

# Types of Acquired Brain Injury

The brain can be injured in many different ways. The type of injury can affect just one part of the brain or several parts which are responsible for different functions. Each brain injury is unique, meaning that symptoms can vary widely. There are two types of brain injury: **traumatic** and **non-traumatic**.

## Traumatic injury

A traumatic brain injury can be classed as an **open** or **closed** injury. A closed injury is caused when the brain is bounced around in the skull due to a blow to the head or severe shaking. A closed motion can cause tearing, shearing or stretching of the brain tissue. These types of injury are much more common than open head injuries.

An open injury occurs when an object such as a bullet, fractures the skull and enters the brain. These injuries usually damage relatively localised areas of the brain resulting in specific damage. Types of traumatic injuries include:

### Contusion

A contusion occurs when there is bruising of the brain tissue at the site of the fracture known as *coup*. It can also occur where other parts of the brain have shifted in the skull on impact. A severe blow may cause greater damage to the cells on the opposite side to where the blow occurred which is known as *contrecoup*.

### Diffuse Axonal Injury

This type of injury can be caused by shaking or strong rotation of the head as in a car accident or fall. The injury occurs as a result of traumatic shearing forces that rotate or twist the axons when the head is rapidly thrown back and forth as may occur in a road traffic

accident or fall. This type of injury causes loss of efficiency in the brain along with slowing down the speed of thinking and moving due to the disruption of the brain's chemical and communication processes.

## Non-traumatic injury

A non-traumatic injury is an injury that does not occur as a result of trauma. This includes stroke, tumours, infectious diseases, lack of oxygen or toxicity.

### Stroke

A stroke is an interruption of blood supply to a section of the brain. If arteries become blocked, bleed or break, the brain tissue deteriorates. Types of stroke are:

- Obstruction of blood vessel - a blood clot can cause an artery blockage that travels to the brain and lodges in small blood vessels.
- Aneurysm – localised swelling of a blood vessel which can be caused by disease, congenital weakness or an injury. If an aneurysm does not burst it becomes blocked leading to a stroke or if it bursts the result is a haemorrhage.
- Haemorrhage – a loss of blood from a vessel. There are two kinds of haemorrhage that can cause stroke;
  - Intracerebral stroke caused by a ruptured artery leaking blood directly into the brain
  - Subarachnoid stroke which occurs on the surface of the brain.

The after effects of a stroke vary widely dependent on the part of the brain affected and extent of blood shortage.

A stroke in the left hemisphere may result in:

- A degree of paralysis on the right side
- Loss of feeling on right side
- Reduction in the right field of vision
- Loss of speech and comprehension

A stroke in the right hemisphere may result in:

- A degree of paralysis on left side
- Loss of feeling on left side
- Acting impulsively
- Difficulty expressing emotions
- Short attention span

### **Anoxic/Hypoxic Injury**

These types of injuries occur due to a lack or complete absence of oxygen in the brain. These injuries can occur as a result of respiratory arrests, drowning, heart attacks and poisoning.

- Anoxic Anoxia – from no oxygen supplied to the brain
- Anaemic Anoxia – blood does not carry enough oxygen to brain
- Atagnant Hypoxia – the brain receives some but not enough oxygen
- Toxic Anoxia - toxins or metabolites block oxygen in the blood from being used.

Areas of the brain particularly vulnerable to lack of oxygen include the cerebellum and the parieto-occipital cortex which play a large role in co-ordination and movement along with memory. Although the left and right hemispheres are usually affected, damage

can also occur in other parts.

The brain stem and cerebellum are responsible for maintaining vital body systems. A stroke in this area can cause an array of difficulties including unconsciousness, inability to speak, paralysis and double vision.

### **Encephalitis**

Encephalitis means inflammation of the brain and is caused by a virus. There are two main types of encephalitis - acute viral caused by a direct viral attack on the brain and post infectious, an autoimmune condition whereby the body's immune system attacks the brain following a viral infection elsewhere in the body. Severe viral encephalitis can cause respiratory arrest, coma and death. In the case of the brain it can cause mental impairments, such as loss of memory, speech problems, lack of muscle coordination, paralysis and hearing or vision defects.

### **Meningitis & Septicemia**

There are two forms of this disease which can lead to brain injury; viral and bacterial. Many people recover but others are left with after effects such as memory loss, learning difficulties, lack of co-ordination, speech problems and seizures.

### **Toxicity**

The brain can be damaged by overuse of substances such as alcohol, drugs and prescribed drugs. Brain injury can be caused by these substances as they have a toxic effect on the central nervous system, change metabolism, heart functioning, blood supply, interfere with absorption of brain nutrients, cause dehydration and can lead to falls and accidents that injure