your body smooth and coordinated. Damage here can lead to poor balance, jerky movements, and shrinking muscles. This can make many everyday activities like walking, talking, and eating, difficult.

Brain Stem
The brain stem is where the brain connects to the spinal cord. This part of your brain controls "involuntary functions" of your body, like your breathing and heart rate. It also controls how awake or sleepy you are. All of the nerve fibres that connect the different parts of your body

to your brain travel through your brain stem. If you have a brain stem injury, you usually have trouble moving some part of your body. You may have an unusual walk or have to use a wheelchair. Your speech may be a little slurred or you may not be able to talk at all.

Stroke

A stroke is an injury to a part of the brain. It happens when blood vessels, called arteries, become blocked or burst and the blood supply to the brain is cut off. Without the supply of blood, the brain does not get the oxygen and nutrients it needs. Permanent damage occurs when the blood supply is cut off for too long.

Every stroke is different and recovery depends on which part of the brain and how much of the brain has been damaged. Some people suffer a mild stroke which means there can be very little injury to the brain. People experiencing mild strokes often fully recover or have fewer problems. Others may have a severe stroke in which a lot of damage is done. In these cases, it may take a very long time for survivors to regain even partial use of their arms, legs, speech, memory or whatever else may have been affected.

Strokes can affect the way a person moves, feels, behaves, talks and thinks. Some parts of the brain may work well while other parts don't. How a person is affected by a stroke depends upon:

- Where in the brain the stroke occurred;
- How serious the stroke was; and
- The person's age, health and personality before the stroke.

Common effects of a stroke include:

- Paralysis or weakness of one side of the body
  * weakness usually occurs on the side of the body opposite the side of the brain where the injury occurred;

- Vision problems
  * some survivors may lose part of their vision in one or both eyes, a condition known as visual field deficit;

- Aphasia
  * aphasia is difficulty in using or understanding language;

- Perceptual challenges
  * a person's perception of everyday objects may be changed in that they may not recognize familiar objects or know how to use them;

- Being tired
  * it often takes more energy to do things after a stroke so many survivors get tired more quickly and more often;

- Depression
  * can be a direct result of the brain injury but people may also become depressed because they feel they can't accomplish things the same way they did before the stroke;

- Emotional expression/lability
  * a term used to describe emotional responses that are exaggerated or inappropriate. Outbursts of anger, moaning, laughing or crying uncontrollably for little or no reason are common results of this condition;

- Memory challenges
  * survivors may also have memory problems or have difficulty learning and remembering new information;

- Changes in personality
    * damage to the brain can cause survivors to have less control over their positive or negative emotions, which can change the way they behave or interact with others.

For survivors, rehabilitation is an important part of recovery. Rehabilitation can help survivors cope with the effects of a stroke. Chapter 3 contains more information on rehabilitation.

Severity of Brain Injury

When someone is injured, everyone wants to know, "how bad is it?" and, "will you be normal again?" It is difficult to answer these questions. This is because there is no way to perfectly predict how much a person will recover. Health professionals sometimes use the severity of the injury as an indicator of **prognosis**. Prognosis is a medical term meaning how well you will recover. With traumatic brain injuries, the terms "mild," "moderate", and "severe" are used to judge prognosis.

For traumatic brain injuries resulting in a coma, the judgment of severity is based on the Glasgow Coma Scale (GCS) stages of emerging

from a coma. The score is based on your ability to talk, to do what you are told, and to make eye contact.

Another measure of severity is your ability to learn new information. After an injury, people often cannot remember what has just happened. They do not know that they are in hospital or what day it is. This inability to remember is called **post-traumatic amnesia** or, PTA. The severity is based on how long your PTA lasts after the injury.

Severity of injury is not always a good predictor of recovery and can vary greatly between individuals. The usual rule is the more severe the injury, the less likely you will return to normal. After a mild injury, 90 percent of individuals will be back to normal in a couple of days. Most survivors of a very severe injury will never regain all of their lost skills. Only a small portion of them will return to work or successfully complete school.

Someone with a mild brain injury might not even be admitted to the hospital. Most frequently, a mild injury is the result of a hit on the head caused by a fall or sudden violent motion, such as a car crash. At the time of the

injury you may have one or more of the following symptoms:

- brief loss of consciousness;
- loss of the memories from immediately before, during, or after the injury;
- dizziness or clouded thinking at the time of the injury.

Symptoms of a mild brain injury often go away completely over a period of a couple of days to three months. Recovery is considered complete if symptoms do not stop you from doing your daily activities.

If you think you have had a mild brain injury, it is important to see a health professional who is experienced in treating brain injury. Health care professionals without this experience may brush the injury off because it is mild. Also, medical tests often do not show damage to the brain if time passes between the injury and the medical test. This means you might have a brain injury even if your medical test says your brain looks normal. A professional who knows about brain injury can give information and encouragement to help you as you recover.

Brain injuries can lead to a number of problems. The most common symptoms include:

- poor problem solving skills;
- language problems;
- personality changes and bursts of emotion;
- physical problems (poor balance, problems with vision, headache, fatigue, and physical disabilities, such as problems walking, sitting, etc.);
- problems in everyday living (poor memory and attention, difficulties planning and setting goals, slowed thinking, and problems understanding others or speaking clearly);
- problems with emotional control (problems controlling one's temper, shifting emotions, lack of emotion, and increased anxiety);
- problems with motivation and self-control (poor hygiene, low sexual drive, lack of initiation, impulse buying, aggression, and saying inappropriate things);

- social problems (difficulty making or keeping friends, poor judgment in groups, standing too close to others, saying the wrong thing, and not understanding when people are tired, angry or bored).

Changes after a brain injury can interfere with life. Some brain injury survivors will not successfully return to home, work, or school and may need ongoing support. Recovery from a brain injury may take months or it may take years. Some changes may be permanent.

Measures of Severity

Knowing that an injury is mild, moderate, or severe tells us how bad things may be but this is not a perfect measure. Each injury is different, and each survivor is affected differently. There are stories of people so severely injured that they were near death but who recovered and went on to university. There are also stories of people with much less severe injuries whose lives have fallen apart. Measures of severity are, at best, a guide. It is how you are doing now and the improvements that you are making that are the best indication of where you are going.

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