

Long term effects of Acquired Brain Injury

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Overview

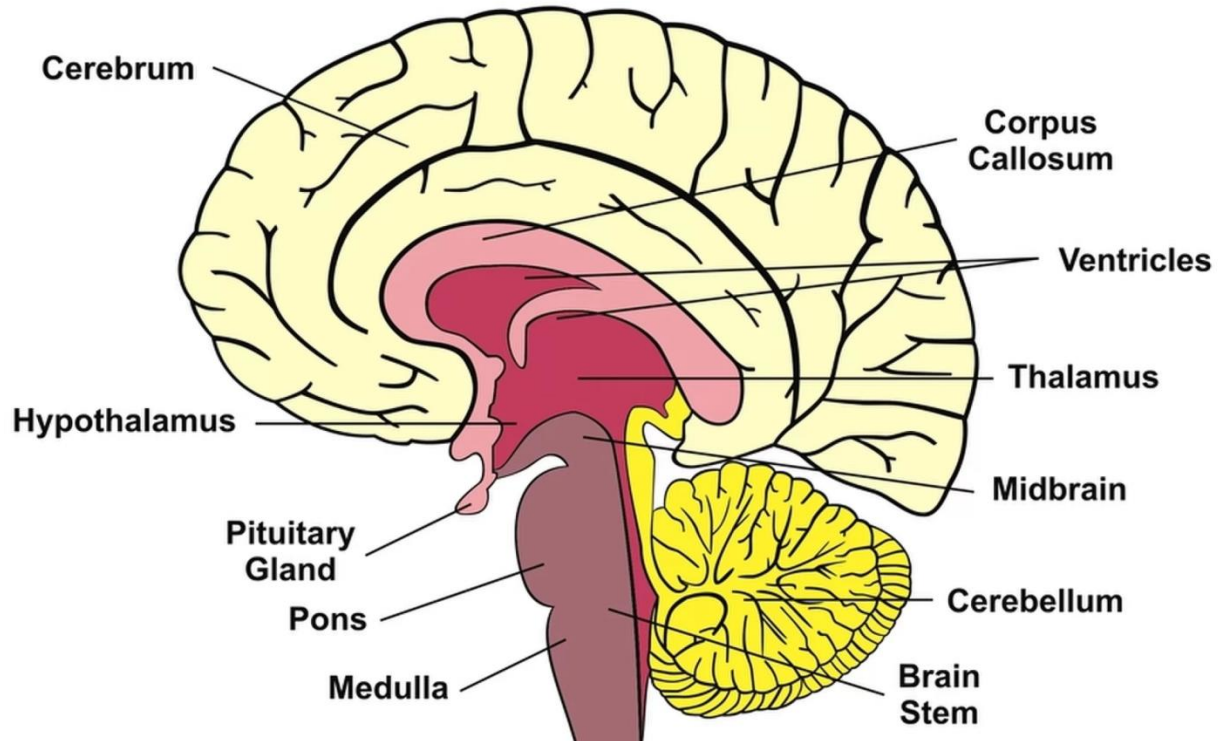
- Consequences of Acquired Brain Injury (ABI):
 - Cognitive (the way people think)
 - Physical
 - Affective (emotional effects)
 - Behavioural
 - Psychosocial (the psychological effects and long term social issues)

A bit about me

- Academic neuropsychologist at Plymouth University
- Graduated 2003, MSc 2005, PhD 2009
- Specialise in ABI research
- Sister of ABI survivor – RTA 1993
- Bereaved sister – Died 2014

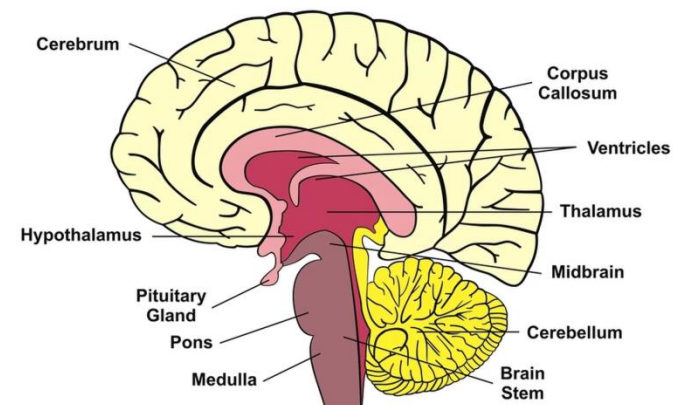
The Brain

- The brain is made up of 3 parts: Forebrain (cerebrum & cerebral cortex), midbrain (brain stem) and hindbrain (brain stem and cerebellum)



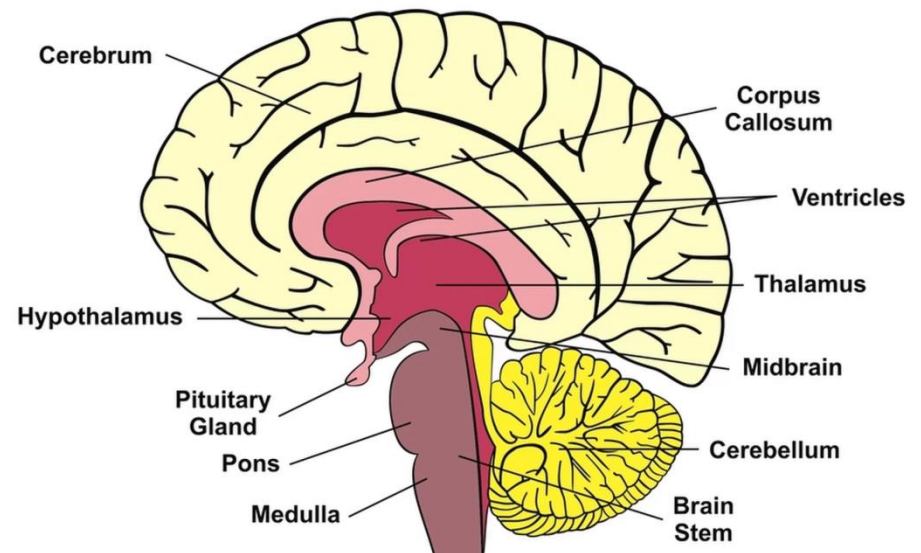
The Hindbrain & Cerebellum

- The **hindbrain** controls functions outside of conscious control, such as breathing and blood flow. It is responsible for essential functions.
- The **cerebellum** is a vital part of the brain and is primarily **responsible for** motor control.



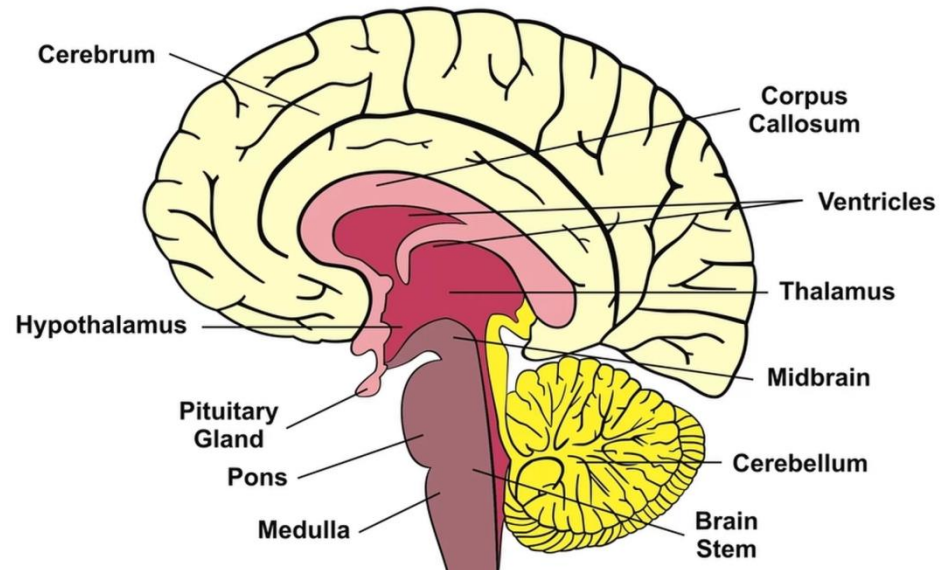
The Midbrain

- The midbrain is responsible for transferring motor signals from the forebrain to the brain stem to ensure movement takes place



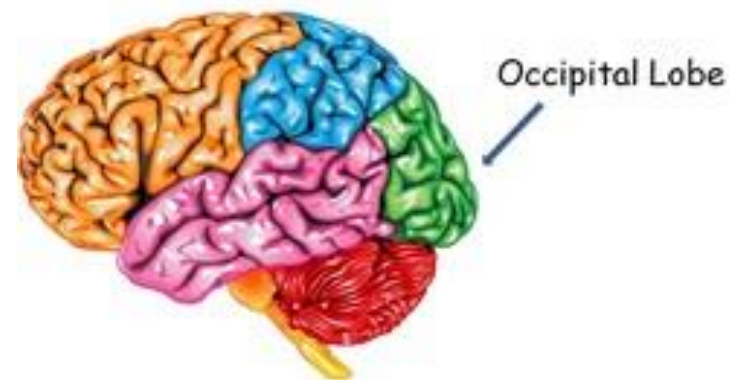
The Forebrain

- The forebrain, or cerebral cortex, is responsible for higher level functions such as hormone release, emotional responses, cognitive responses and relaying sensory and motor control. The forebrain is made up of 4 “lobes”:
- Occipital
- Parietal
- Temporal
- Frontal



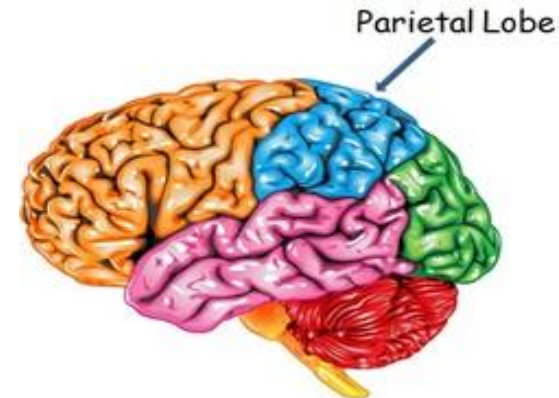
Occipital Lobe

- The occipital lobe is important to being able to correctly understand what your eyes are seeing.
- These lobes have to be very fast to process the rapid information that our eyes are sending.
- Damage to the occipital lobe means we would not be able to correctly process visual signals, thus visual confusion would result.



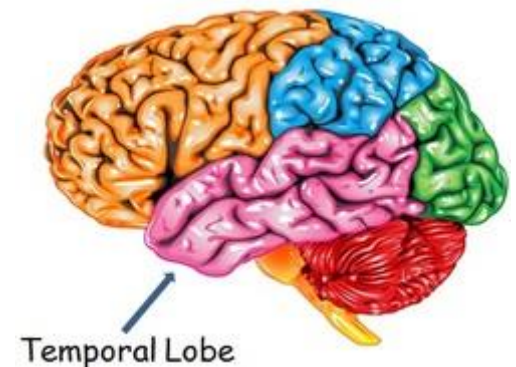
Parietal Lobe

- The parietal lobe carries out some very specific functions.
- It has a lot of responsibilities and has to be able to process sensory information within seconds.
- The parietal lobe is where information such as taste, temperature and touch are *integrated*, or processed.
- Humans would not be able to feel sensations of touch, if the parietal lobe was damaged.



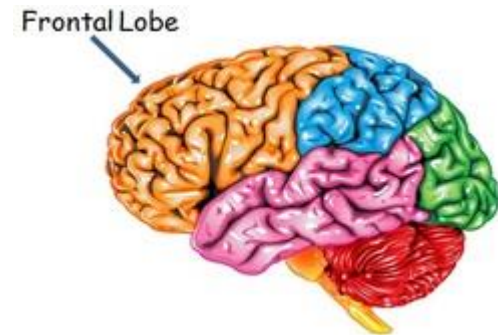
Temporal Lobe

- The Temporal Lobe mainly revolves around hearing and selective listening.
- It receives sensory information such as sounds and speech from the ears.
- It is also key to being able to *comprehend*, or understand meaningful speech.
- We would not be able to understand someone talking to us, if it wasn't for the temporal lobe.



Frontal Lobe

- You use your frontal lobe to make decisions such as what to eat or drink for breakfast in the morning, as well as for thinking or studying for a test.
- The frontal lobe is also where our personality is formed and where we can carry out higher mental processes such as planning.
- In addition, the frontal lobe is necessary to being able to speak *fluently*(without fault) and meaningfully.



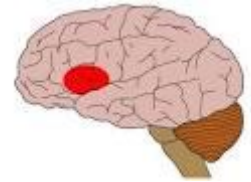
Brain Facts

- The brain weighs less than 2.5% of our total bodyweight. But it:
 - Accounts for 20% of our energy consumption when we are at rest
 - Burns oxygen and glucose at 10 times the rate of other body organs
 - Contains 86 BILLION nerve cells
 - Is made up of 77% water
- The left side of our brain controls the right hand side of our body and vice versa
- The hemispheres of the brain are joined by the corpus callosum

Hitty Heady Hurty Lotty

- The brain is the most important organ in the body.
- The brain is the centre for life & functioning
- The brain makes us what we are
- Damage to the brain or a knock to the head **hurts**, but more importantly **causes a range of long term problems.**

What we know about damage to the brain

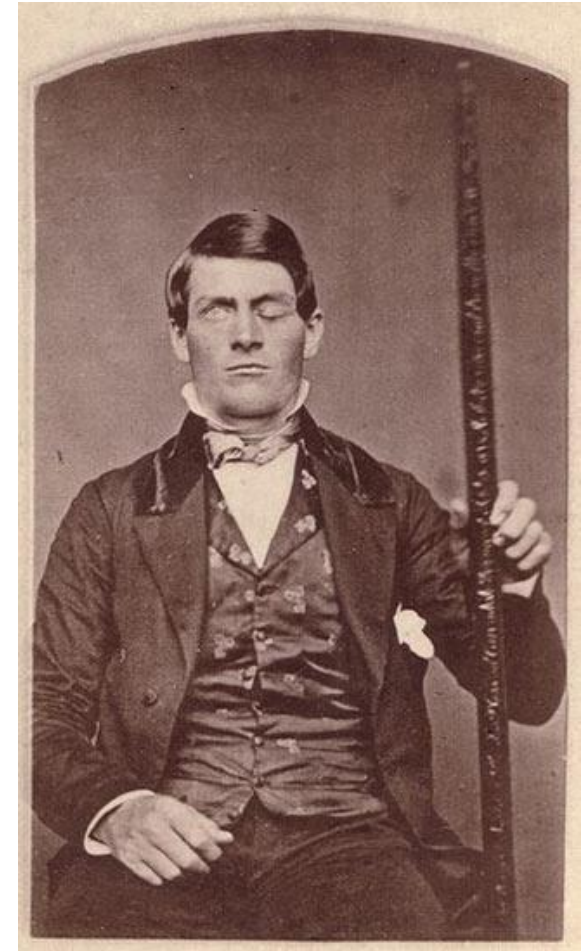


- Paul Broca (1861): A French surgeon discovered that damage to this region led to an inability to articulate speech but did not affect speech comprehension
- Carl Wernicke (1874) – A German neurologist discovered that damage to this region led to an inability to understand speech but left articulation intact



Phineas Gage (1823 –1860)

- The first case suggesting that damage to specific regions of the brain might affect personality and behaviour.
- Extensive personality changes
- Language deficits
- Inability to undertake previous employment



Why Study People with Brain Injuries?

“In any well-made machine one is ignorant of the working of most of the parts – the better they work, the less we are conscious of them...it is only a fault which draws attention to the existence of a mechanism at all”

(Craik, 1943)

Physical Consequences of ABI

- **Mobility:** Common side effects include mobility issues such as slowed movement or difficulties with balance or coordination
- **Spasticity:** Limited movement or stiff or weak limbs and muscle spasms
- **Ataxia:** Uncontrolled movements tremors
- **Paralysis:** Weakness or paralysis in areas of the body, often on one side known as “hemiplegia”



Physical Consequences of ABI

- **Speech:** Slowed, slurred or rapid speech
- **Fatigue:** Excessive tiredness is a common side effect. The brain has to work harder than it did before to perform basic tasks.

Physical Consequences of ABI

- **Sensory Impairment:**
 - **Positioning:** May cause unusual postures when walking, or may experience dizziness
 - **Touch:** May not respond to heat/pain etc
 - **Eyesight:** May need glasses to correct visual disturbance such as astigmatism. Often associated with headaches
 - **Taste/smell:** Often sense of smell especially is affected after ABI

Other physical Consequences of ABI

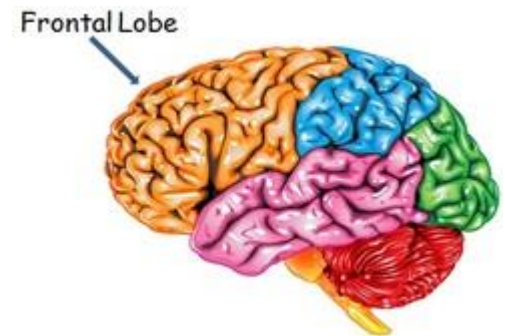
- **Pain:** Headaches & ataxia
- **Epilepsy:** Seizures are a common side effect due to disruption to the signals in parts of the brain
- **Hyperhidrosis:** A common condition in which a person sweats excessively.
- **Diabetes Insipidus:** a rare condition where you produce a large amount of urine and often feel thirsty.

Cognitive Consequences of ABI

- **Memory:** Problems with long term or short term memory, or memory for specific things, such as faces or names
- **Aphasia:** Difficulty understanding or expressing speech
- **Information Processing:** Inability to divide attention, switch attention or hone attention or speed of processing problems

Cognitive Consequences of ABI

- Reduced initiation of tasks
- Reduced concentration
- Increased repetition
- Impaired reasoning
- Impaired insight

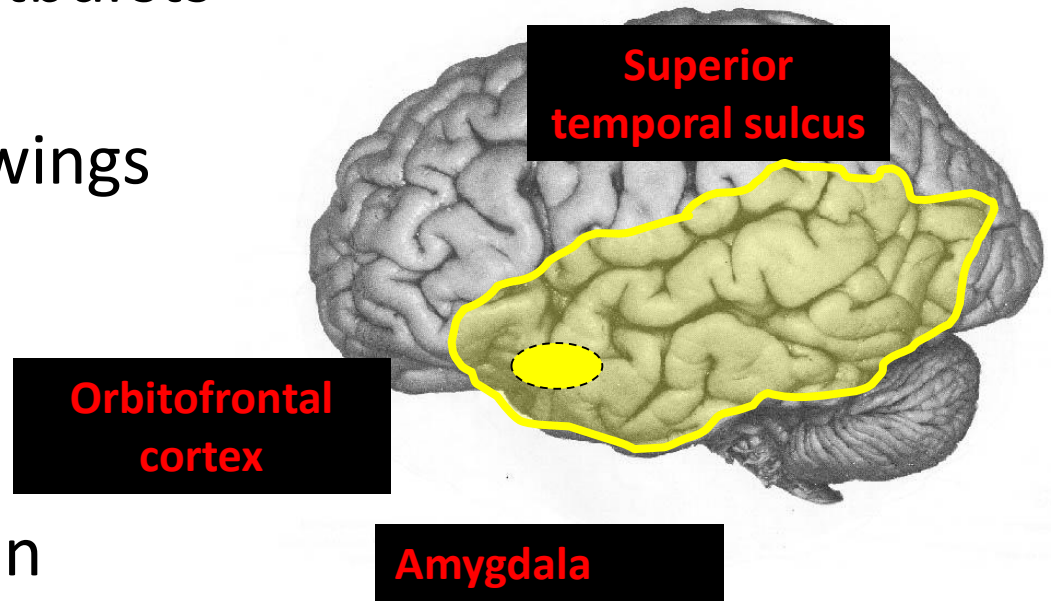


Emotional Consequences of ABI

- **Personality Changes:** Damage to the frontal lobes leads to changes in who we are as a person.
 - Can lead to a sense of guilt and grief in family members.
 - Problems with reconstructing sense of self for ABI survivors
- **Mood Swings:** Changes in emotional control centres and hormonal release can lead to wild changes in mood

Emotional Consequences of ABI

- **Loss of Empathy:** An inability to put oneself in another's shoes
- **Anger:** Aggressive outbursts caused by frustration or mood swings
- **Anxiety:** Common consequence caused by both neurological damage and changes in circumstance

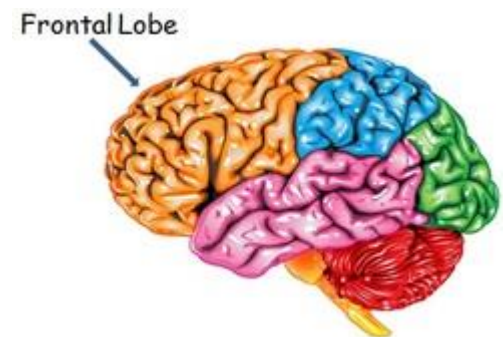


Emotional Consequences of ABI

- **Depression:** Common consequence of ABI, caused by both neurological damage and changes in circumstance
- **Post-Traumatic Stress Disorder (PTSD):** Common in those who have experienced a traumatic injury

Behavioural Consequence of ABI

- **Disinhibition:** Inability to stop oneself from doing/saying things
- **Impulsiveness:** Not planning through and thinking about situations before acting
- **Obsessive-compulsive behaviour:** Collecting things, repeating things etc
- **Aggression:** Becoming physically aggressive
- **Apathy:** Inability to get on with things or start tasks
- **Egocentricity:** Selfish behaviour



Executive Dysfunction

- **Problems with:**
 - Planning and organisation
 - Flexible thinking
 - Monitoring performance
 - Multi-tasking
 - Solving unusual problems
 - Self-awareness
 - Learning rules
 - Social behaviour
 - Making decisions
 - **Motivation**
 - **Initiating appropriate behaviour**
 - **Inhibiting inappropriate behaviour**
 - Controlling emotions
 - Concentrating and taking in information

Psychosocial Consequences of ABI

- **Reduced social networks:** Lost friends and family
- **Poor community reintegration:** Difficulty forming new friendships
- **Decision-making:** inability to make decisions or informed decisions
- **Finances:** Inability to manage finances
- **Mental Health difficulties:** Increased likelihood to be depressed or anxious or to engage in substance abuse

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What we know about the long-term consequences of brain injury

- Research shown us what specific regions of the brain do (some that is!)
- Brain injuries are rarely that straightforward clinically:
 - Reverberation & Bruising
 - Neurodiversity
 - Neuroplasticity
 - Rehabilitation

Take home messages

- Brain injuries are not “curable”
- We know a lot about the brain and brain injury BUT every injury is individual
- Brain injuries do not just affect survivors they affect ALL individuals surrounding that person too
- Long-term rehabilitation is the key to long-term success