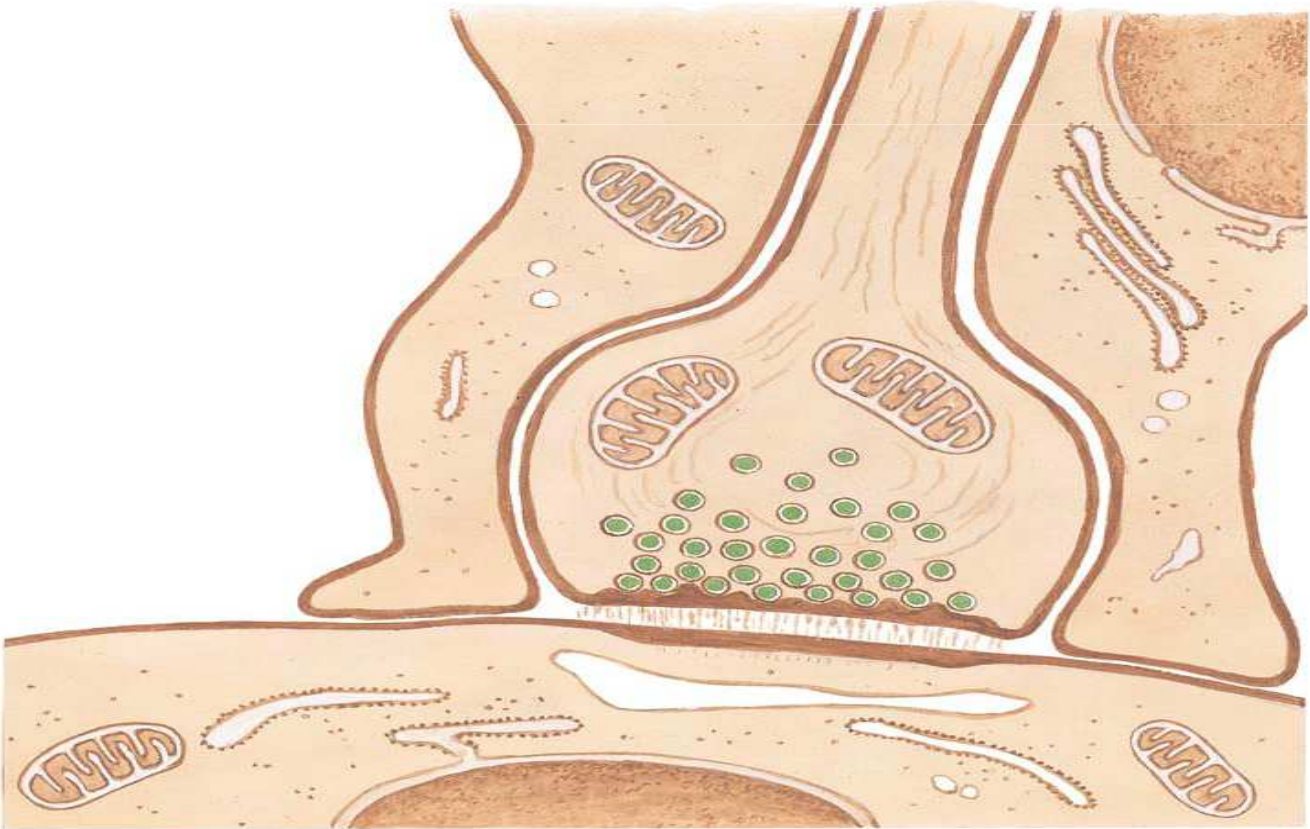
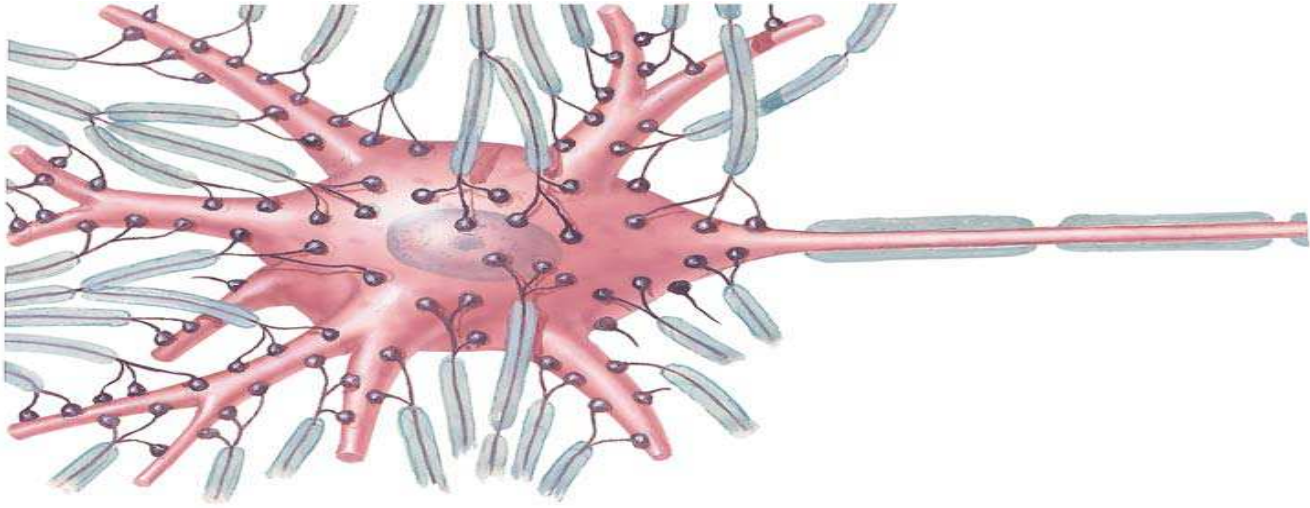
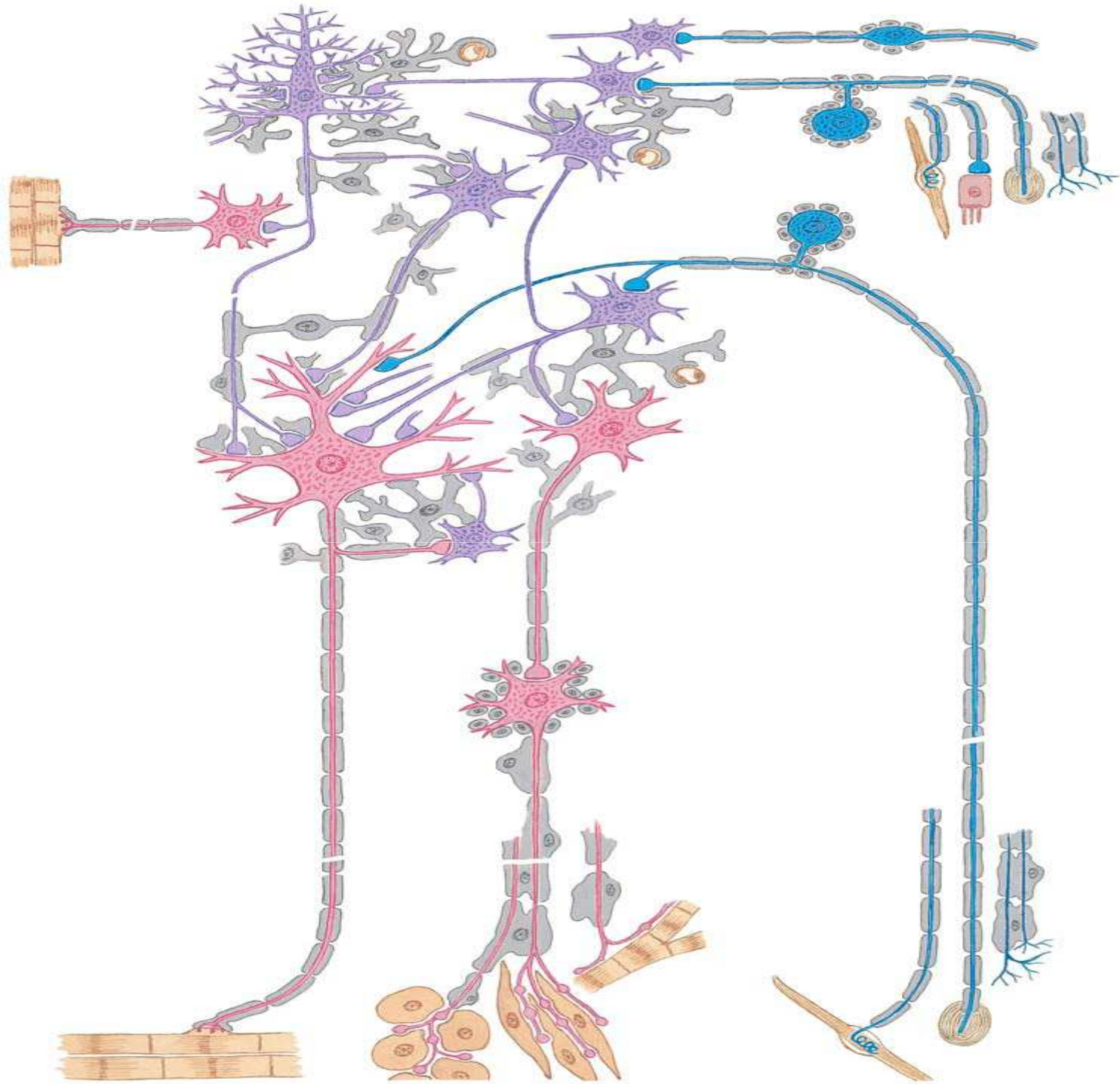


PRINCIPLES OF NEUROSURGERY

Dr.Khudur Shukur •





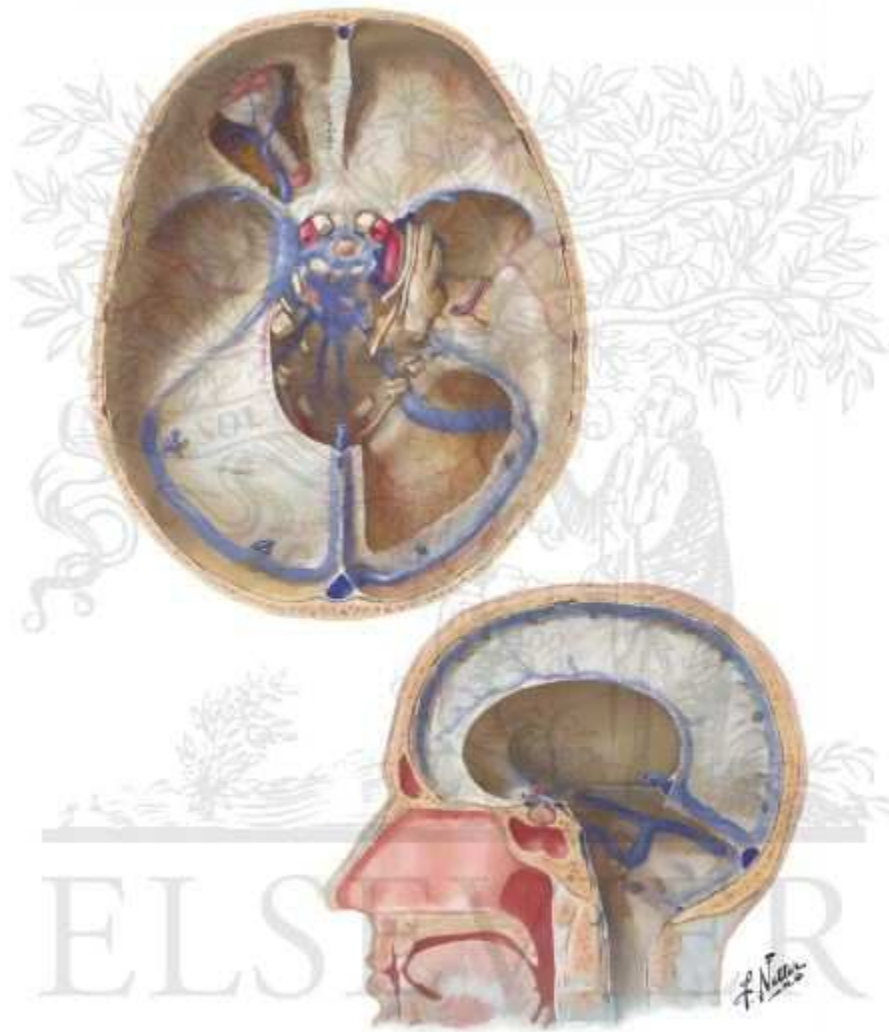


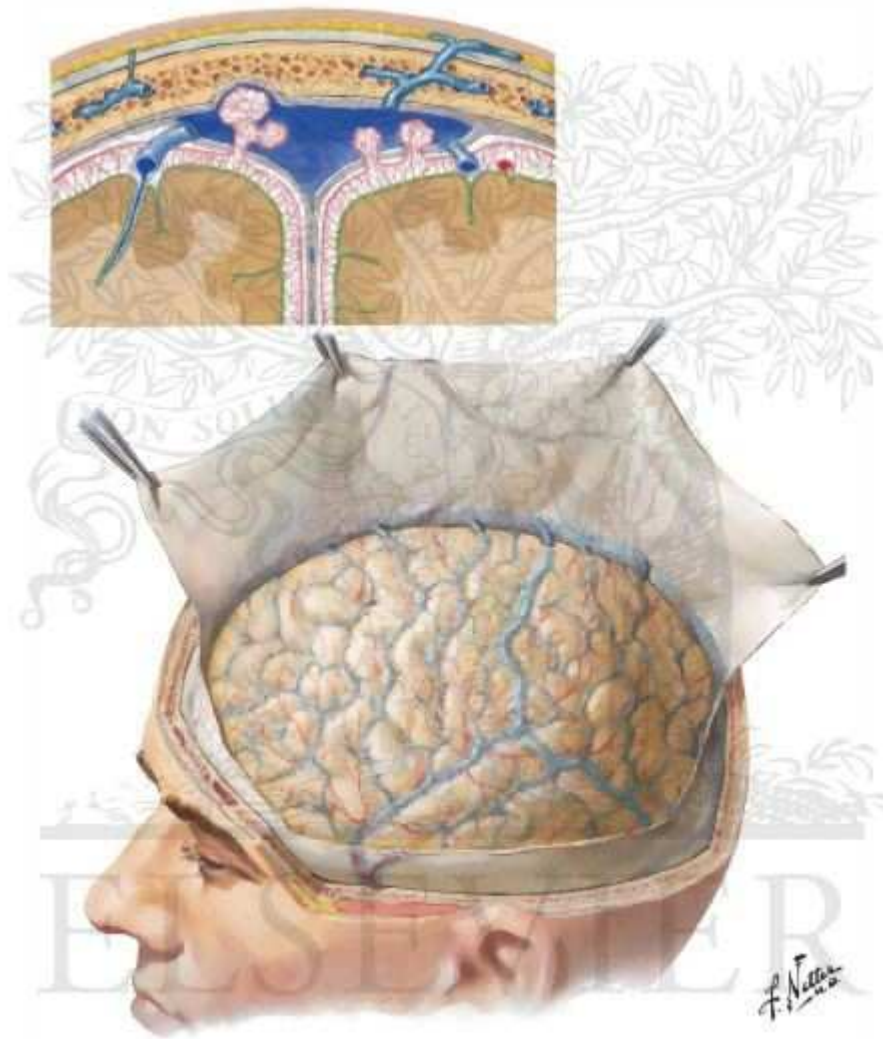
Three principles :

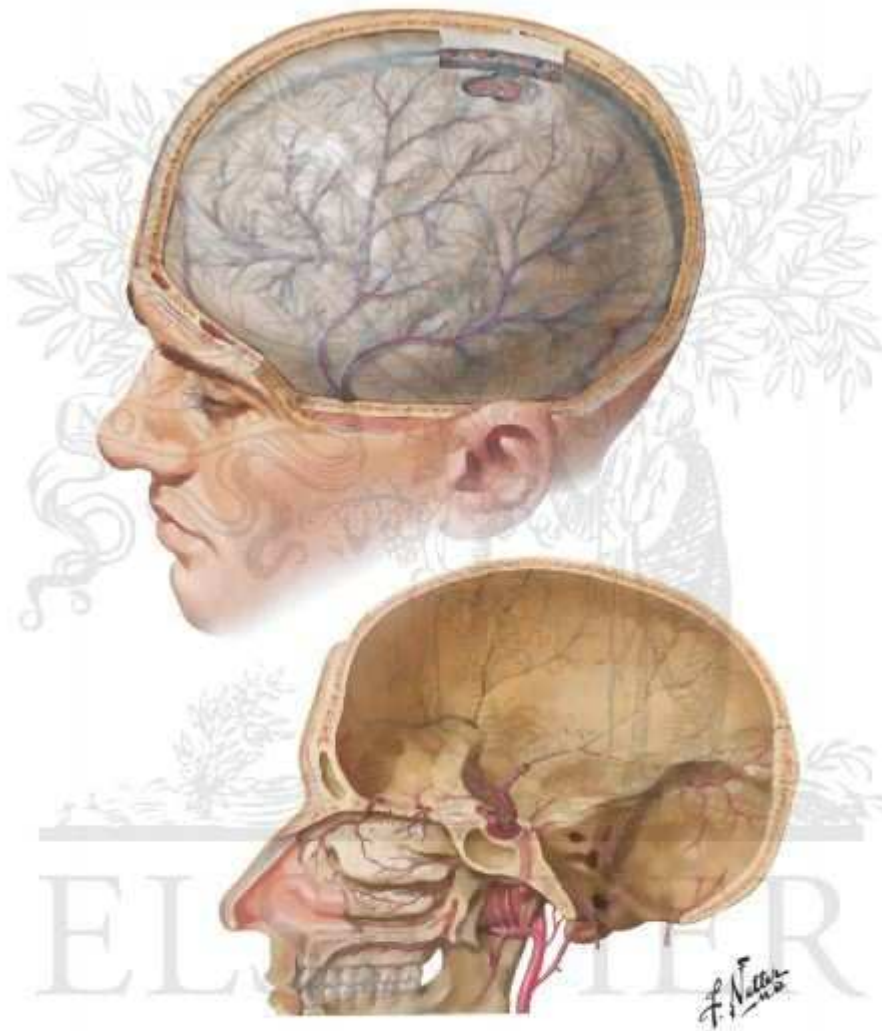
1-limited space

2-irreversible damage

3-limited time





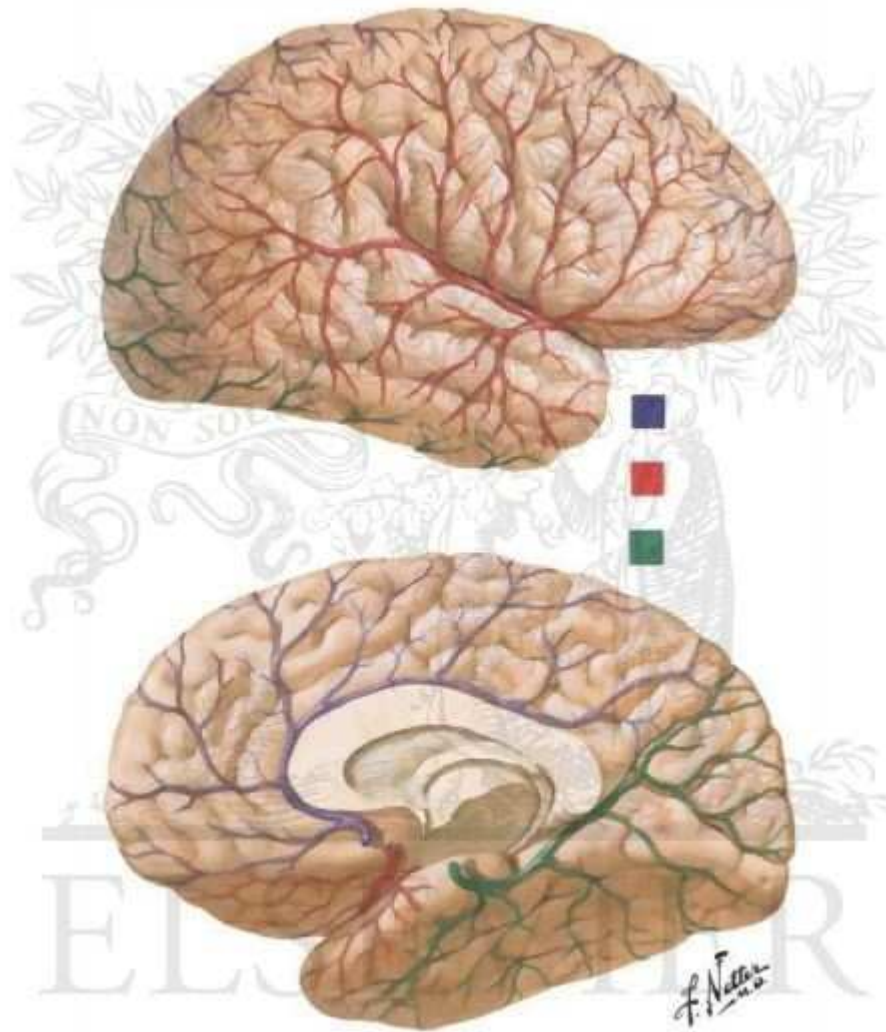


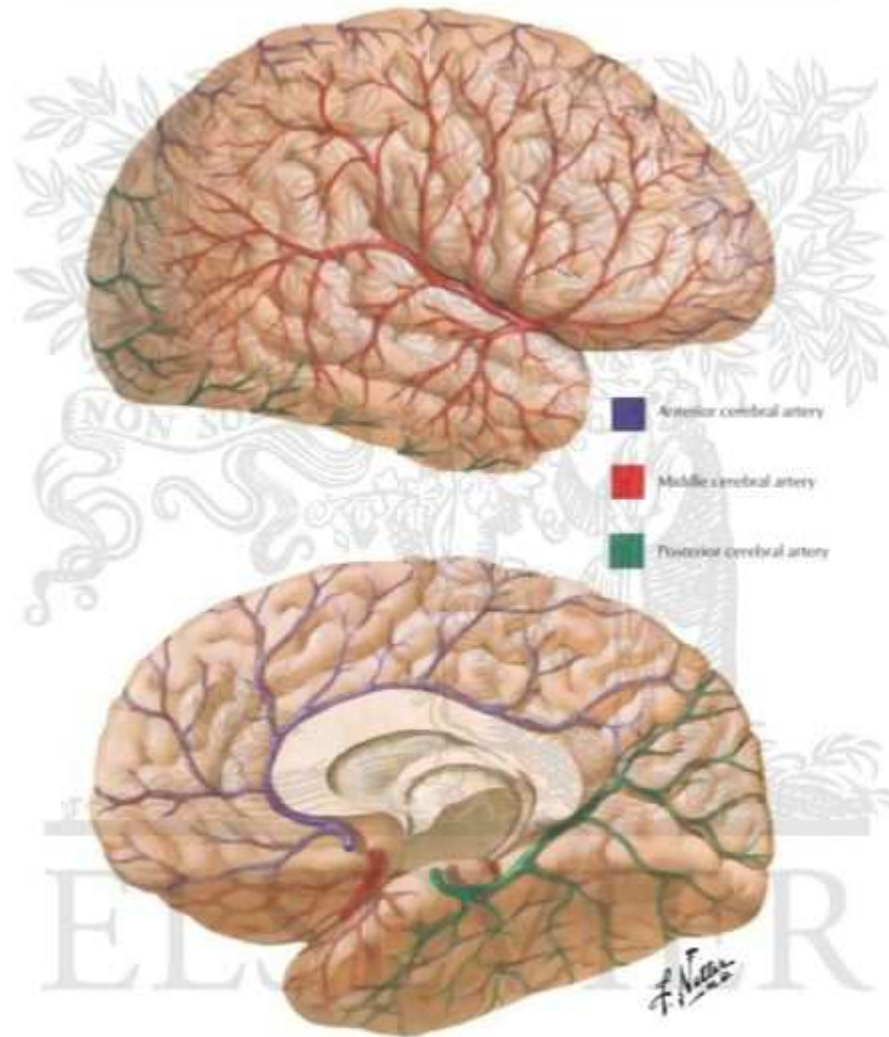
Arteries of the brain

Arteries of the brain

Anterior circulation – internal carotid artery, from common carotid in the neck. Bifurcates to MCA and ACA

Posterior circulation – vertebral arteries that join to form the basilar artery that will then bifurcate to 2 PCA

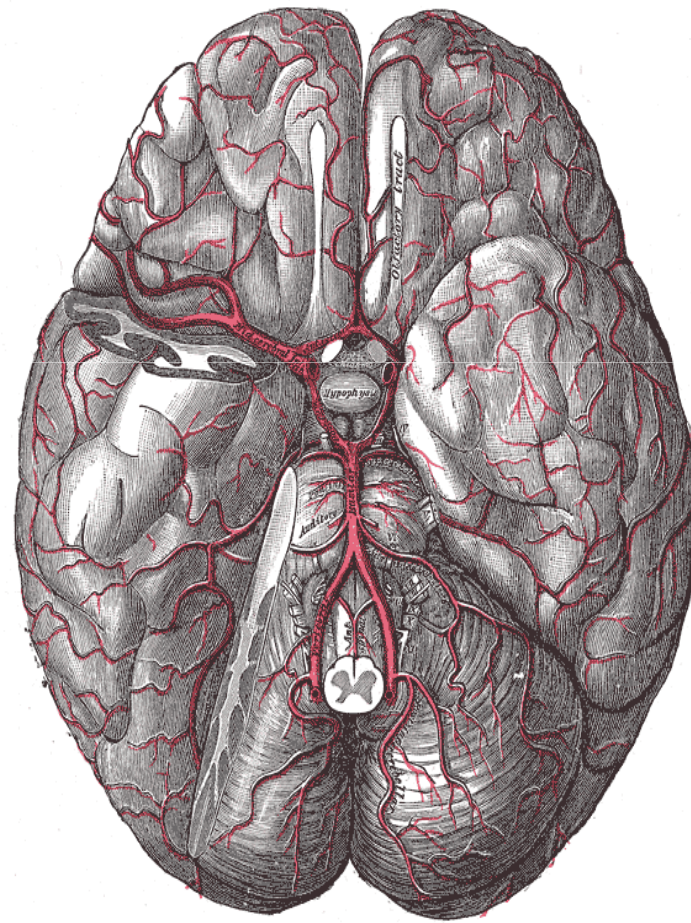




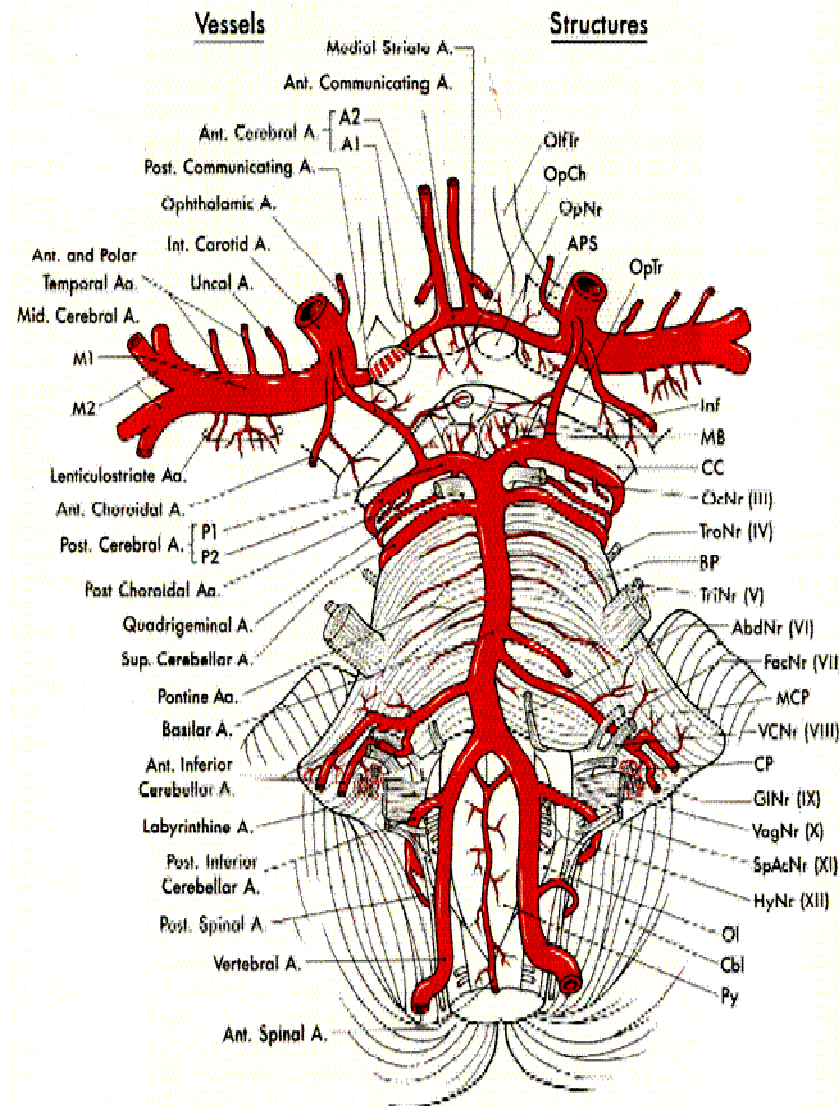
Circle of Willis

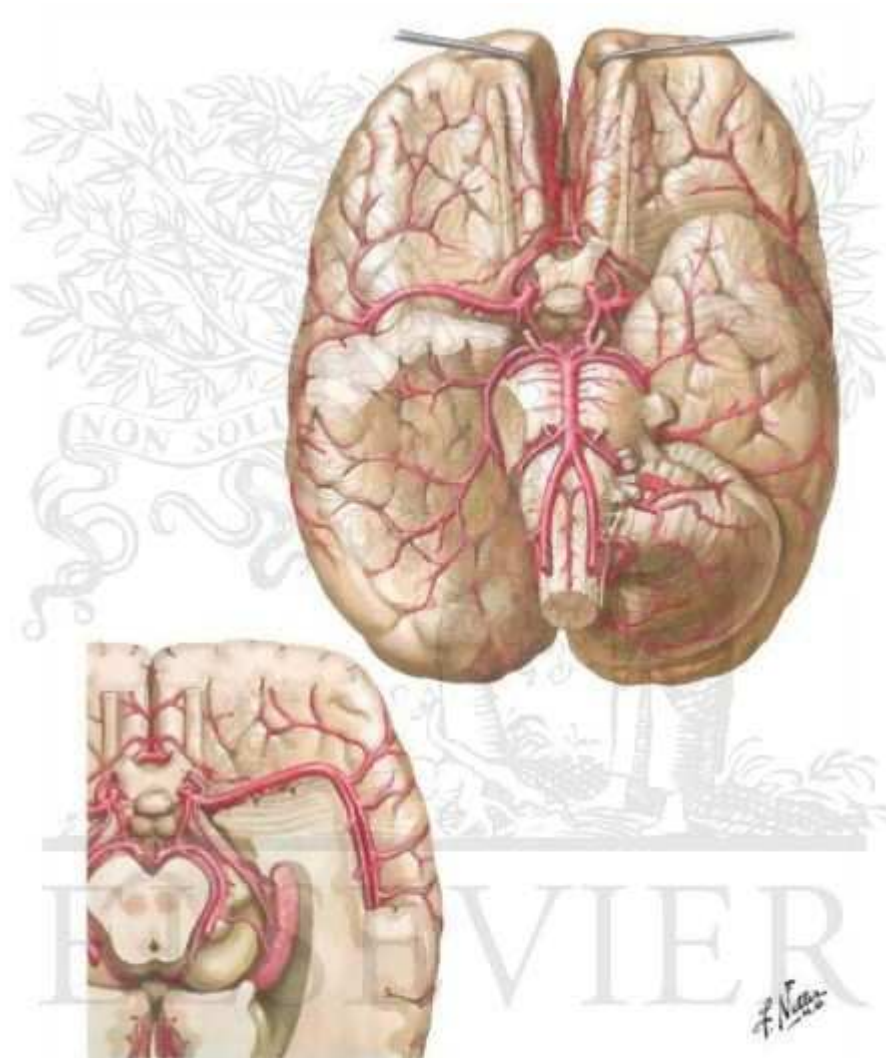
- Communication between 2 sides
anterior communicating (a-com)
- Communication between anterior and
posterior circulation – posterior ---
communicating (p-com)
- Many anomalies may exist

Arteries in the subarachnoid space



Arteries of the brain





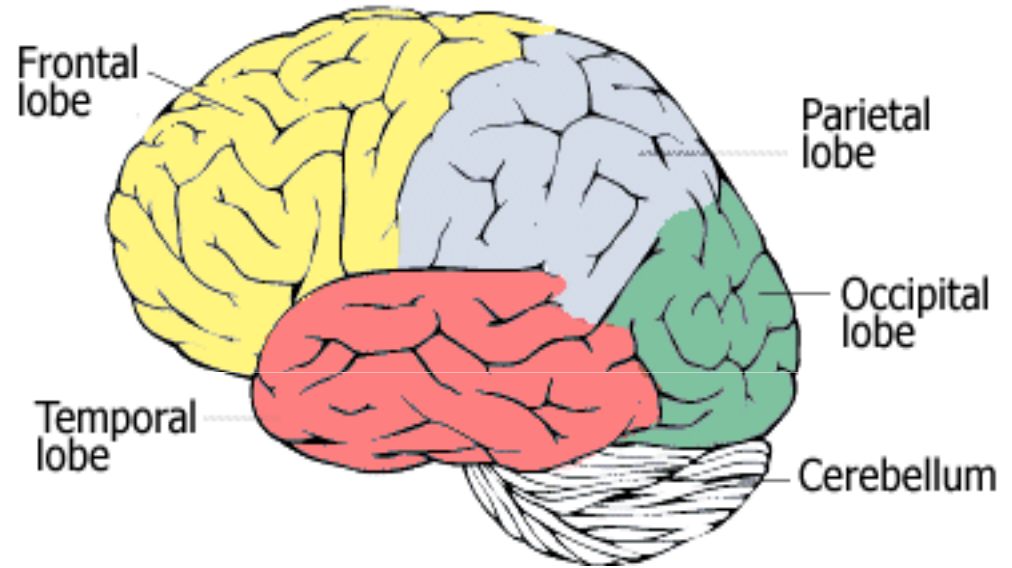
Each hemisphere has lobes:

Frontal lobe

Parietal lobe

Temporal lobe

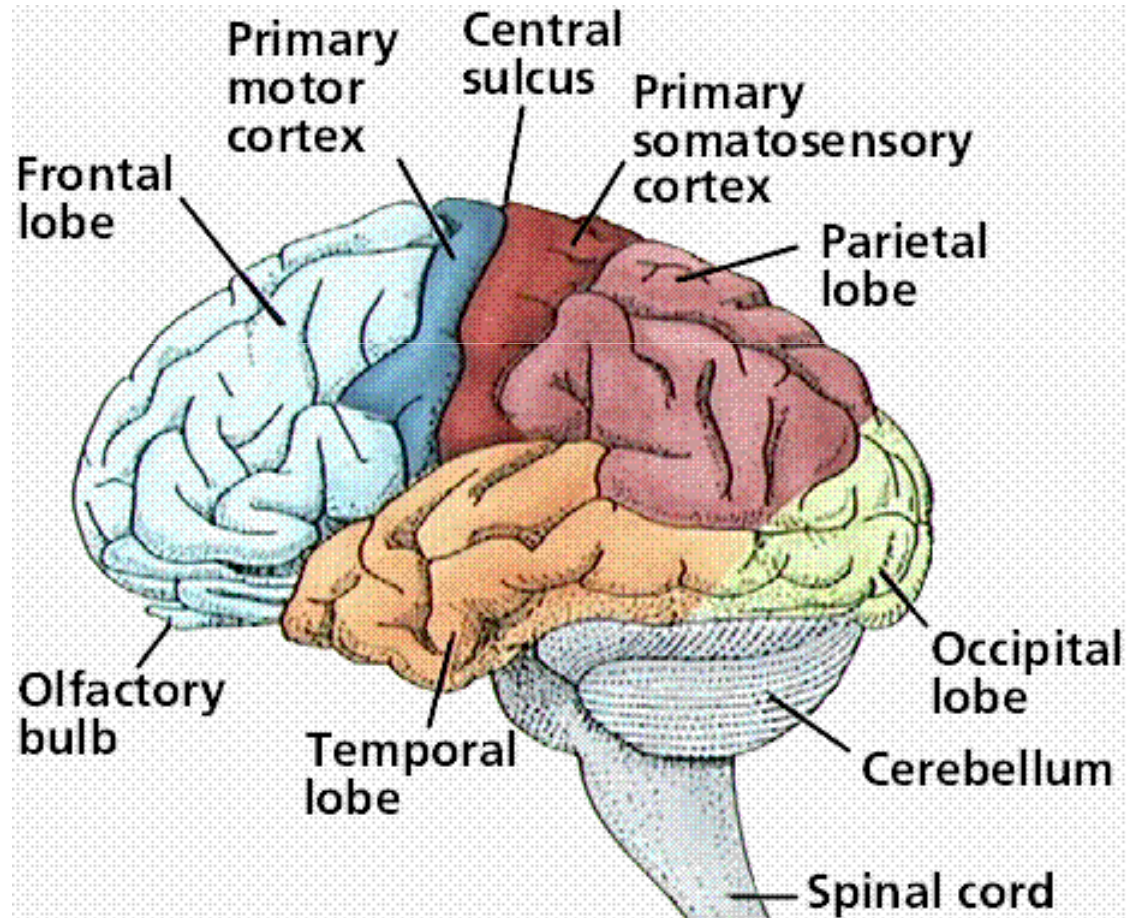
Occipital lobe



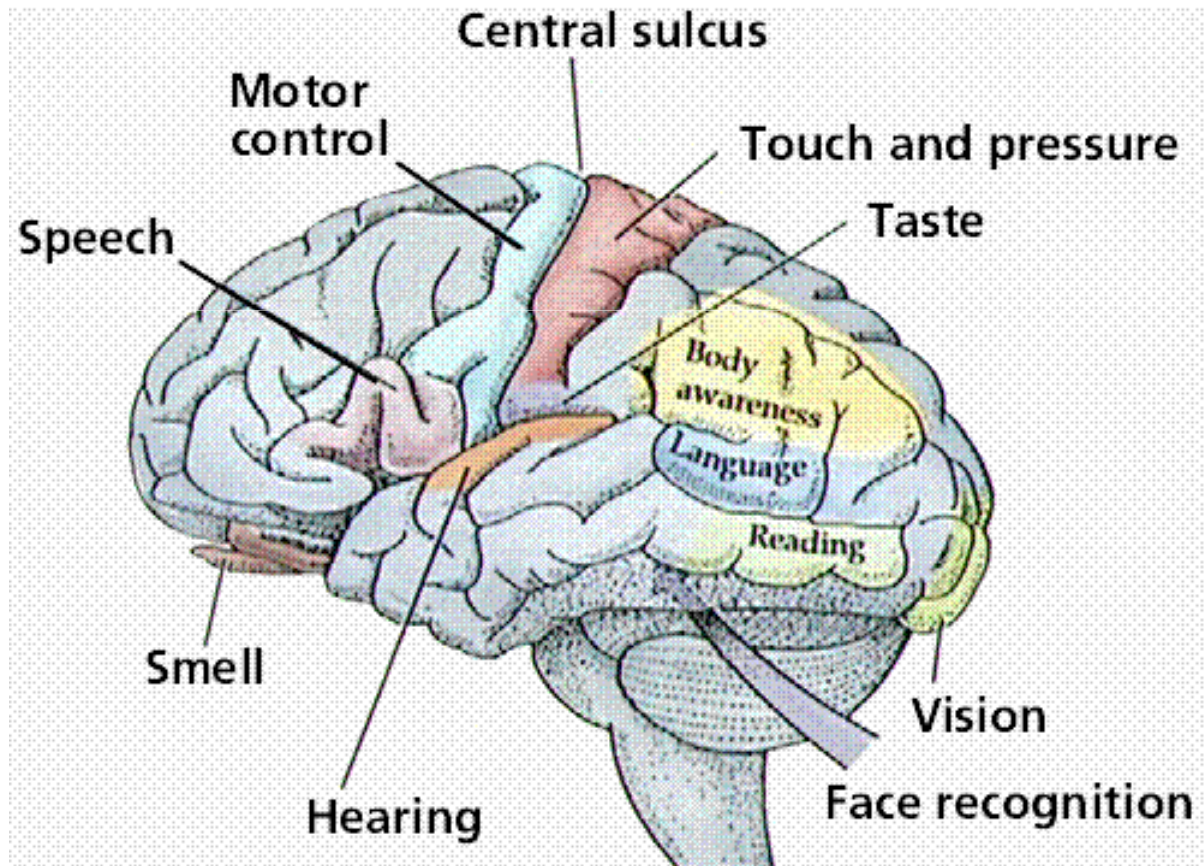
Insular lobe •

Limbic lobe •

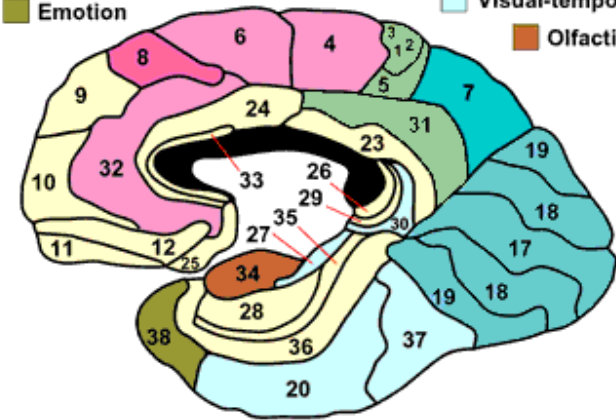
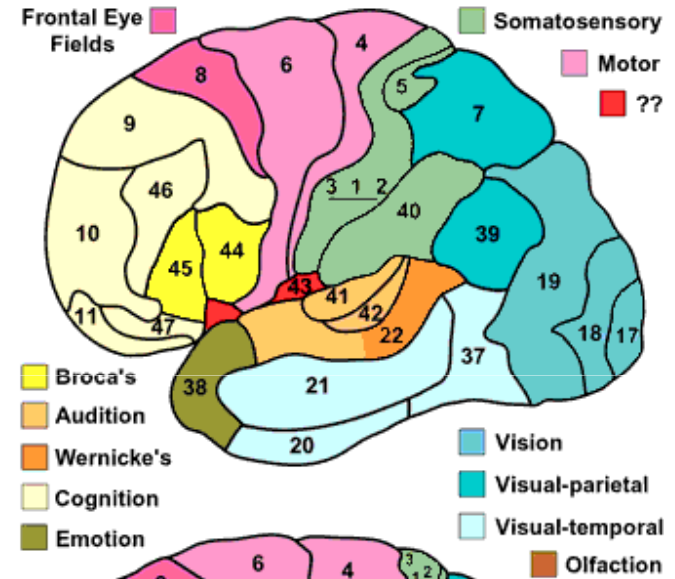
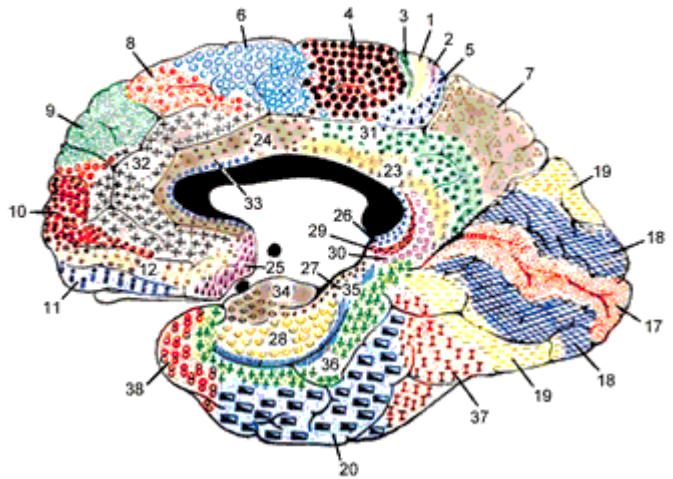
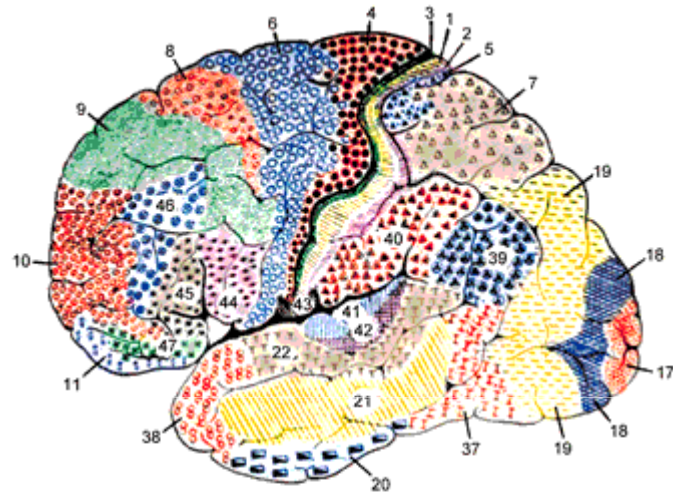
Functional areas



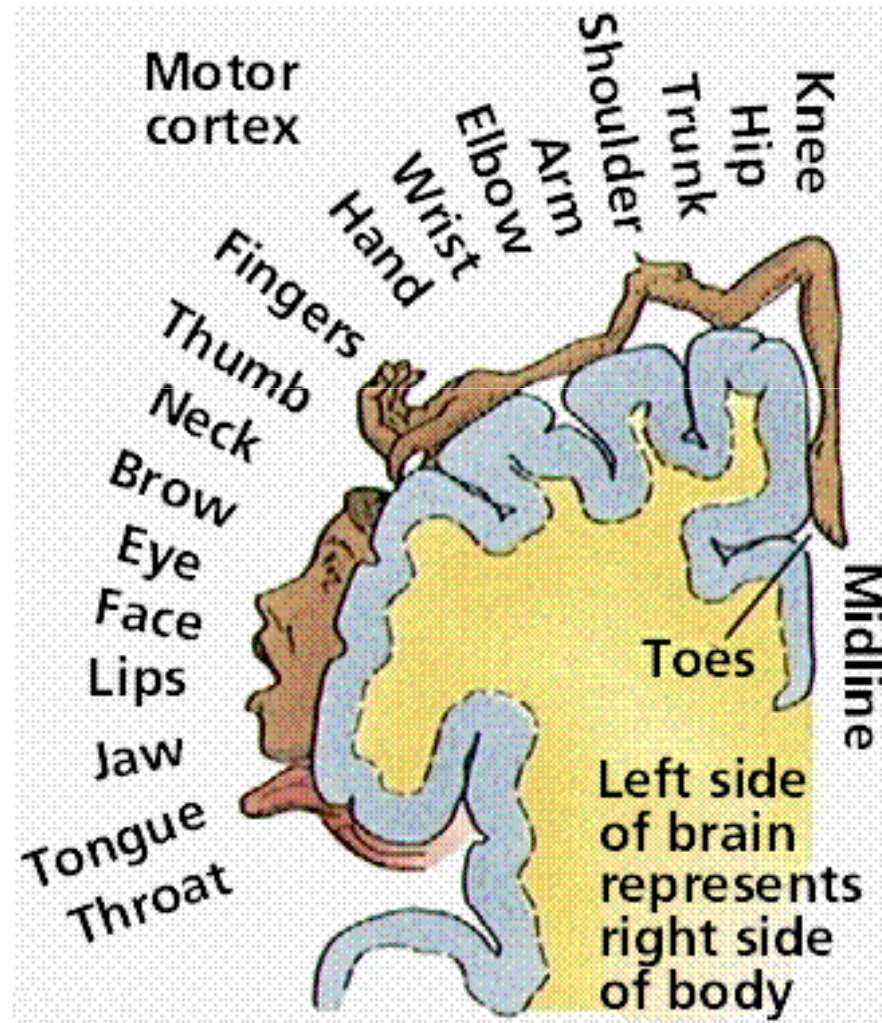
Function 2

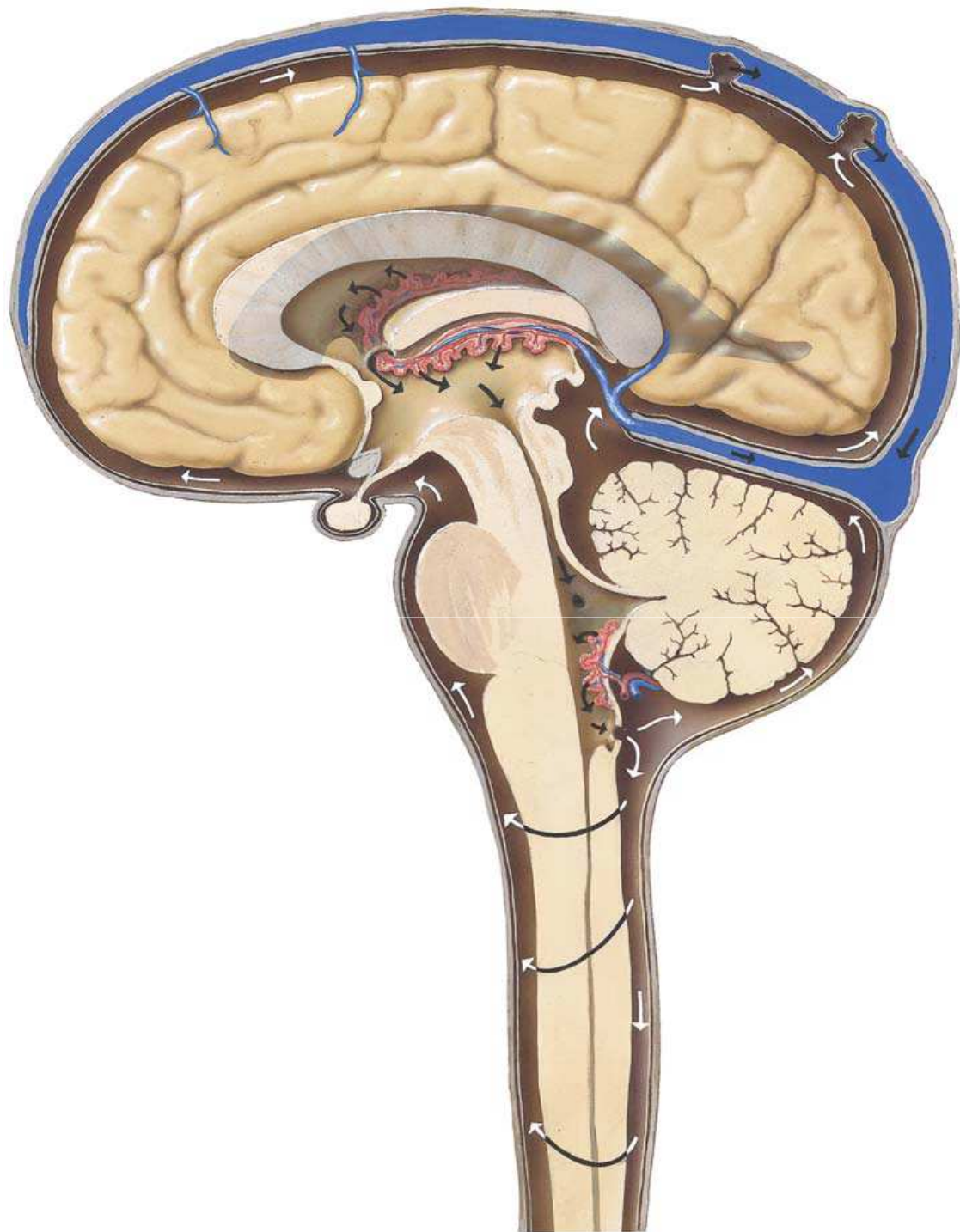


Brodmann Map

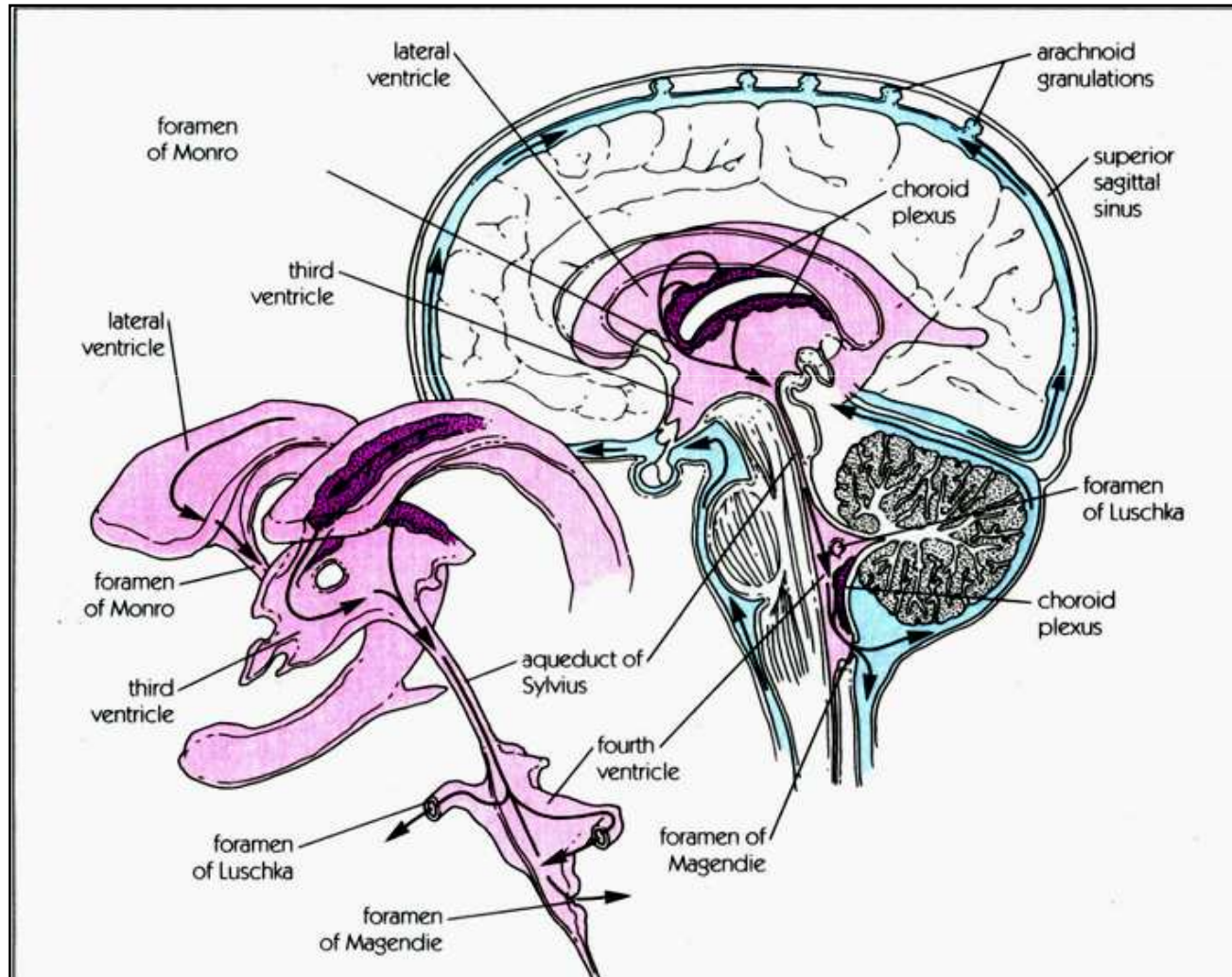


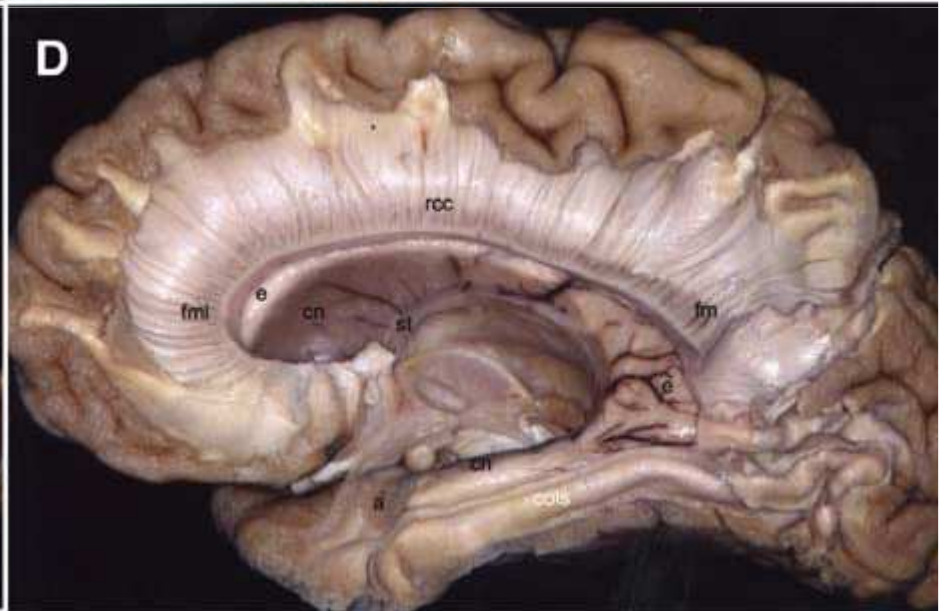
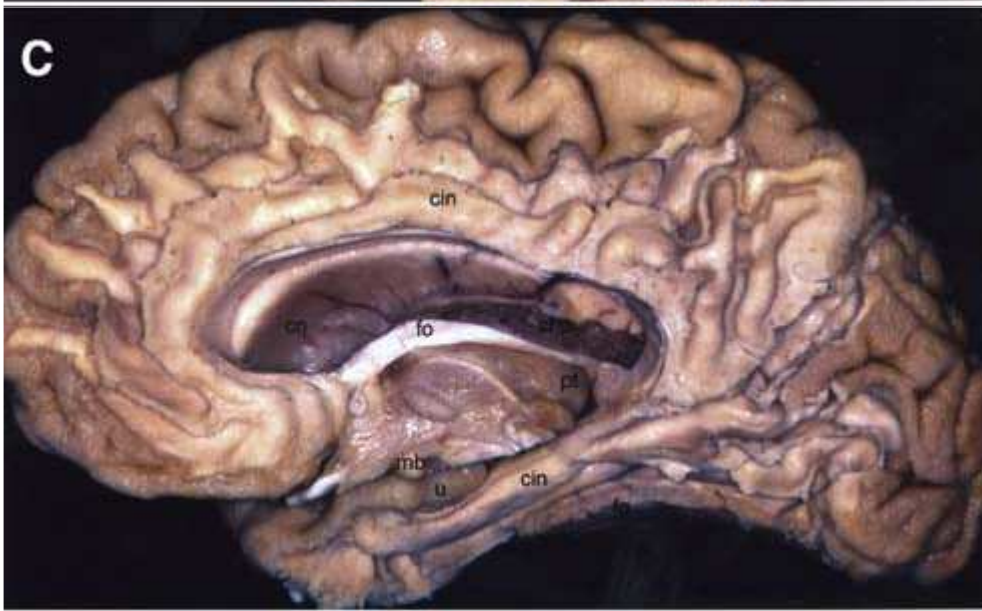
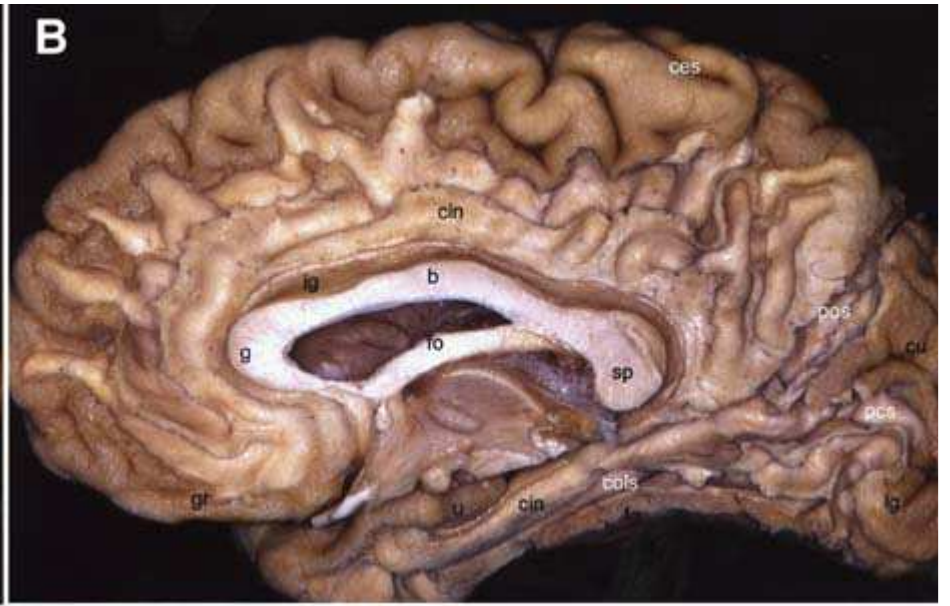
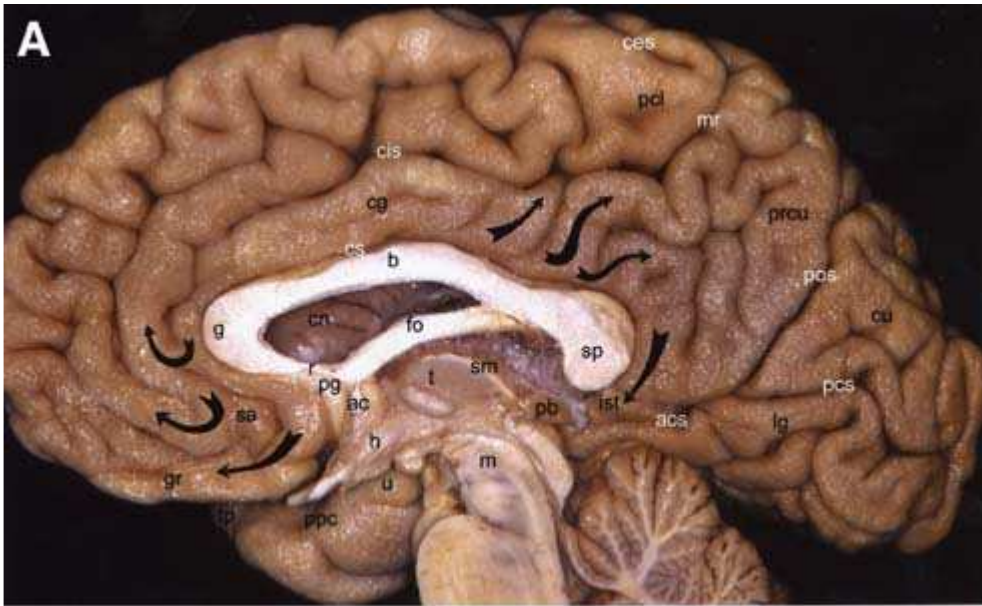
The Motor Strip

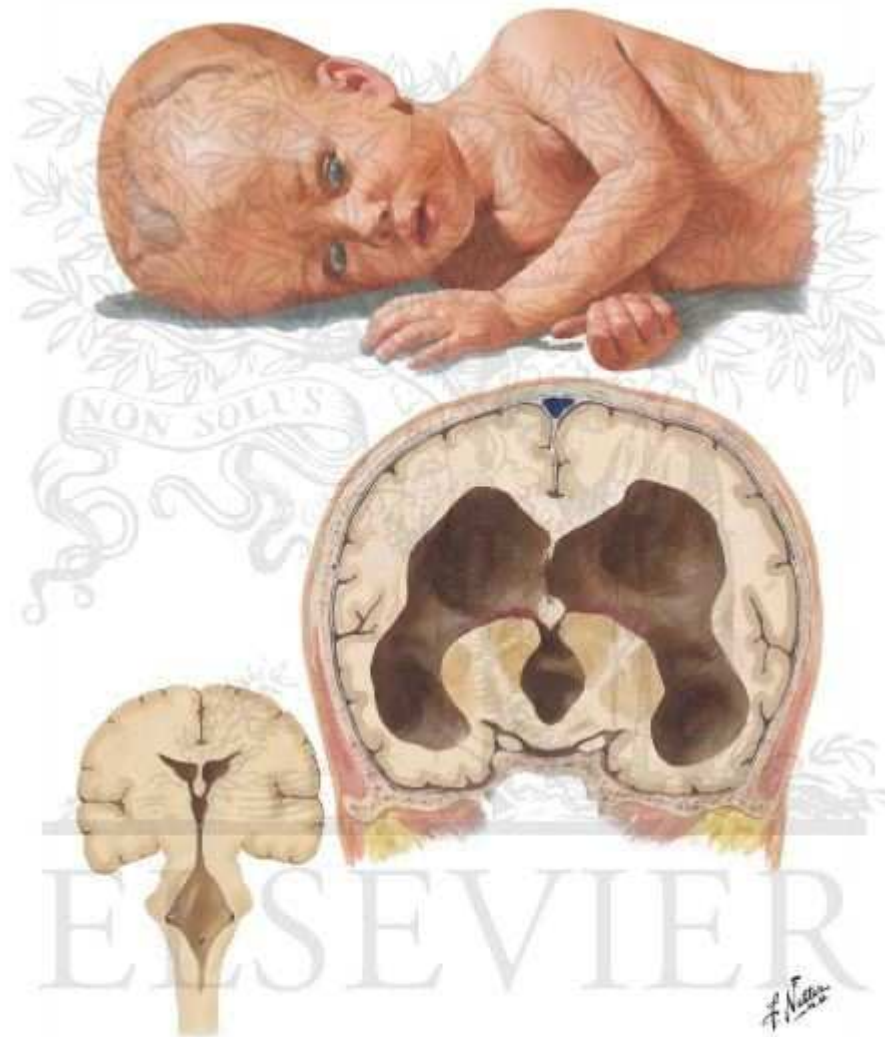


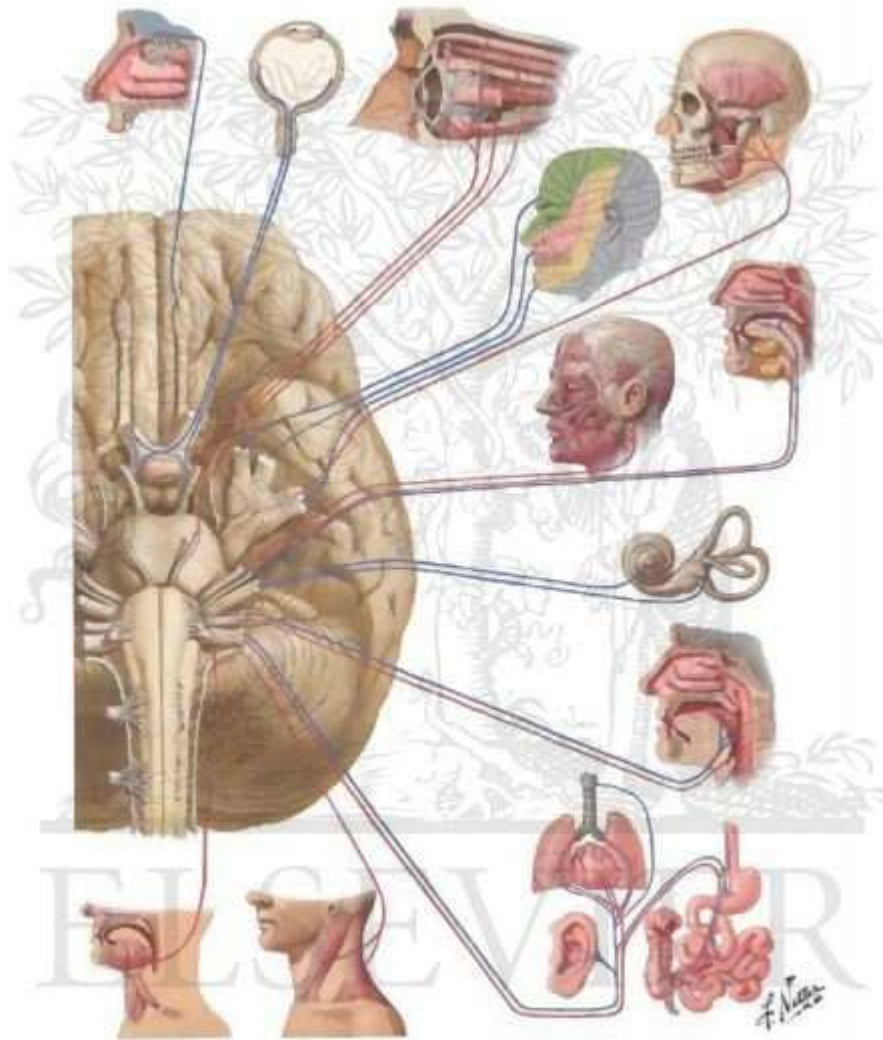


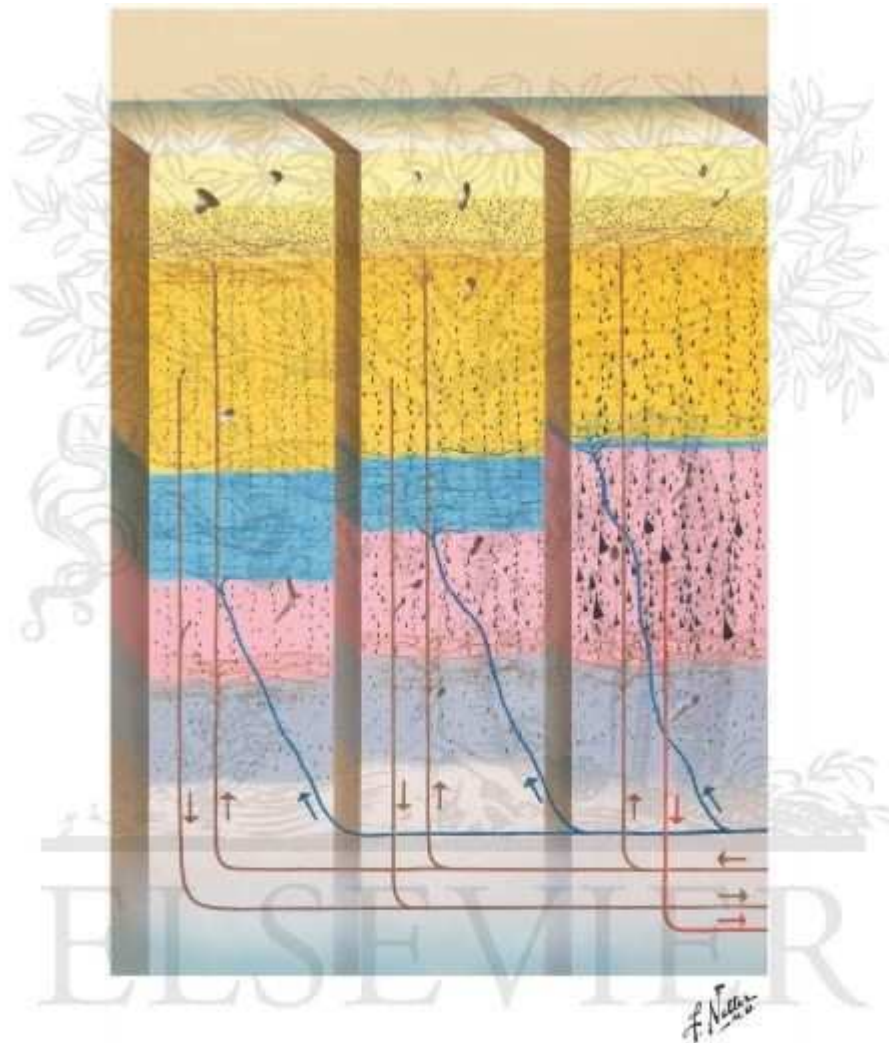
CSF Pathways











Physiology

Blood supply to the brain

The brain gets 15% of the cardiac output and 20% of the oxygen consumption

The brain tissue gets in average 50ml of blood per 100gr of tissue per minute. The gray matter receives about 3 to 4 times more than the white matter

Total blood supply to the brain is about 500-600ml per minute

Factors Affecting the blood supply

- Autoregulation •
- Biochemical changes – O_2 and CO_2 •
- Blood brain barrier - BBB •

Autoregulation

Maintains a regular blood supply to the brain ✓
in changing blood pressures

The range is 50-150 mm mercury ✓

Possible mechanisms are the myogenic ✓
control, neurogenic and biochemical control

CO₂

The most important and powerful mechanism that controls brain blood flow

A change in 1mm PCO₂ changes the flow in 4-5%

PCO₂ of 70 gives a maximal vasodilatation.

Above that the flow is pressure dependent

Hyperventilation

Hyperventilation lowers the PCO_2

It has a strong effect but it is limited in time

Could be dangerous if not regulated- ischemia

Can be regulated with a jugular bulb oximeter

BLOOD BRAIN BARRIER

The BBB is composed of the **tight junctions** in the endothelium cells of the blood vessels

Prevents passage of large molecules and even small ions like Na and Cl

Specific substances pass the BBB like glucose and amino acids

BLOOD BRAIN BARRIER

Because of the BBB, in the brain hydrostatic and oncotic pressures are not significant. The important parameter is the osmotic pressure

The BBB is damaged in trauma, tumor, infarct, SAH and infection

BLOOD BRAIN BARRIER

