KING'S College LONDON

INSTITUTE OF PSYCHIATRY,
PSYCHOLOGY & NEUROSCIENCE

Module:
Biological foundations of mental health

Week 1:
Introduction to brain anatomy

Dr John Pizzey

Topic 2
Neuroanatomy, neural systems and brain function

Part 2 of 3

Axes and planes

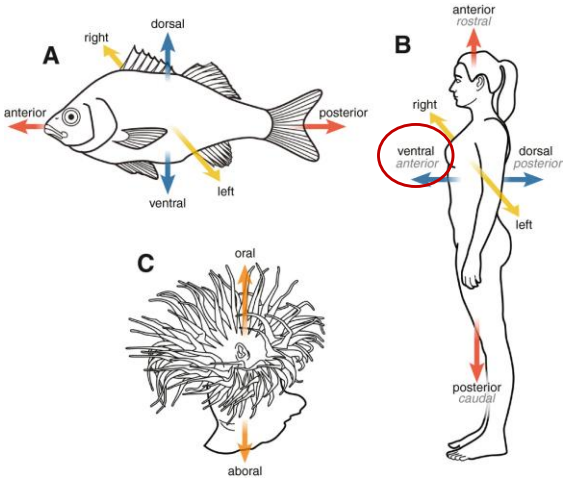

Figure 5: Axes and planes I

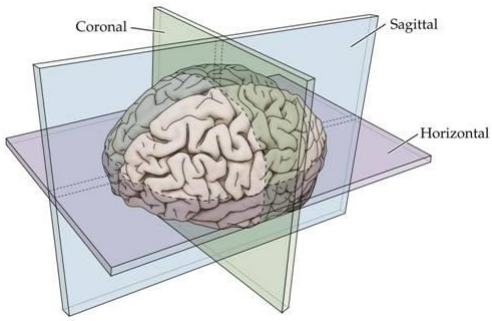

Figure 6: Axes and planes II

Anatomical divisions of the nervous system (2)

The central nervous system can also be divided into anatomical compartments

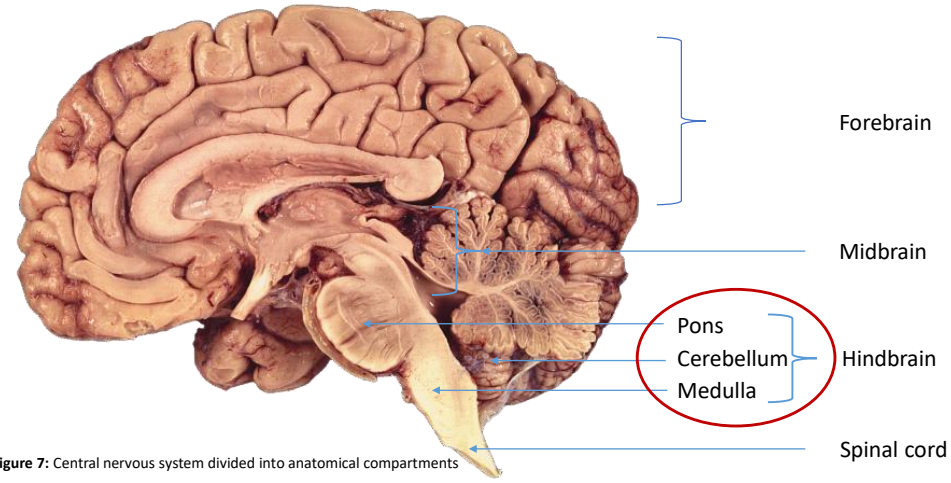

Figure 7: Central nervous system divided into anatomical compartments

The Spinal Cord

Spinal nerves are "mixed" nerves

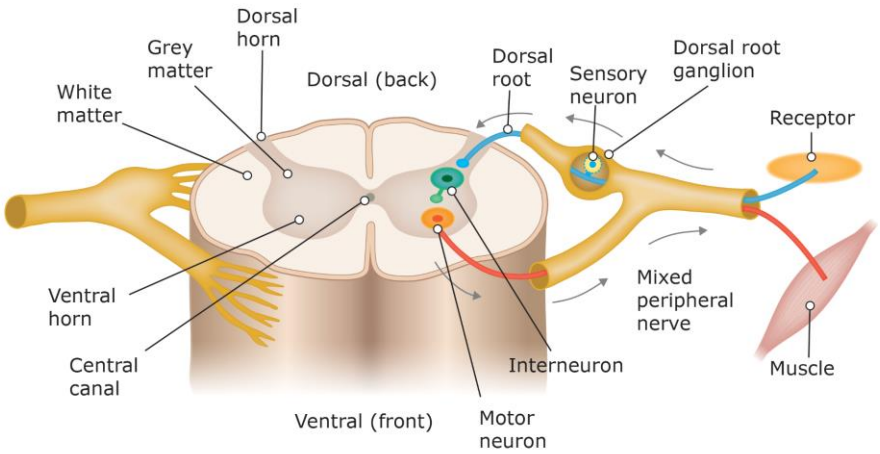

Figure 8: Spinal Nerves

Spinal nerves

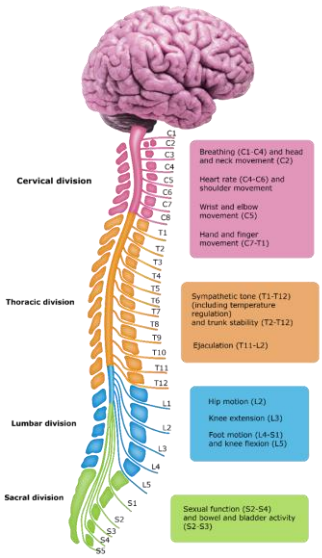

Figure 9: Spinal Nerves I

- There are normally 31 spinal nerves (8 cervical, 12 thoracic, 5 lumbar, 5 sacral and 1 coccygeal).
- All leave through a corresponding intervertebral foramen BUT the spinal cord ends at vertebral level L1/L2.
- Therefore … the cauda equina (horse's tail).

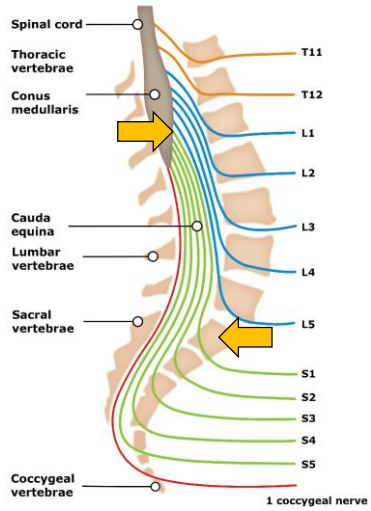

Figure 10: Spinal Nerves II

The Brainstem (1)

Medulla controls life supporting centers

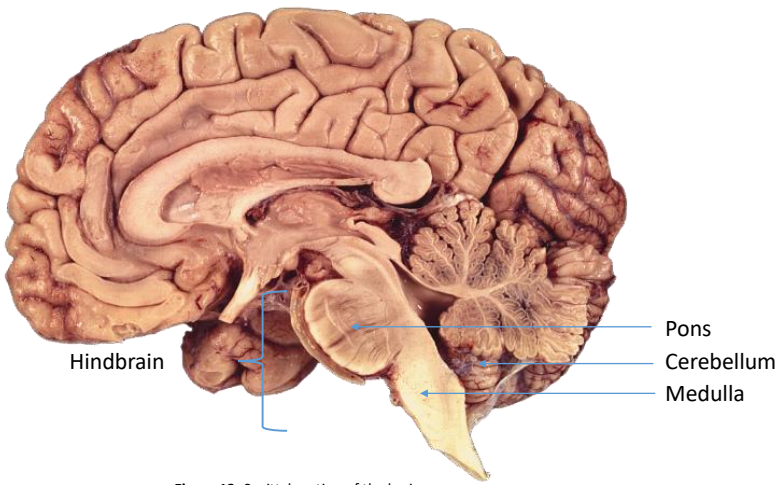

Figure 12: Sagittal section of the brain

The Brainstem (2)

Midbrain relays information between the forebrain and the hindbrain

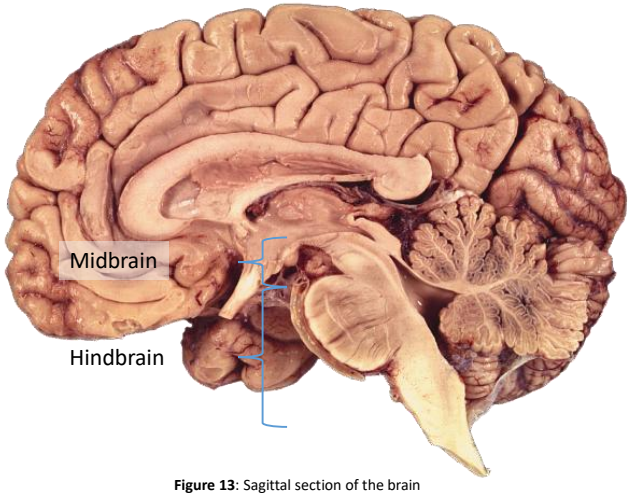

Figure 13: Sagittal section of the brain

The Brainstem (3)

Thalamus, part of the diencephalon, relays ascending sensory and descending motor information

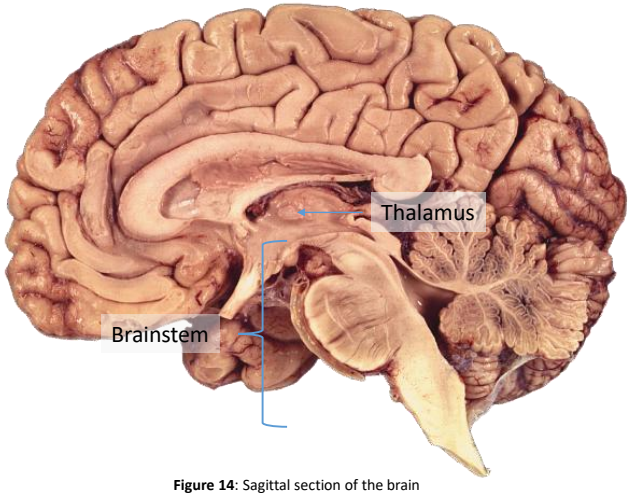

Figure 14: Sagittal section of the brain

Brainstem Functions

- Conduit for ascending and descending pathways
- Conduit for cerebellar connections
- Houses most cranial nerve nuclei
- Chemoreception, salivation, mastication, swallowing
- Reticular formation – arousal; cardiovascular and respiratory centres – vital life-supporting role
- Raphe, locus coeruleus nuclei - mood, sleep
- Substantia nigra – movement control

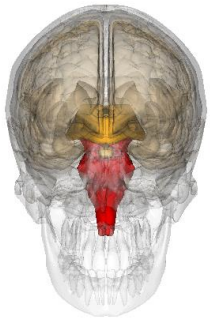

Figure 15: Brain stem

The Forebrain

Sulci, Gyri and Fissures

- The outer part of the cerebrum is the cerebral cortex. It is thrown into several ridges (gyri, sing. gyrus) and grooves (sulci, sing. sulcus).
- Deeper grooves are known as fissures.
- The gyri and sulci of the cerebral cortex increase the surface area of the brain to approx. 2,500 cm^2 - this is about the same as 4 pieces of A4 paper and allows much more neural material to be contained within the skull.

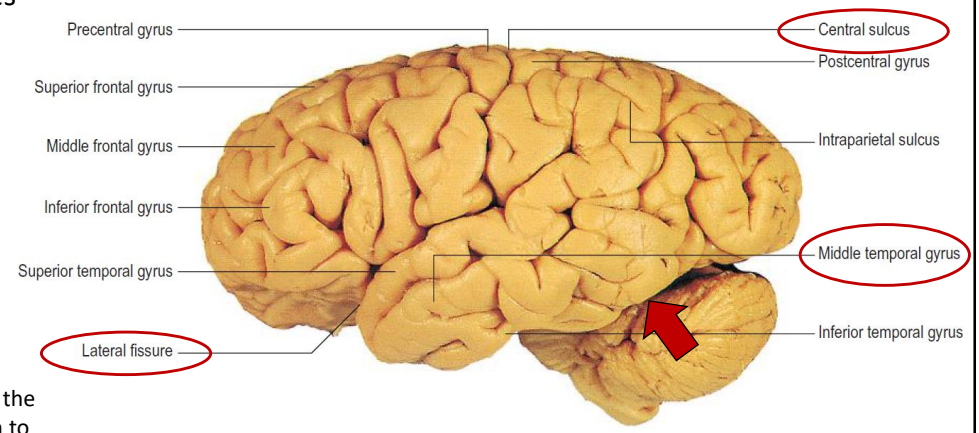

Figure 16: Lateral aspect of the cerebral hemisphere showing major gyri and sulci

The cerebrum is divided into lobes

Some functions are particularly associated with individual lobes

BUT

- No function is only located to just one lobe
- No lobe is associated with just one function

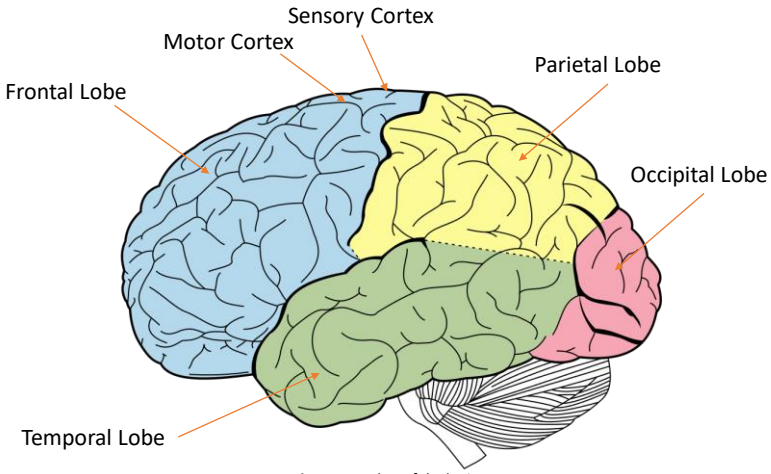

Figure 17: Lobes of the brain

The Forebrain - Parts

Cerebral Hemisphere
- Cerebral cortex
- Basal ganglia
- Various small nuclei
- Olfactory bulb

Diencephalon
- Thalamus
- Subthalamus
- Hypothalamus
- Epithalamus

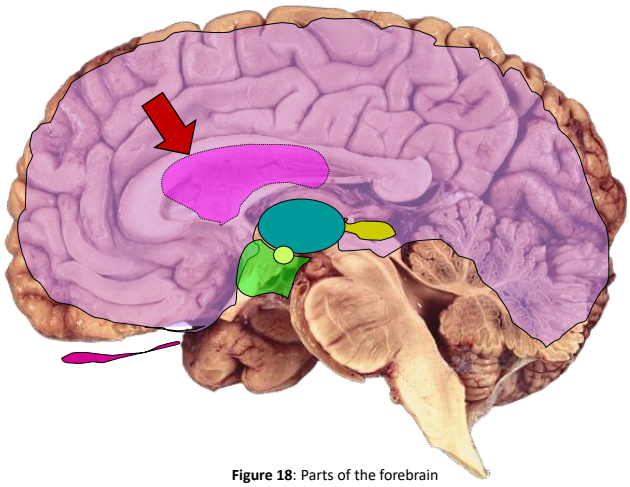

Figure 18: Parts of the forebrain