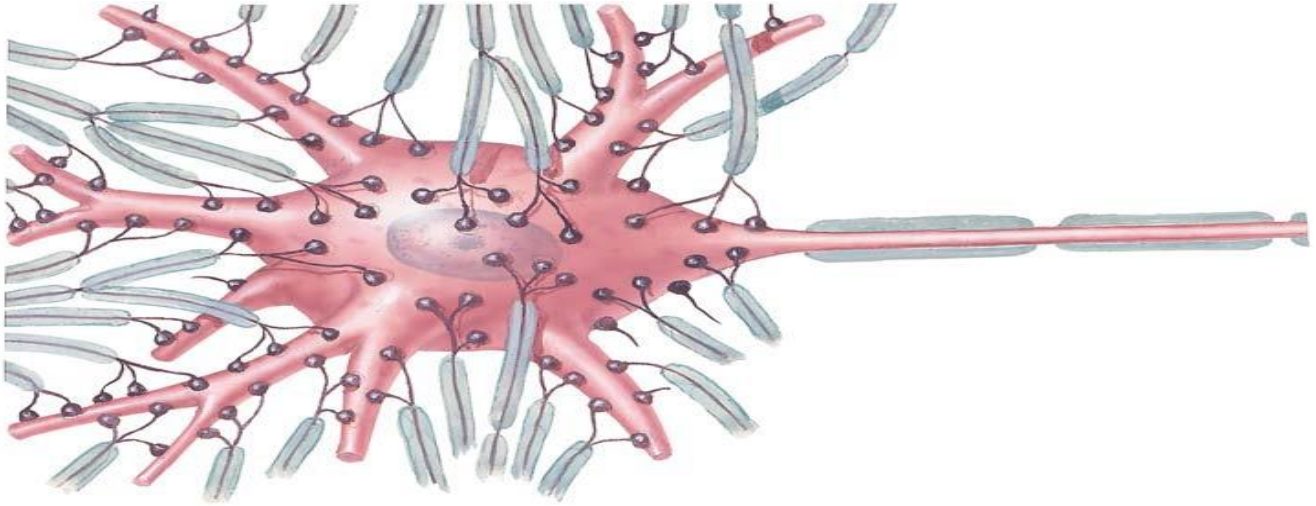
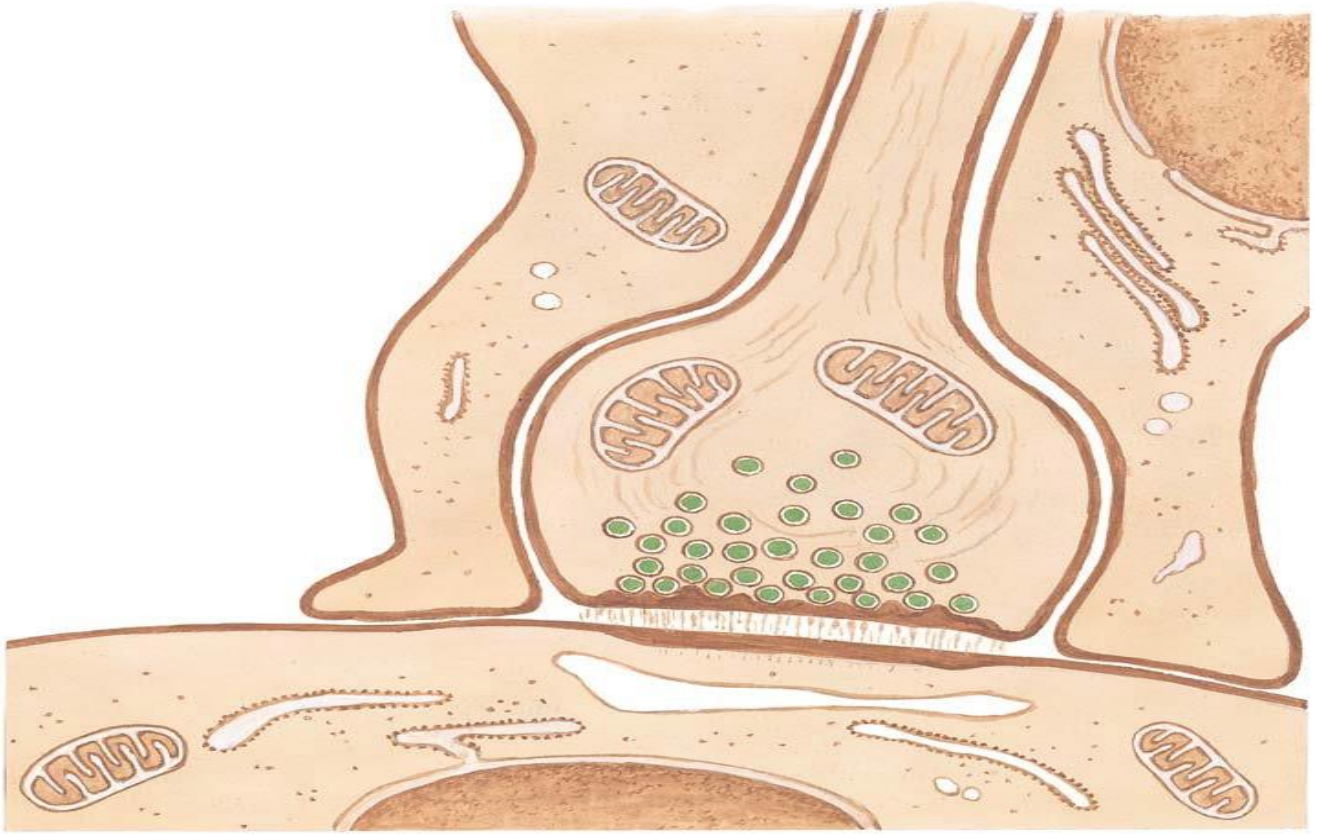
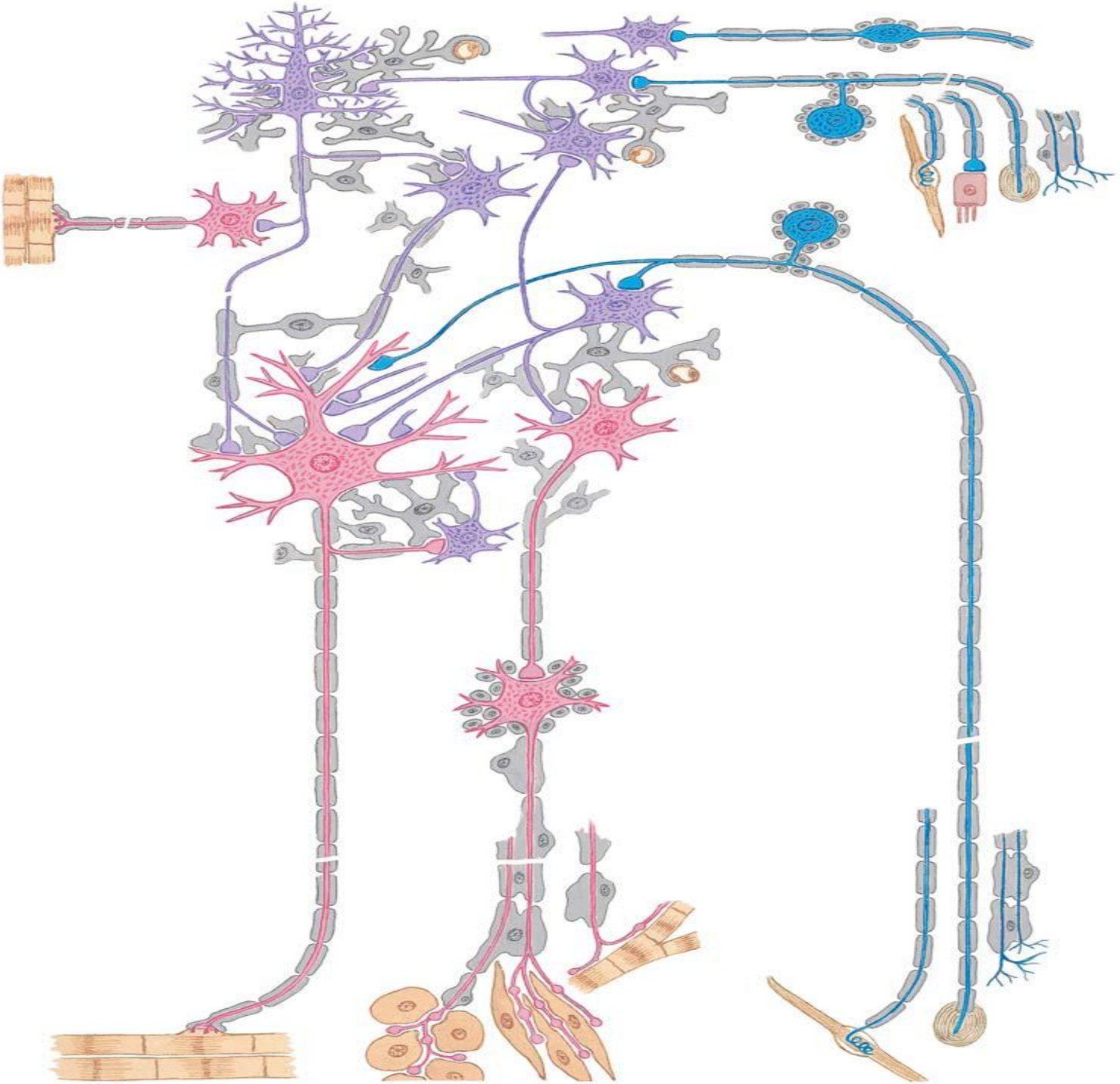
PRINCIPLES OF NEUROSURGERY

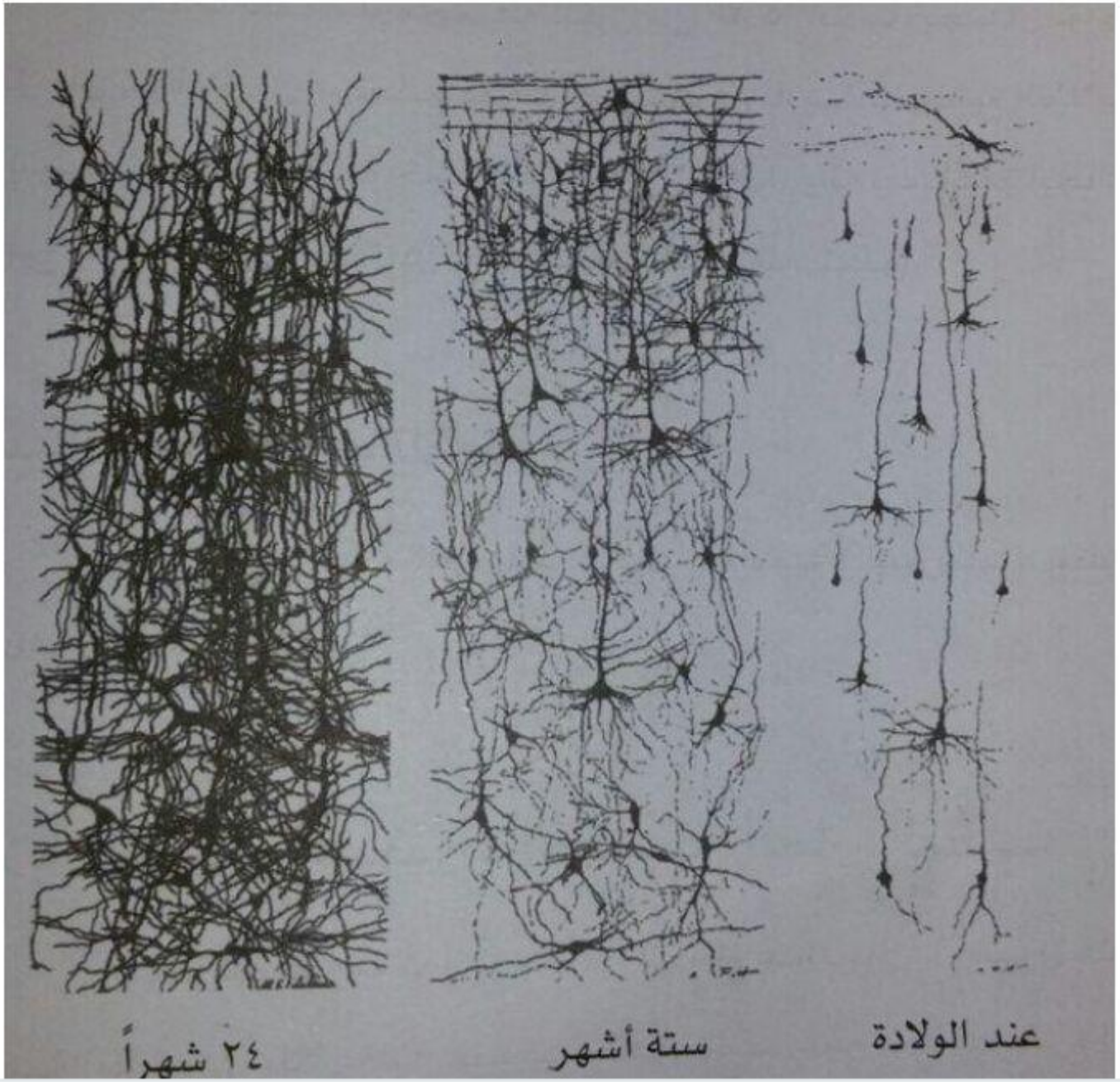
Dr.Khudur Shukur •


12 09 2012





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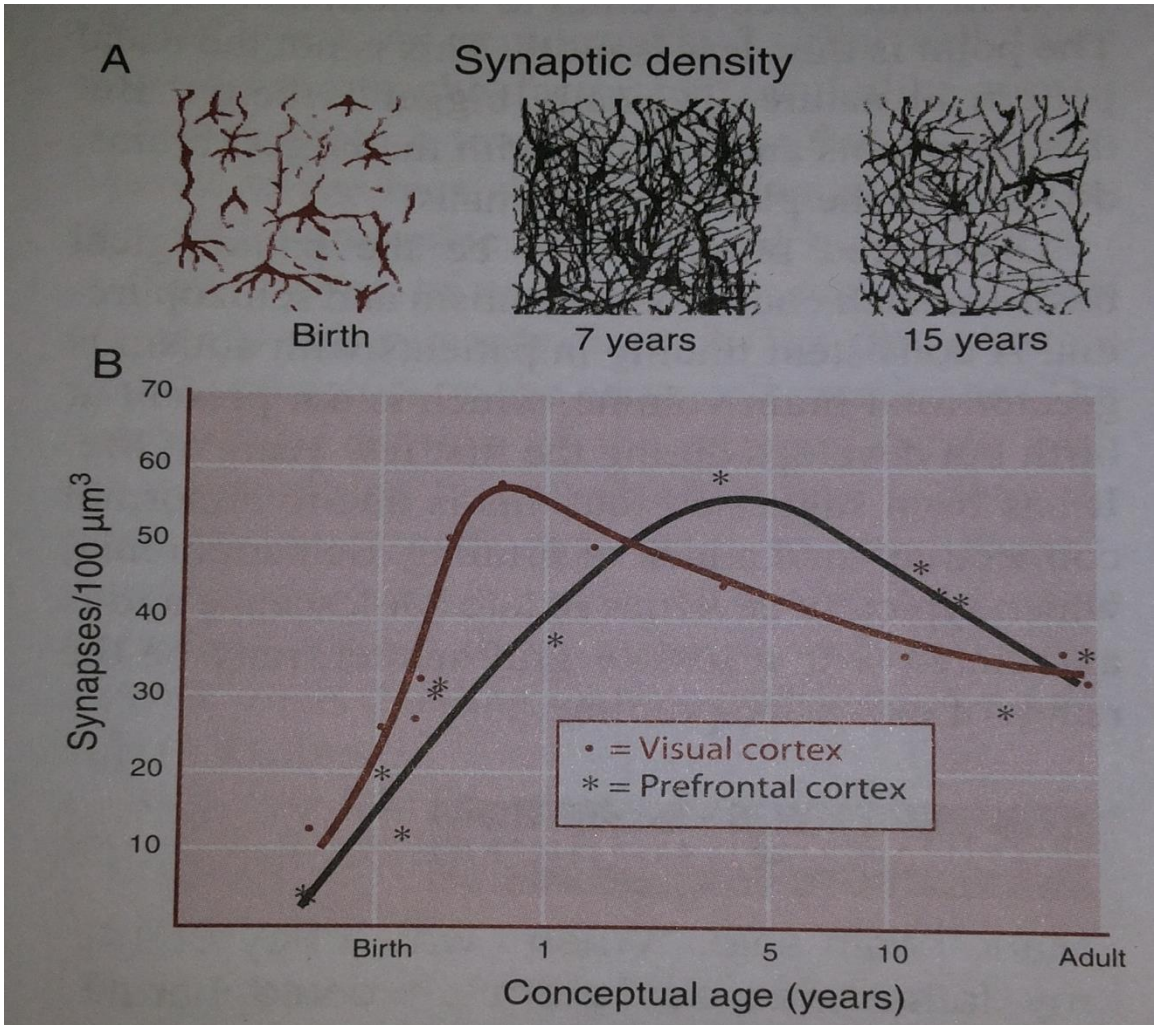


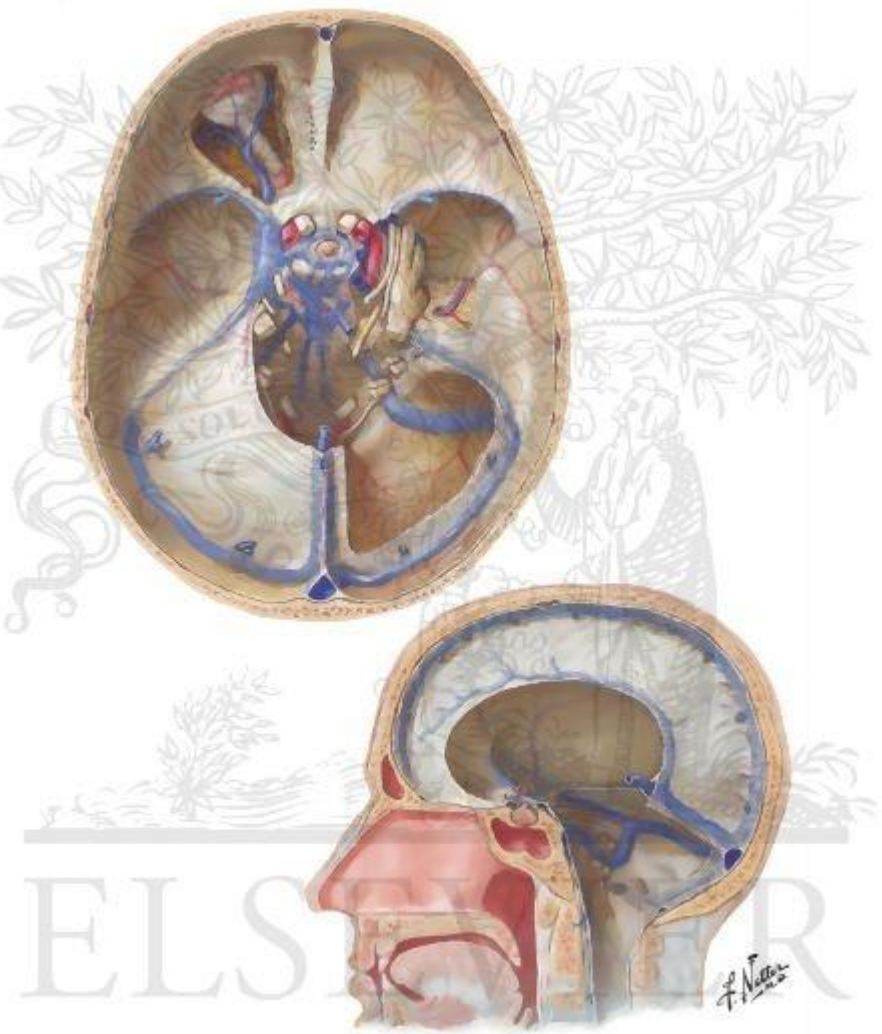
FIGURE 8.7 ● **A.** Schematic representation of changes in synaptic density. **B.** Measured synaptic densities in visual and prefrontal cortex from 14 individuals who died of non-neurological diseases. (Adapted from Huttenlocher PR, Dabholkar AS. Regional differences in synaptogenesis in human cerebral cortex. *J Comp Neurol*. 1997;387(2):167-178.)

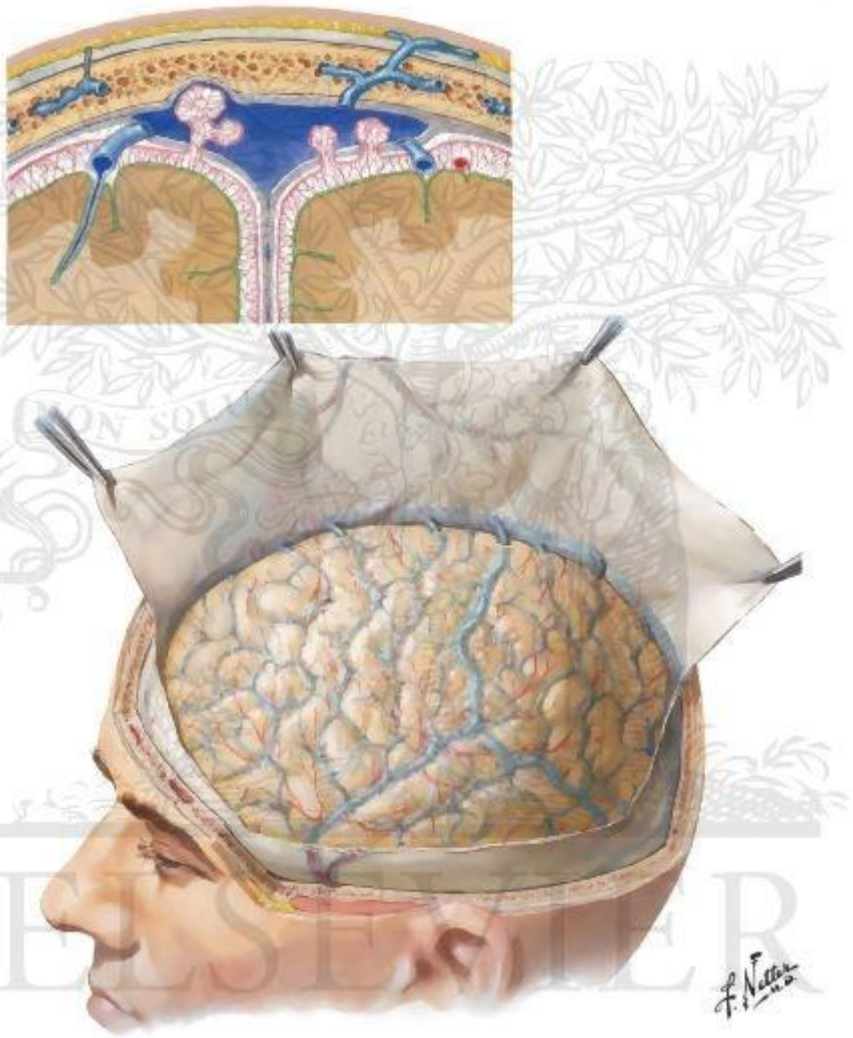
Three principles :

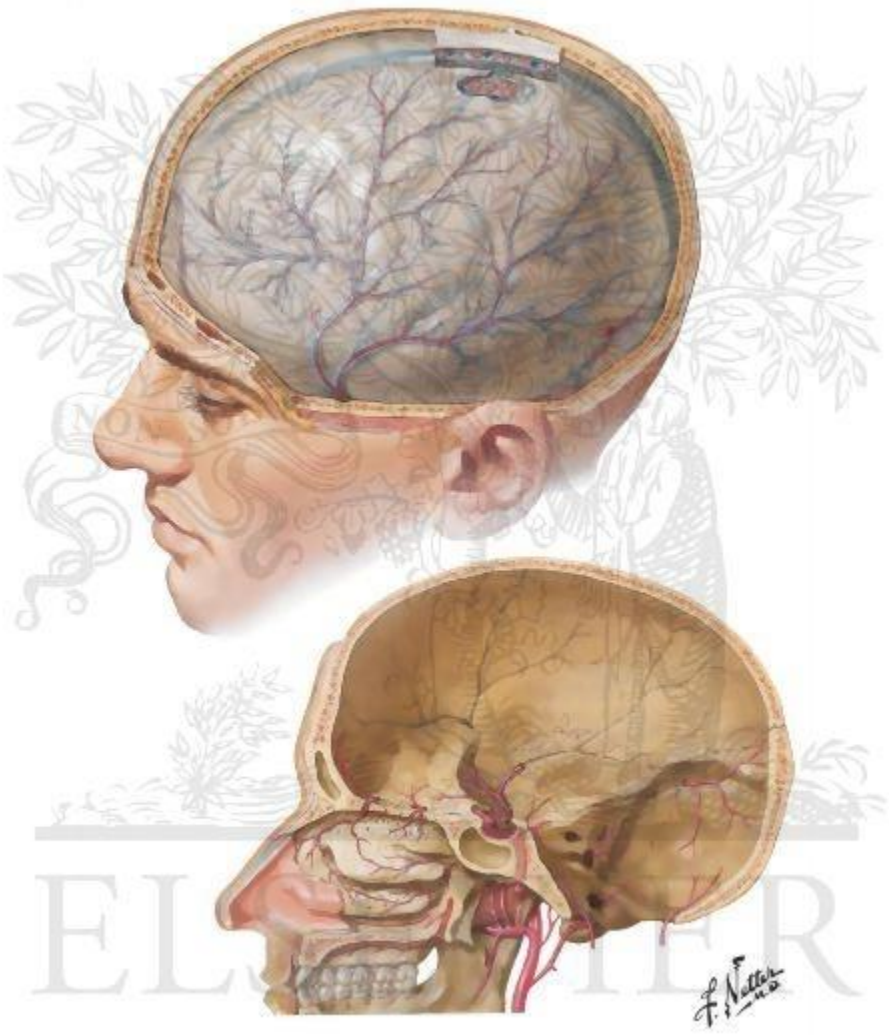
1-Limited space

2-Irreversable damage

3-Limited time





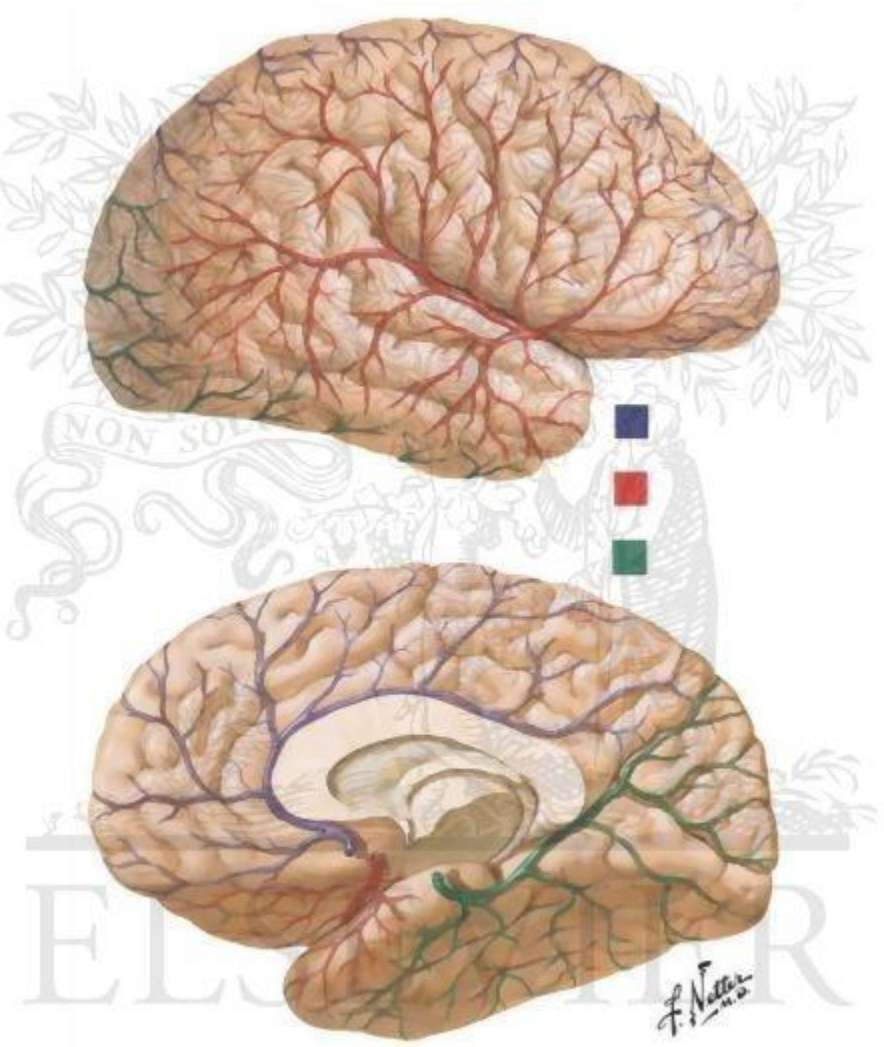


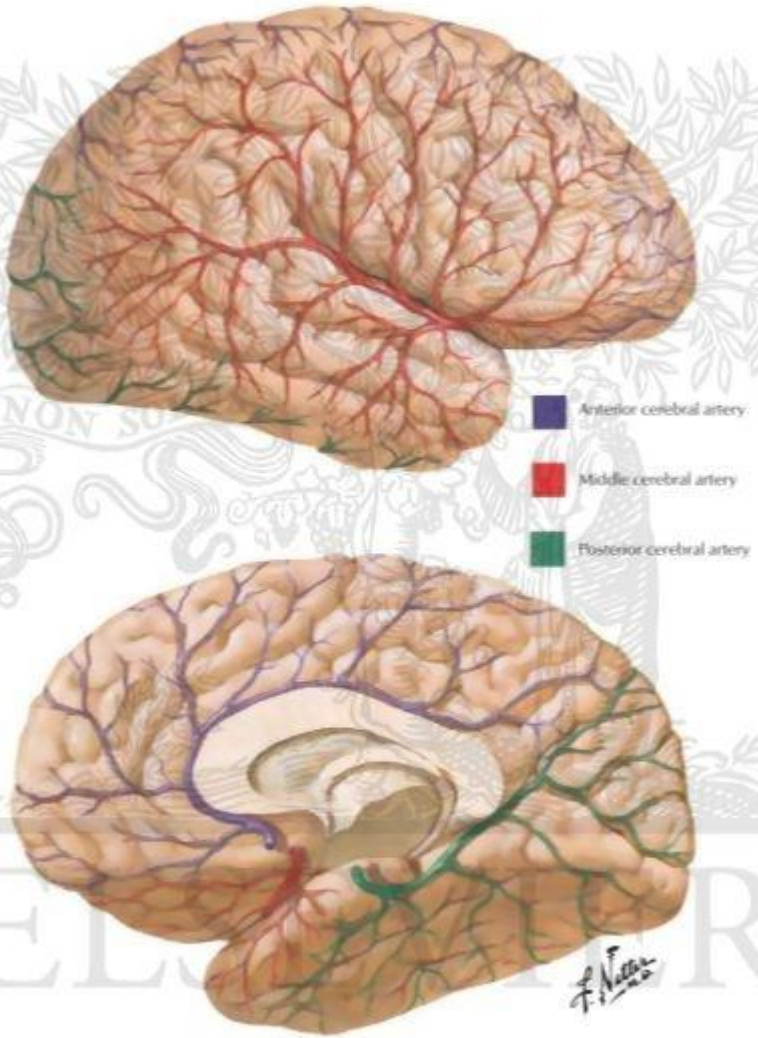
Arteries of the brain

Arteries of the brain

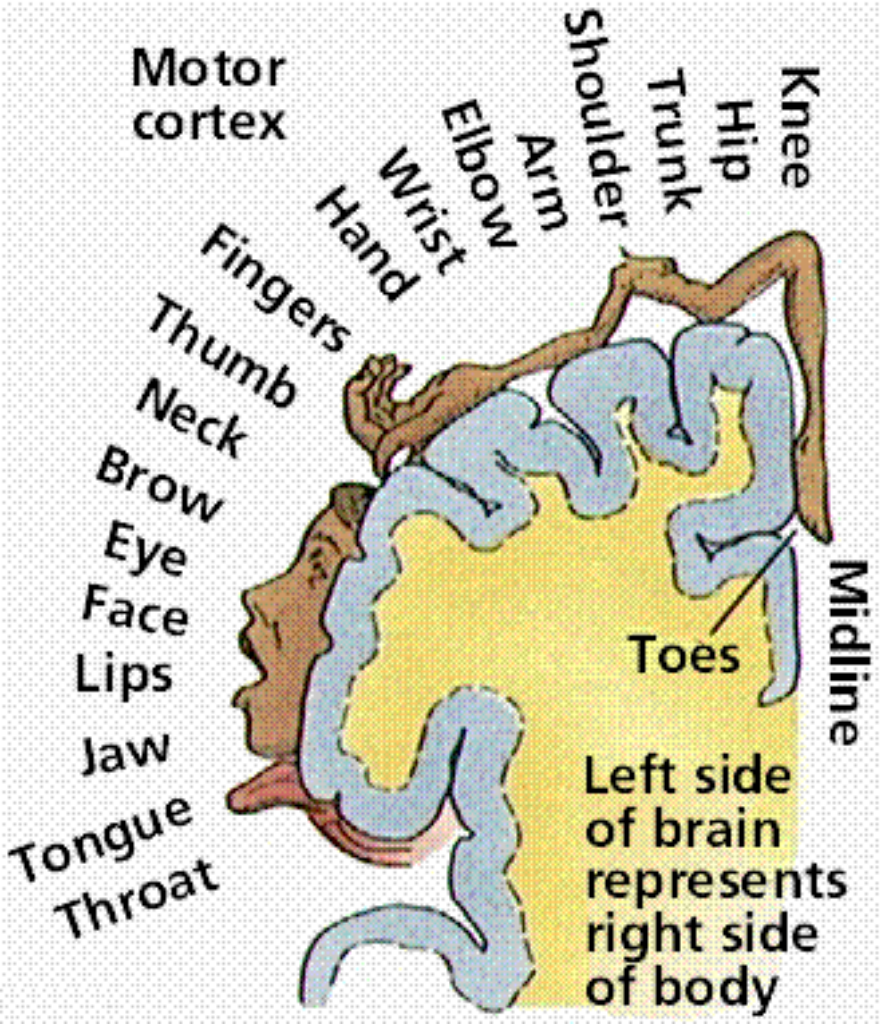
Anterior circulation – internal carotid artery, from common carotid in the neck. Bifurcates to MCA and ACA

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





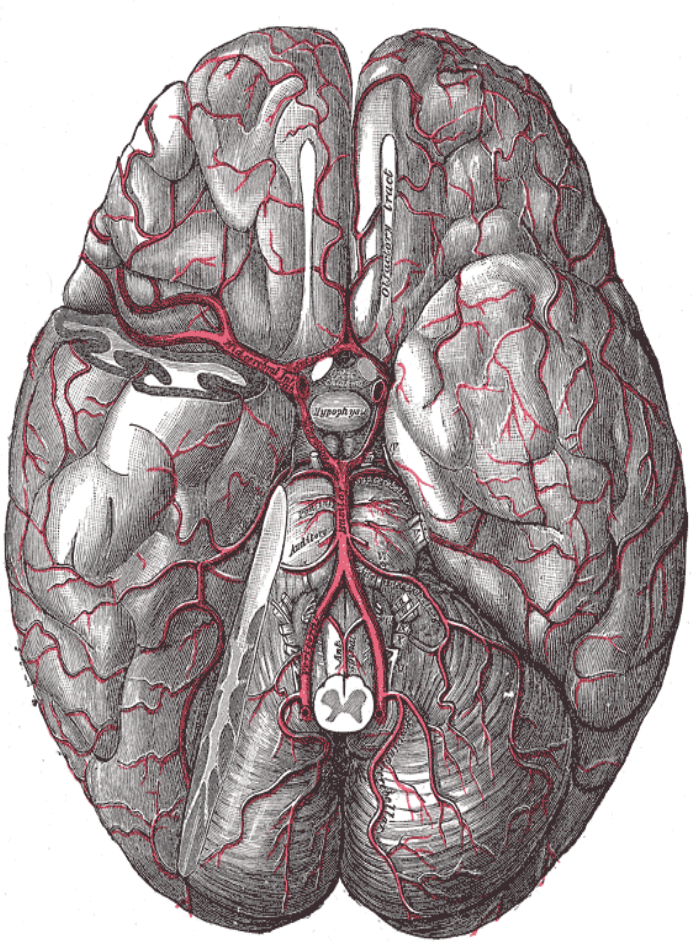
The Motor Strip



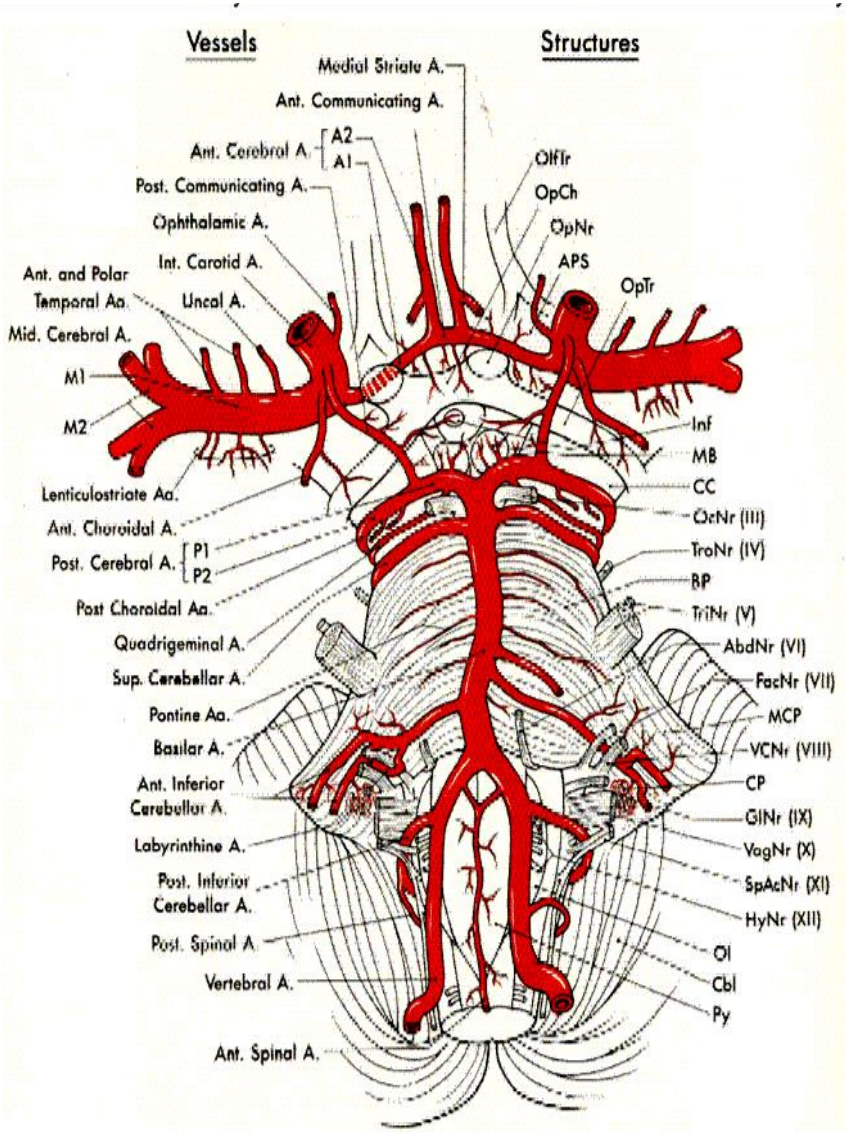
Circle of Willis

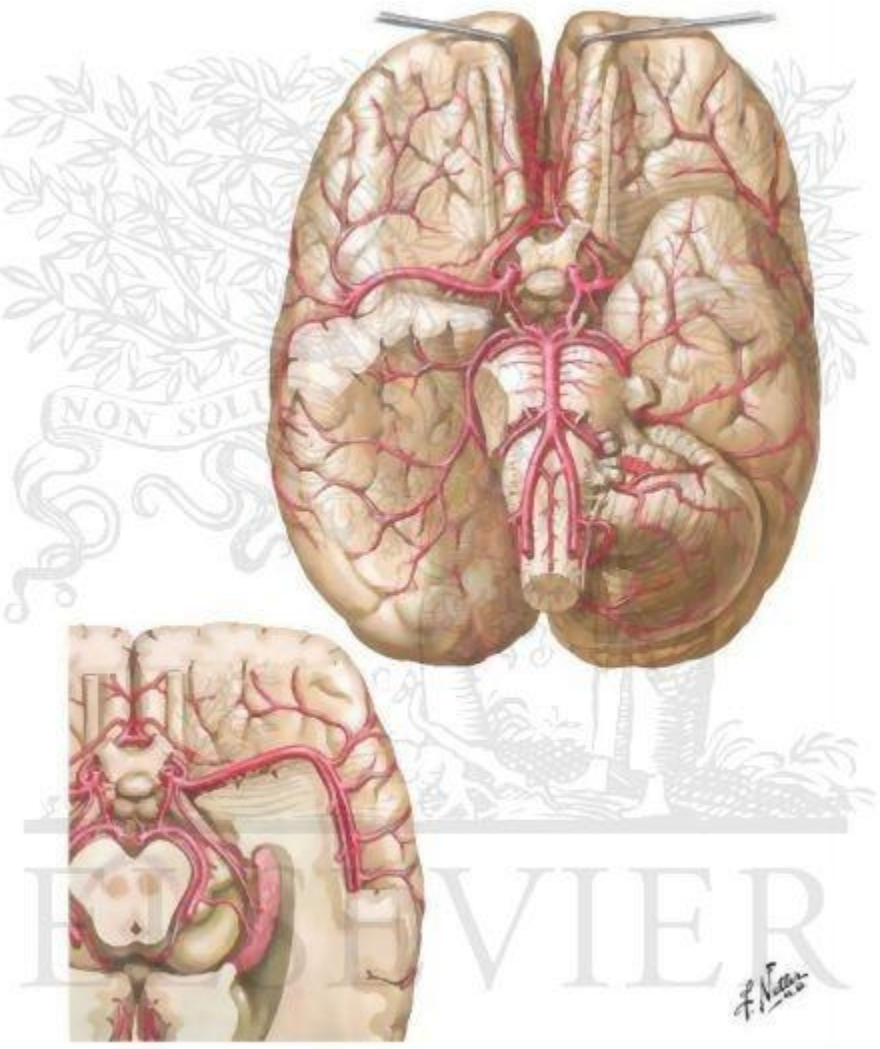
- Communication between 2 sides anterior communicating (a-com)
- Communication between anterior and posterior circulation – posterior --- communicating (p-com)
- Many anomalies may exist

Arteries in the subarachnoid space



Arteries of the brain





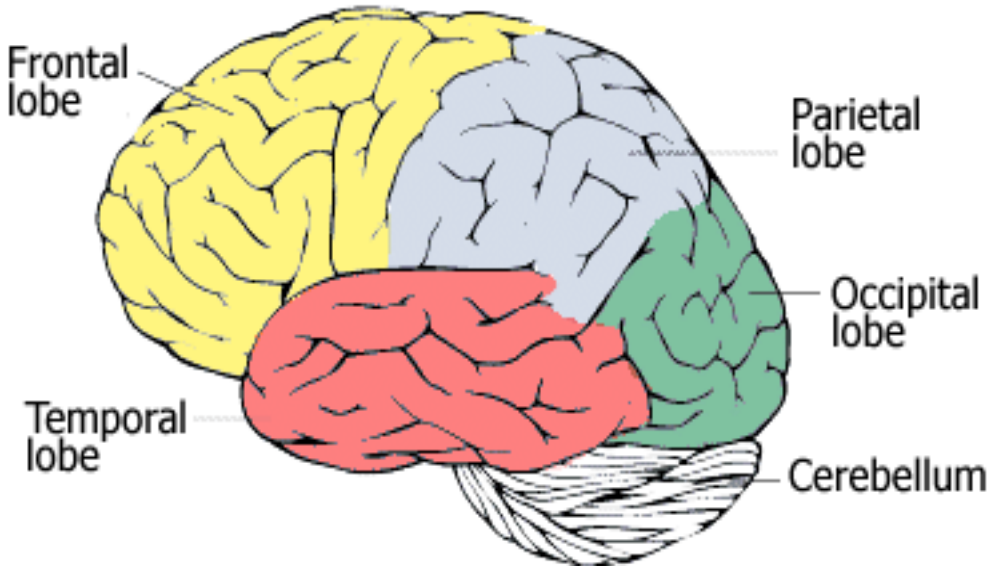
Each hemisphere has lobes:

Frontal lobe

Parietal lobe

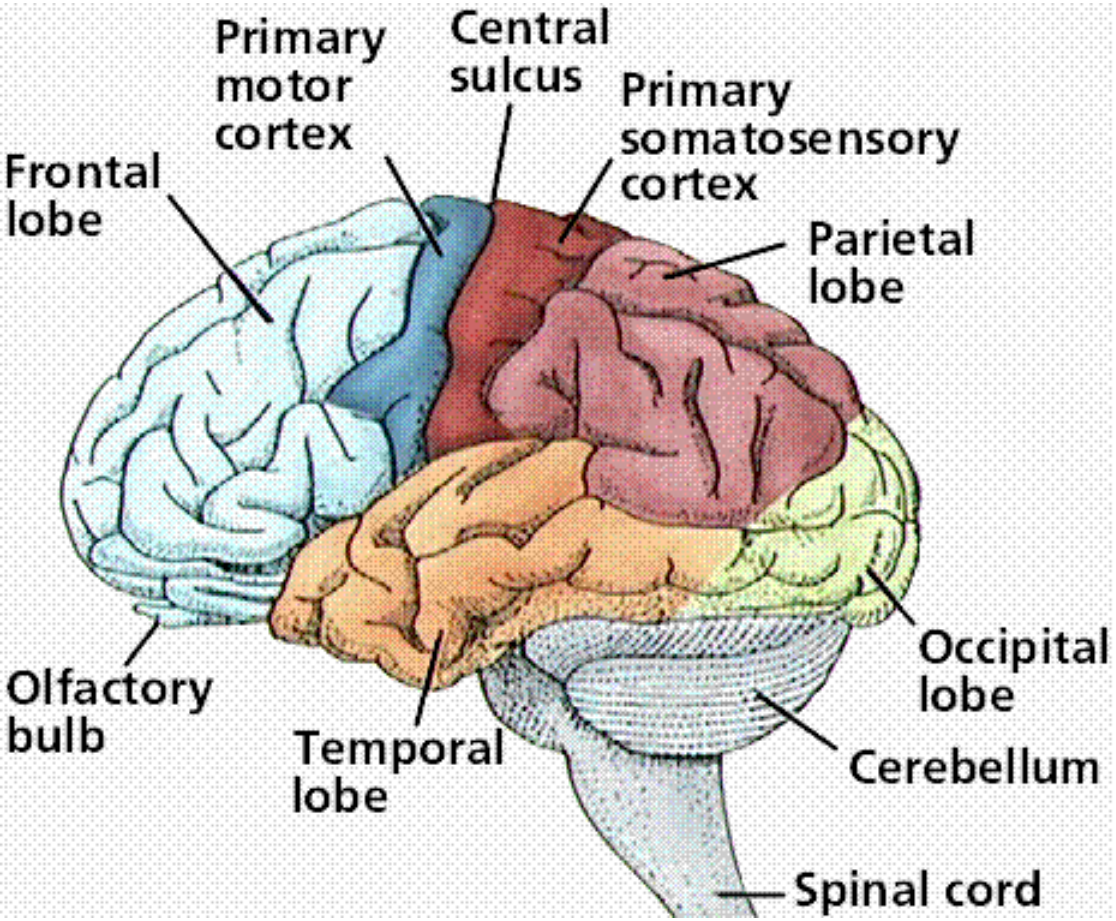
Temporal lobe

Occipital lobe

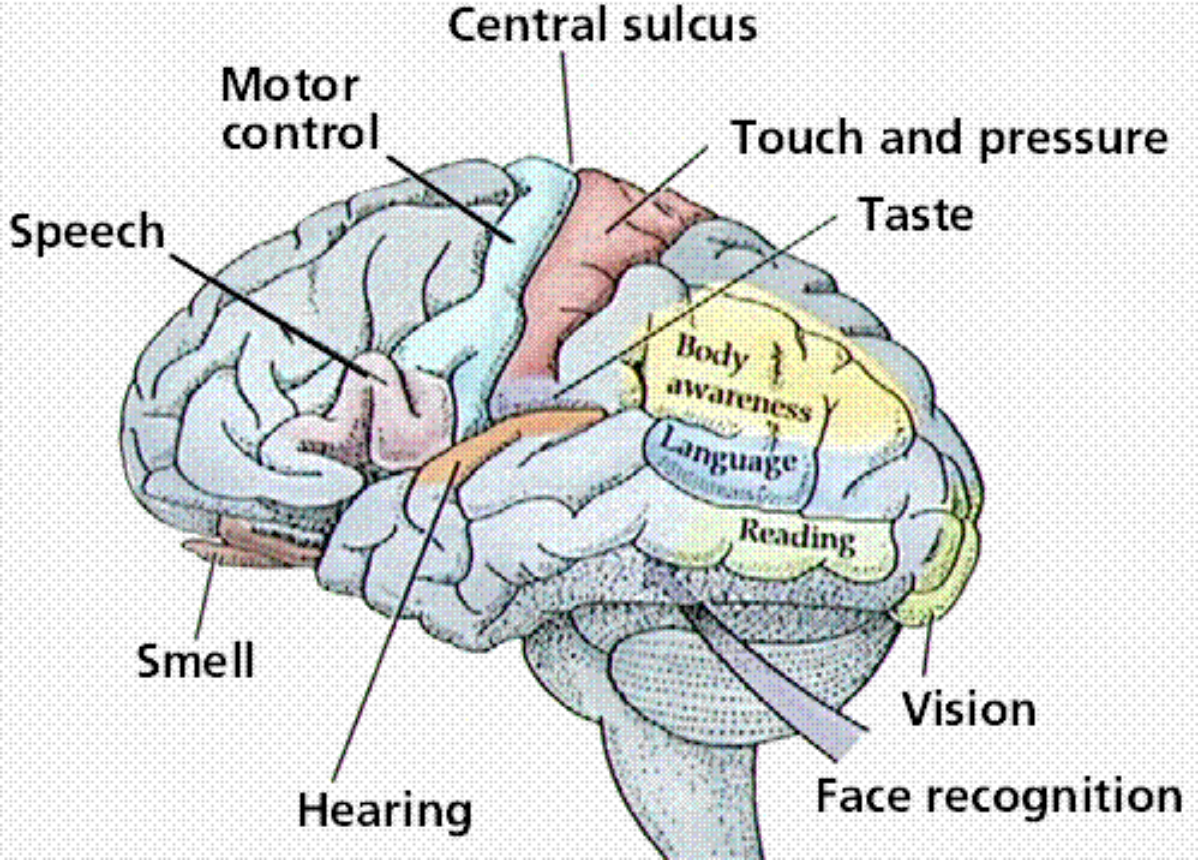


- Insular lobe
- Limbic lobe

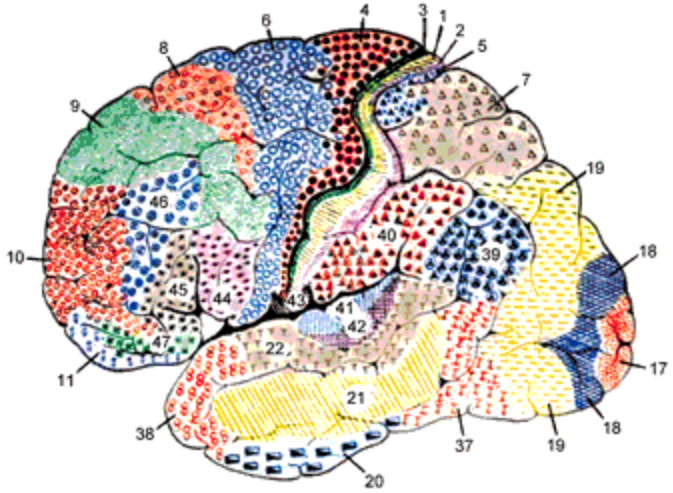
Functional areas

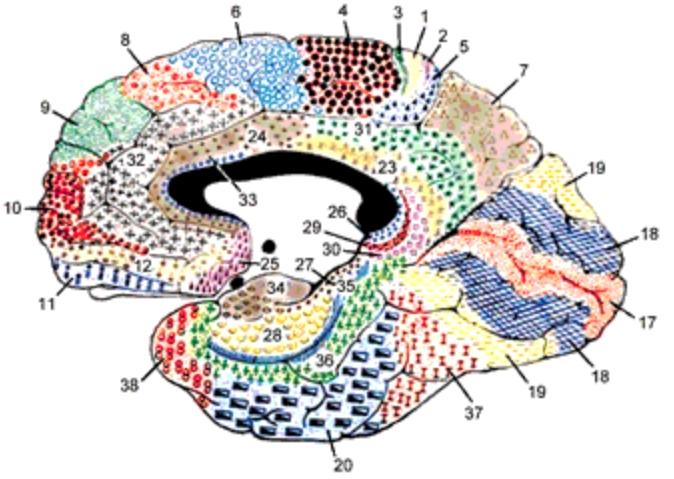


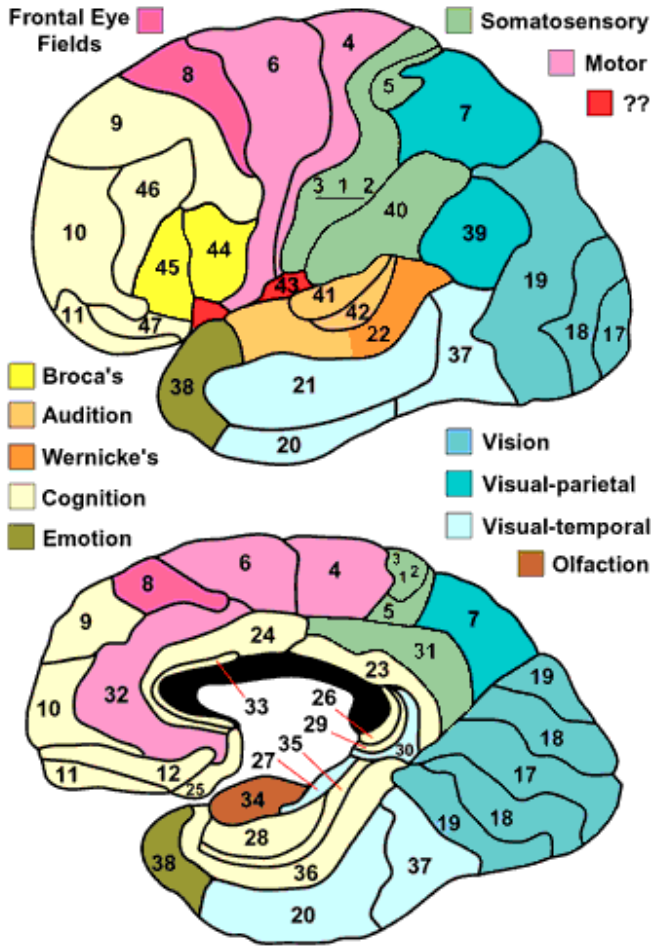
Function 2


Central sulcus
Motor control
Touch and pressure
Speech
Taste
Body awareness
Language
Reading
Smell
Vision
Hearing
Face recognition

Brodmann Map







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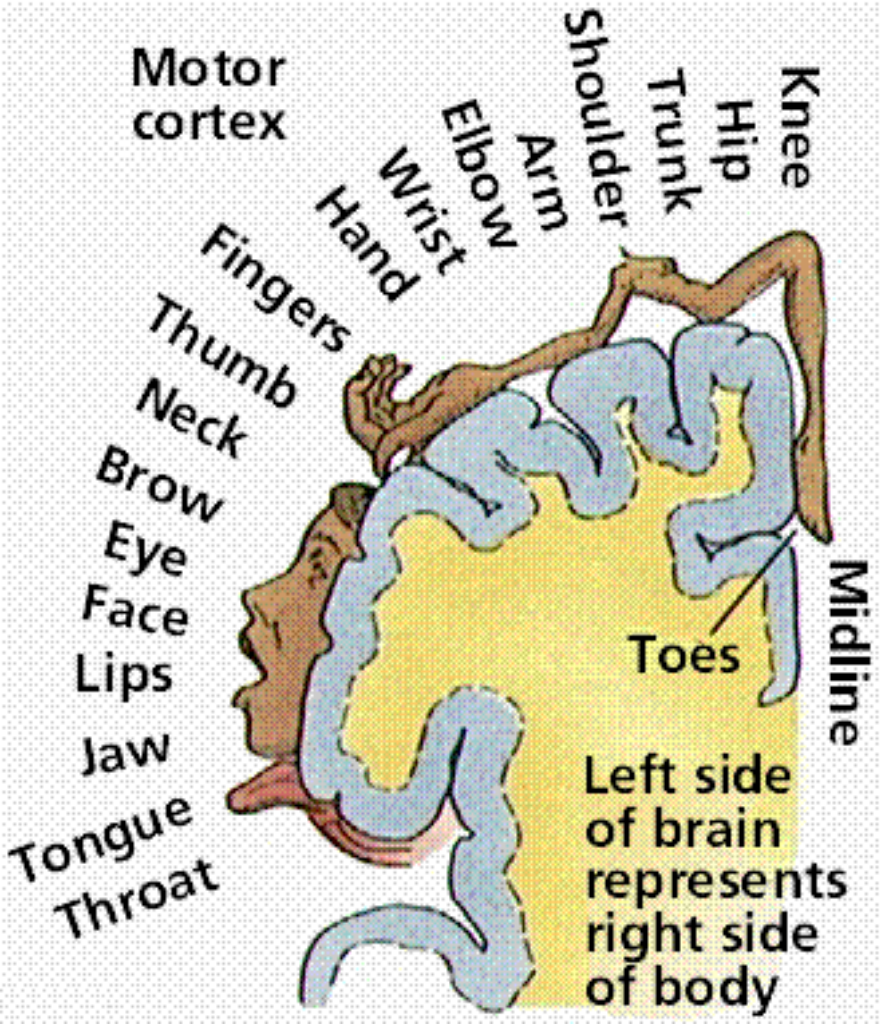
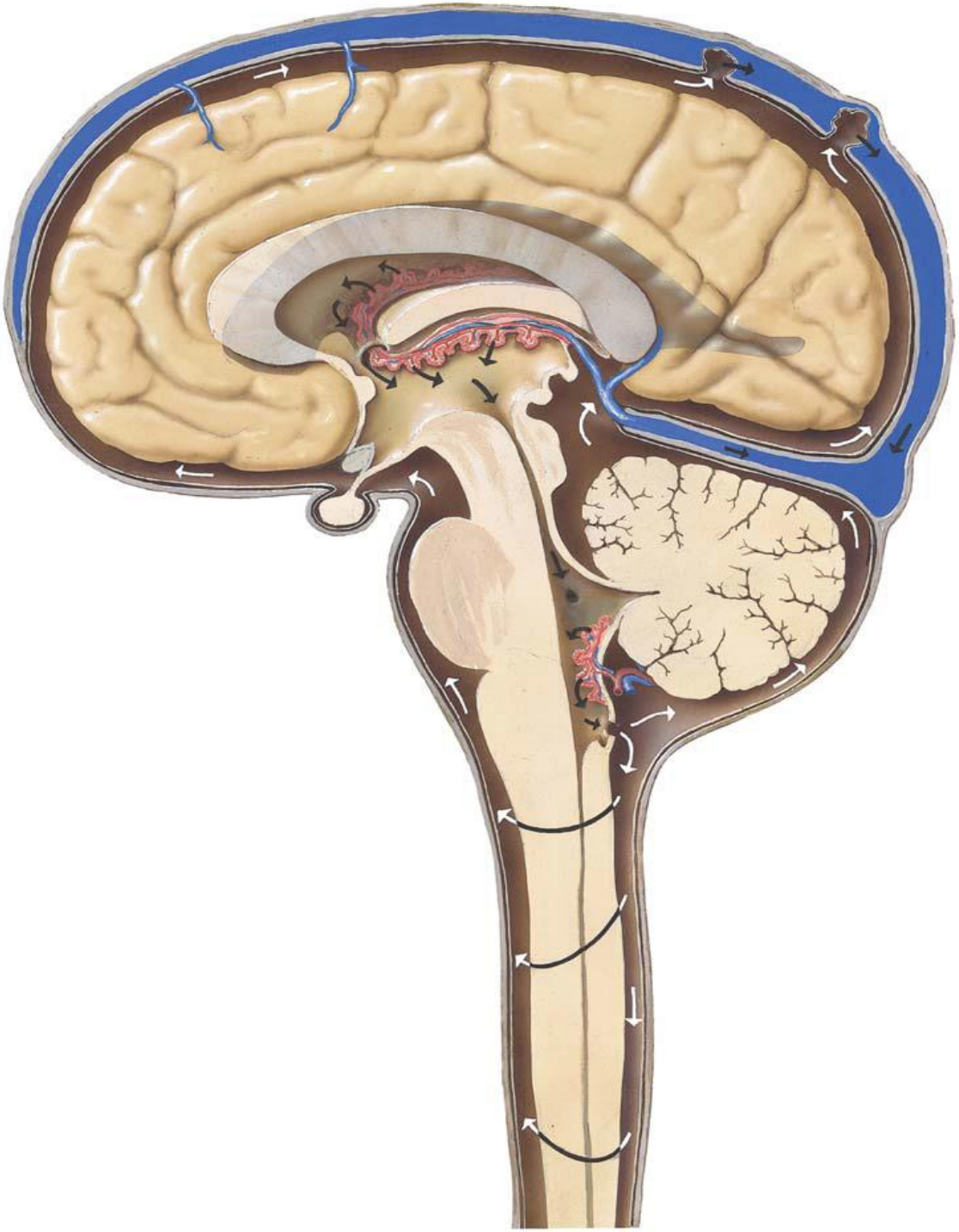
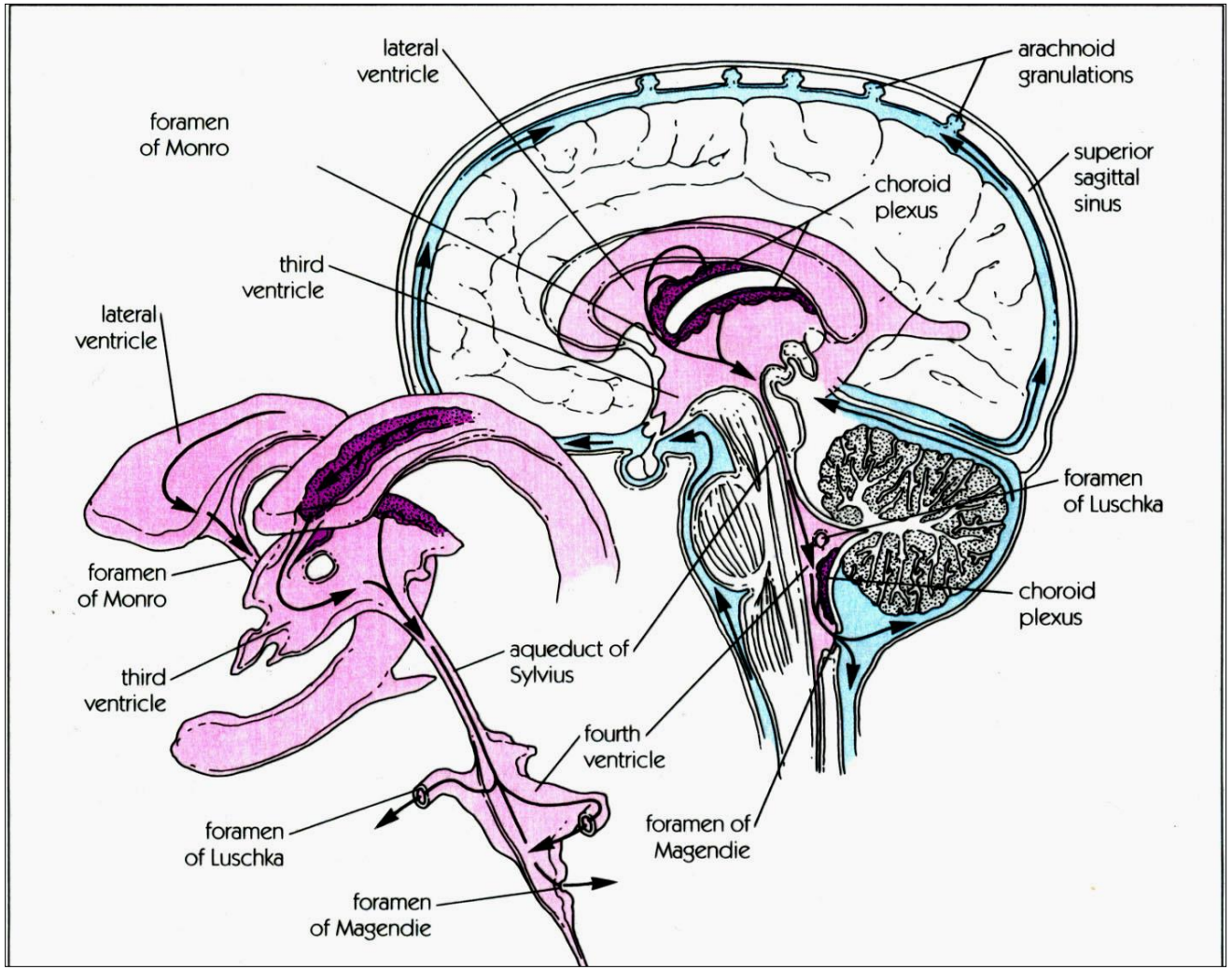
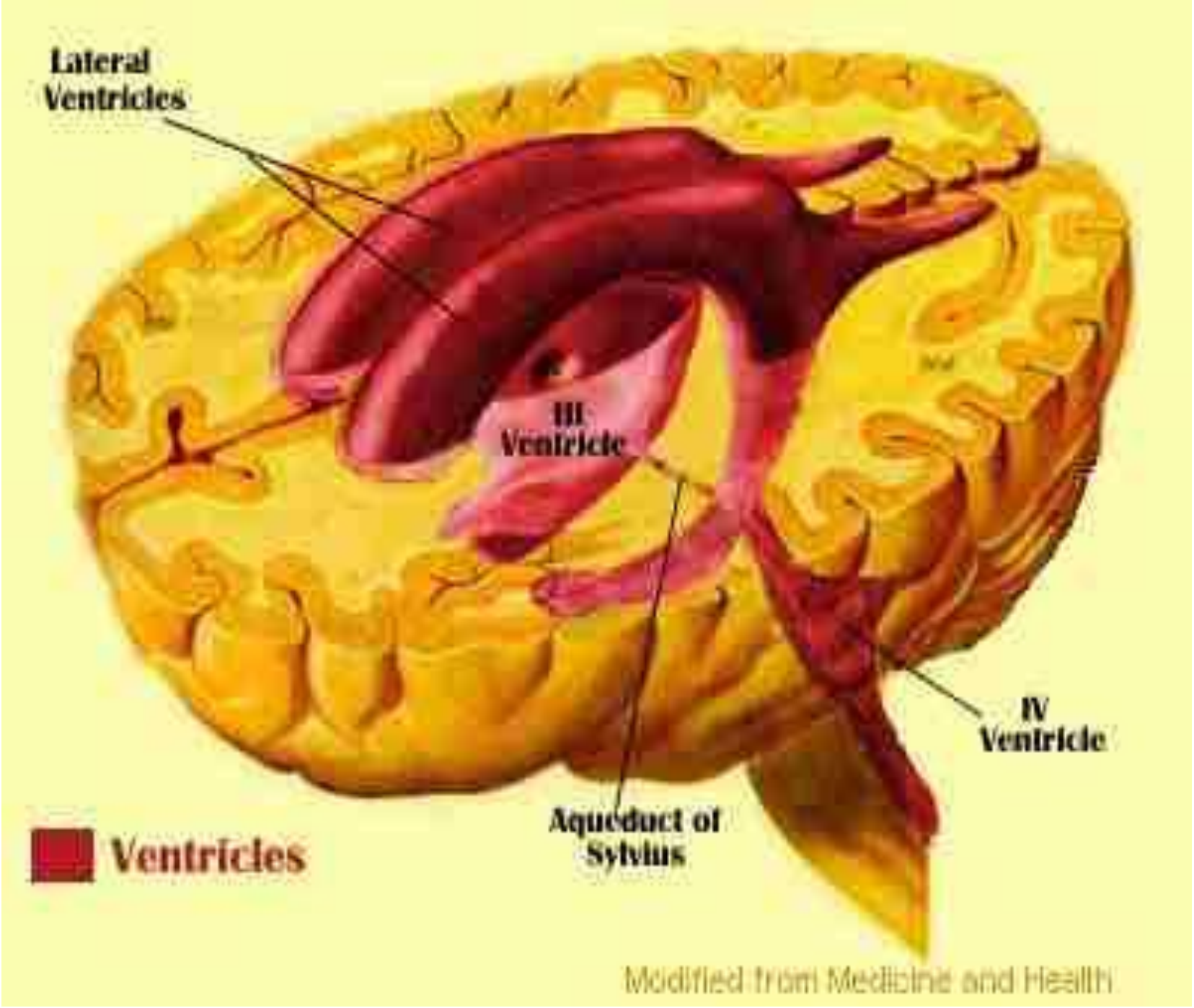
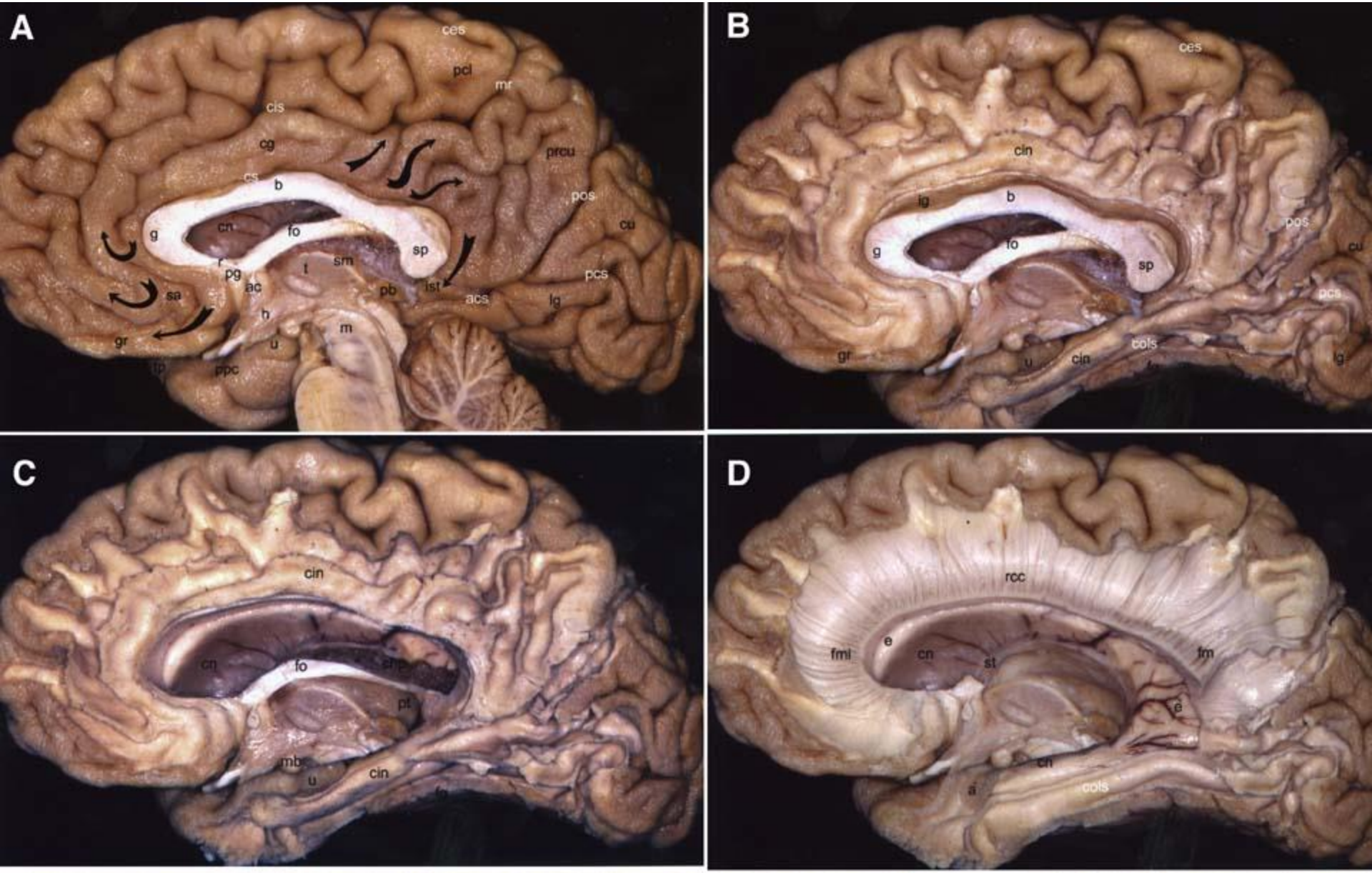




CSF Pathways




Lateral Ventricles
III Ventricle
IV Ventricle
Aqueduct of Sylvius
Ventricles
Modified from Medicine and Health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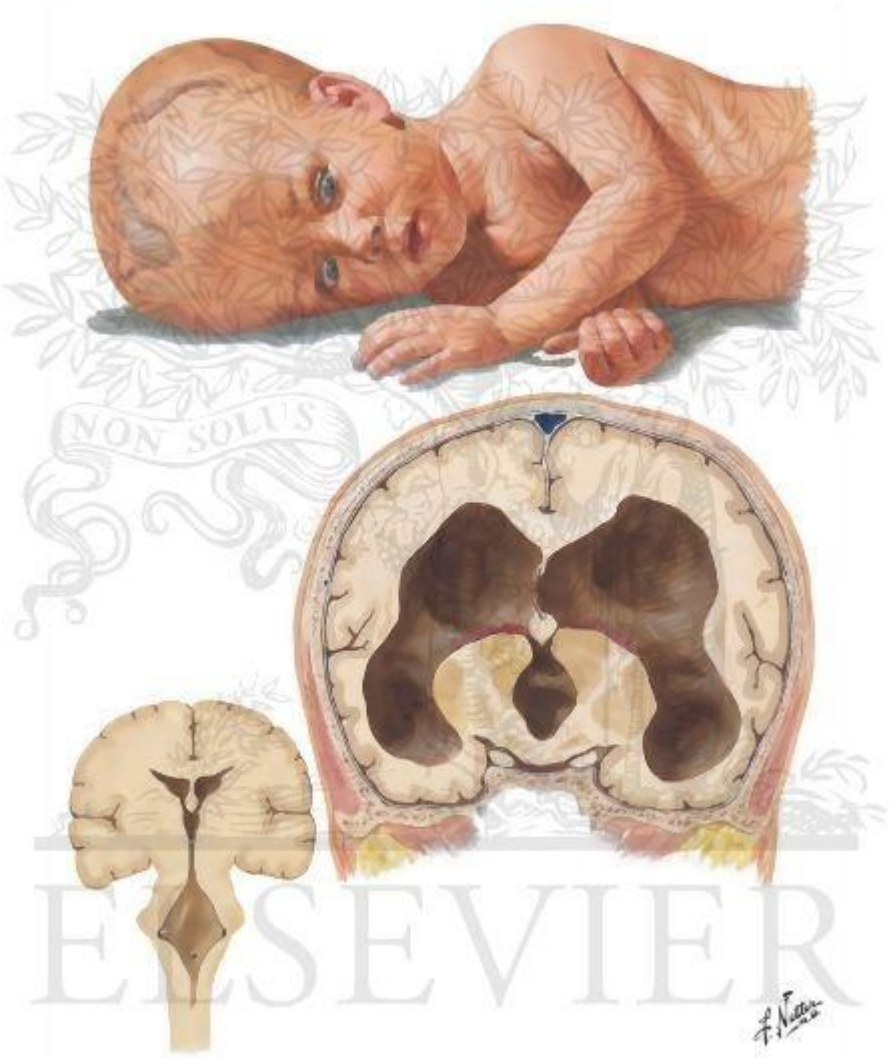
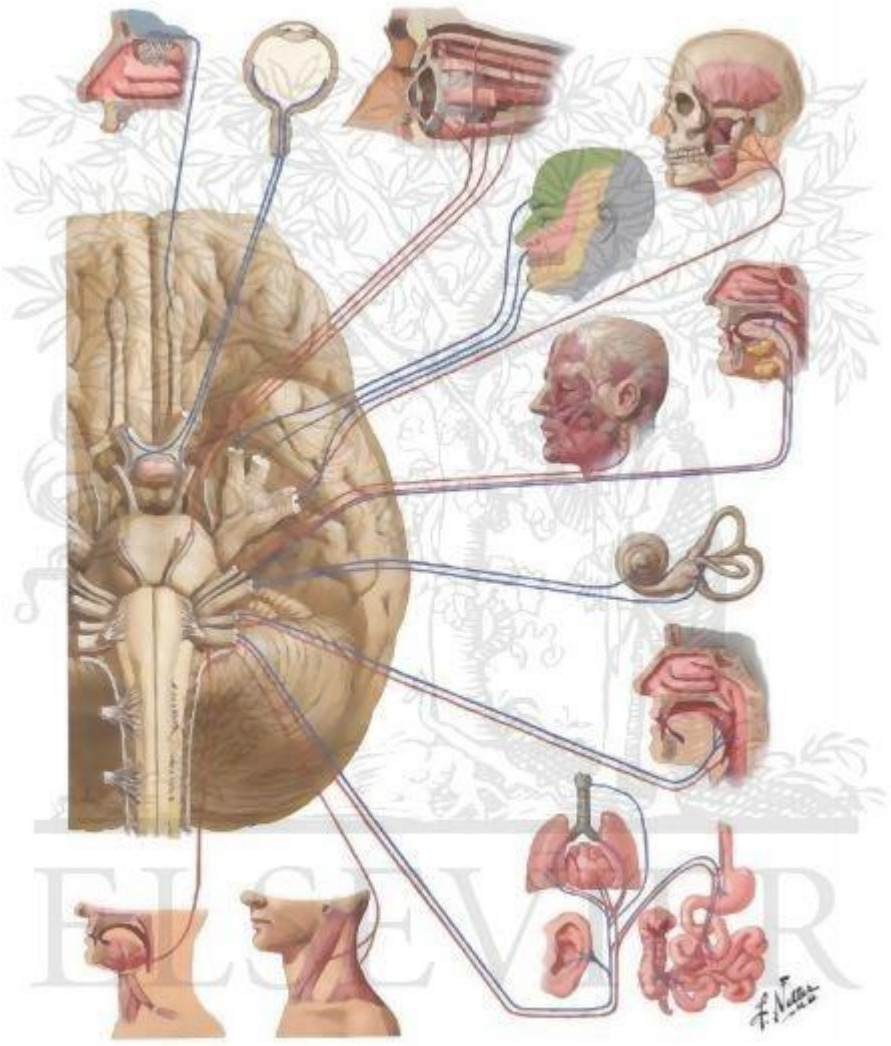
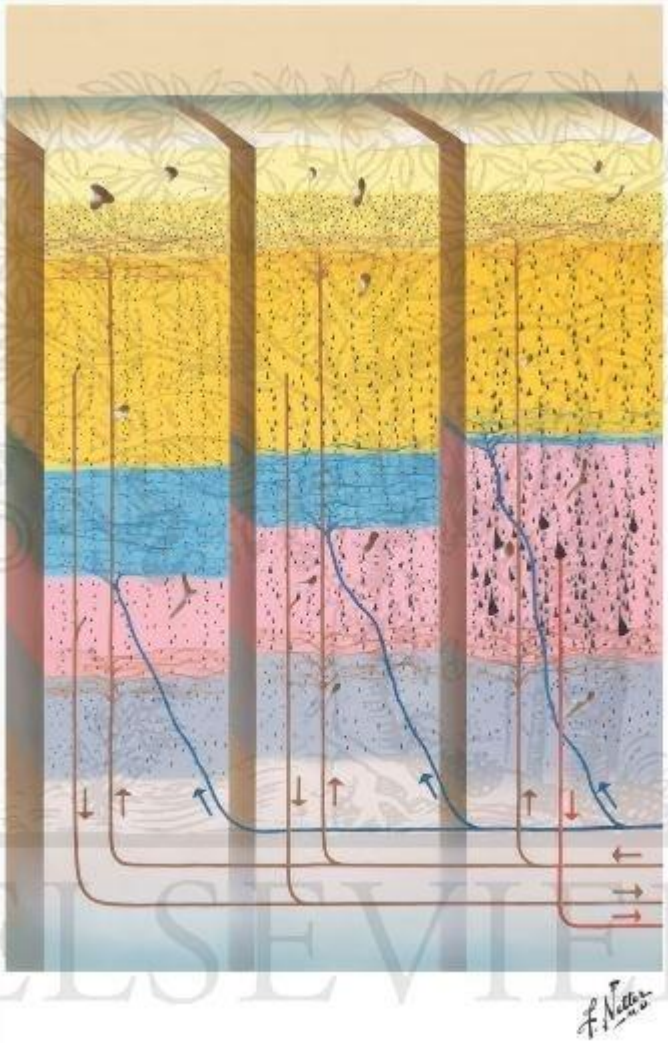






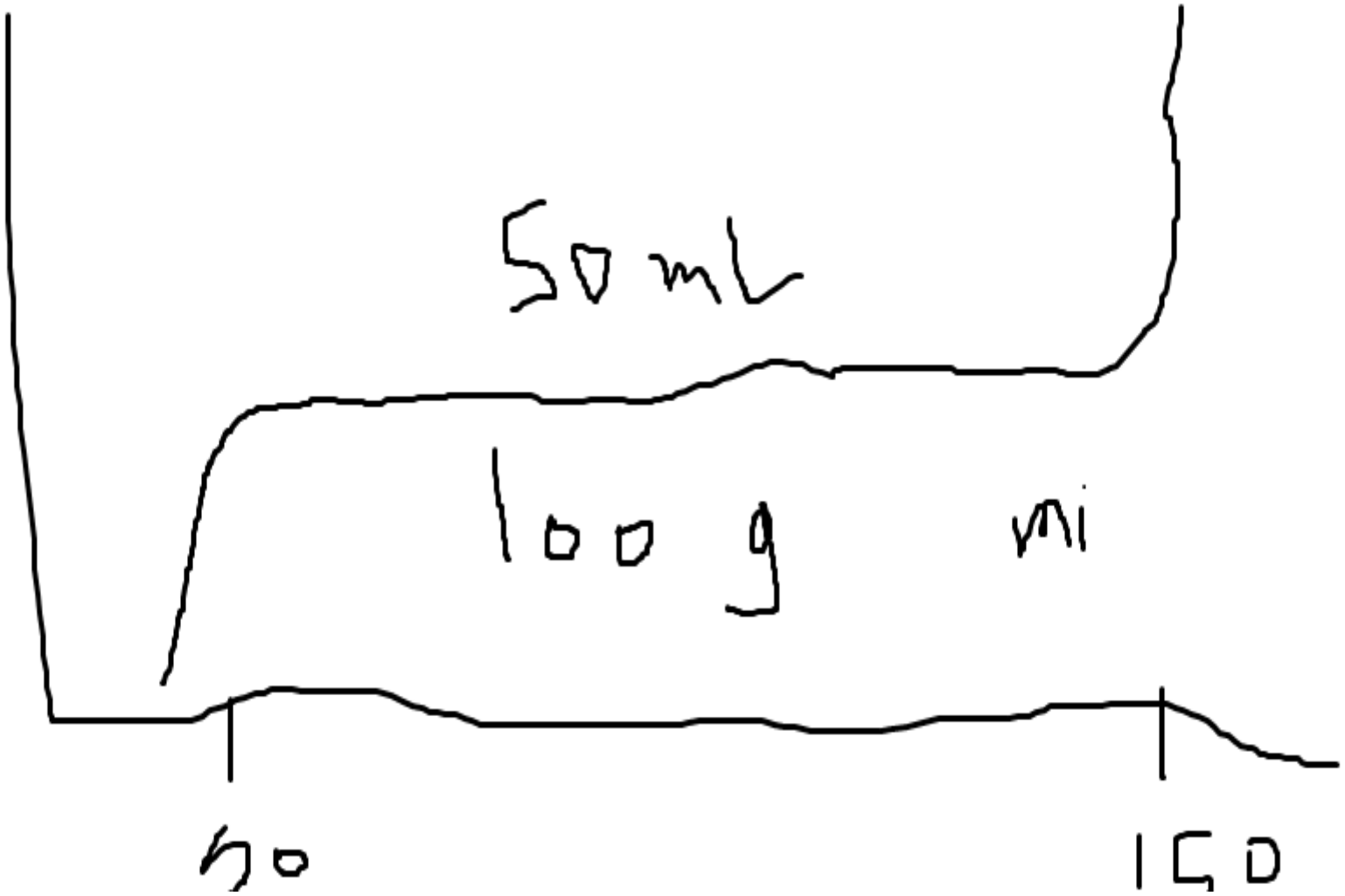
Physiology

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


50 mL
100 g
mi
50
150

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 biochemichal control ✓

CO_2

The most important and powerful mechanism that controls brain blood flow

A change in 1mm PCO_2 changes the flow in 4-5%

PCO_2 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 damages in trauma, tumor, infarct, SAH and infection

BLOOD BRAIN BARRIER