Epilepsy Connections, Suites 129-134 Baltic Chambers, 50 Wellington Street, Glasgow G2 6HJ
Tel: 0141 248 4125    Email: info@epilepsyconnections.org.uk
Website: www.epilepsyconnections.org.uk
Welcome to the Brain

Contains about 85,000,000,000 neurons, specialised cells communicating via electrical & chemical signals.

CONTROL CENTRE that's in charge of everything we do - from heart beat to memory storage.

Links neuron groups via long connections called axons to form neural circuits which are organised differently in discrete brain regions carrying out specific tasks.

Contains support cells, glia, which provide & maintain optimal environment in which neurons can grow & interact.

Different regions interconnect to co-ordinate actions - such as guiding motors skills using visual information.
Welcome to the Brain
Cerebrum

Is divided into **2 SYMMETRICAL HALVES** by a deep longitudinal cleft.

These halves are connected by the **CORPUS CALLOSUM**.

The surface of the cerebrum shows winding rounded ridges – **GYRI CEREBRI** – which are separated from one another by deep furrows.
The cerebrum is subdivided into the following **FOUR LOBES**: 

- Frontal Lobe
- Occipital Lobe
- Parietal Lobe
- Temporal Lobe
Frontal Lobe

Personality

- Largest lobe of the cerebral cortex.

- Responsible for many of the behavioural traits we consider uniquely human.

Decision Making

- Makes sense of information about the environment, memories and emotions, and uses this for decision making.

Motor Control

- Frontal Lobe
Frontal Lobe

- Maintains **CONNECTIONS** to nearly every other part of the brain
- **FILTERS** vast amounts of information to ensure we only focus on the relevant – without it, we wouldn’t have much of an attention span.
- Provides us with **WORKING MEMORY**, which keeps relevant information available for a short time to make complex decisions.
The temporal lobe...

... houses...
- memories
- emotions
- language comprehension

... contains...
- hippocampus
- primary auditory cortex
- Wernicke’s area

... is key for...
- recognition of objects, places and people
Temporal Lobe

- Information through the brain is funnelled through the **ENTORHINAL CORTEX** of the temporal lobe and into the hippocampus to create memories.
- The temporal lobe **LINKS WORDS** – written or spoken – to their semantic meanings.
Parietal Lobe

Integrates information from our SENSES to focus our attention on important things in our environment.

Interprets our sense of touch (SOMOSENSATION).

Reconciles signals from occipital lobe with touch & body position to paint a realistic picture of our surroundings.

Monitors the relative position of the body & limbs (PROPRIOCEPTION).

Receives signals from the occipital lobe that reflects the location of objects in our visual field.
Occipital Lobe

**RETINA (in the eye)**
- Bears some of the burden of detecting colours, edges and movement in our field of vision
- Sends visual information to the thalamus

**THALAMUS**

**OCCIPITAL LOBE**
- Decodes VISUAL SIGNALS
- Informs us about WHERE, HOW & WHAT we are seeing
The PRIMARY VISUAL CORTEX is the first part to receive visual information

NEURONS in this area detect high-contrast edges and their orientations, and motion

Information is relayed through the rest of the occipital lobe either

up towards the parietal lobe for a response based on motion

or

down towards the temporal lobe to recognise objects
Cerebellum (“Little Brain” in Latin)

Contains **70 BILLION NEURONS** – 5 x as many as the physically larger cerebral cortex

Highly convoluted (resembling a cauliflower)

- Helps improve motor skills by detecting errors in movements
- Helps honing talents – e.g. playing a piano
- Makes minute adjustments to the next movement. These adjustments strengthen the connections within neural circuits encoding complex movement.

These “procedural memories” of learned motor skills can persist, even when memories of events are disrupted by damage to the hippocampus.
Pons & Medulla oblongata

Pons

- Contains the **LOCUS CERULEUS**, an area important for **ATTENTION**.

Medulla oblongata

- Houses breathing control centres, including an area called the **PRE-BOTZINGER COMPLEX**, which generates breathing rhythm.
Corpus callosum

- Thick bundle of neural connections linking left and right hemispheres cerebral cortex
- Biggest superhighway in the brain

Axons

- Neural wires that neurons in either hemisphere stretch through the corpus callosum to communicate with neurons in the opposite hemisphere.
Corpus Callosum

Glia

- Specialised cells that wrap fatty deposits, known as myelin, around axons to provide insulation for electrical signals (akin to the plastic insulating cables around electrical wires)

White matter

- There is so much fatty myelin in the corpus callosum that is white in appearance
- **Superhighway** for information

Grey matter

- Contains cell bodies of neurons
- Where computations are made in the brain
Thank you!