

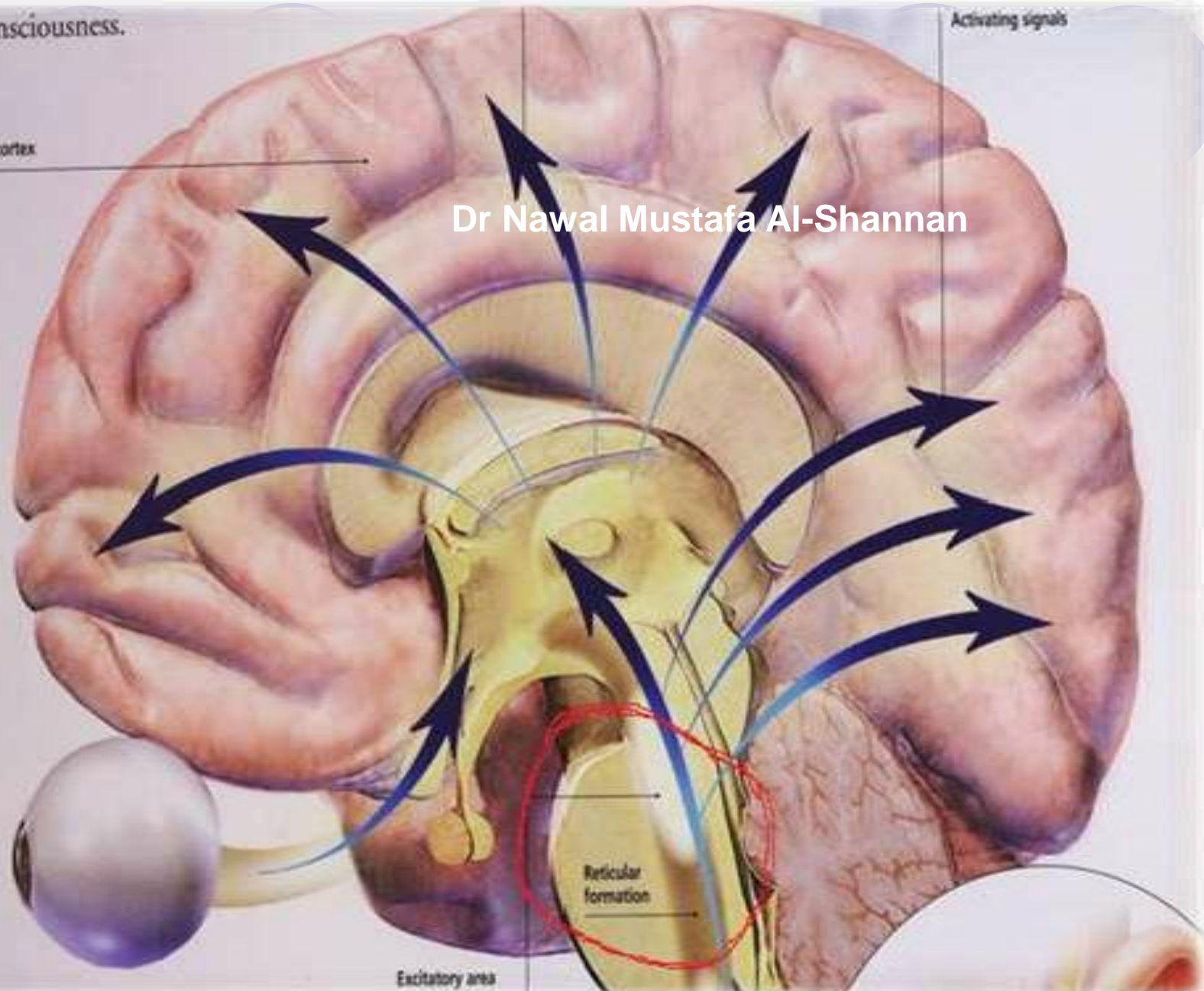
all consciousness.

Activating signals

Cerebral cortex

Dr Nawal Mustafa Al-Shannan

15
14
13
12
11
10
9
8
7
6
5
4
3
2
1



Excitatory area

Reticular formation

Reticular formation

Deeply placed **continuous network of nerve cells and fibers** that extend from **spinal cord**

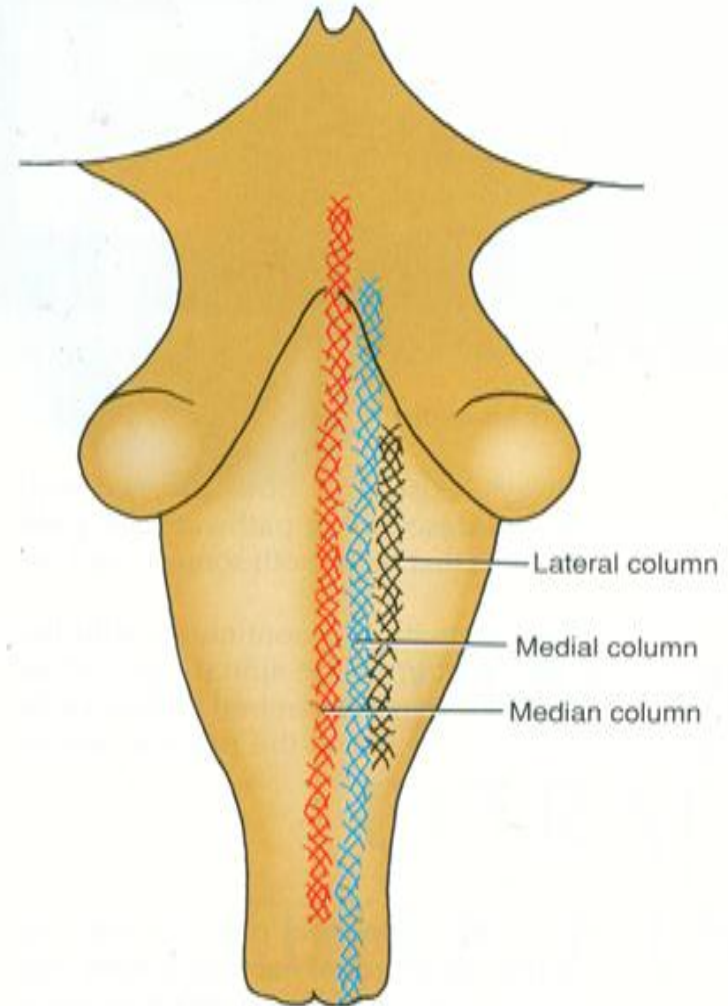
through **medulla, pons, midbrain, subthalamus, hypothalamus and thalamus.**

Divided into

1. **Median column** = intermediate size neurons

2. **Medial column** = large neuron

3. **Lateral column** = mainly small neurons



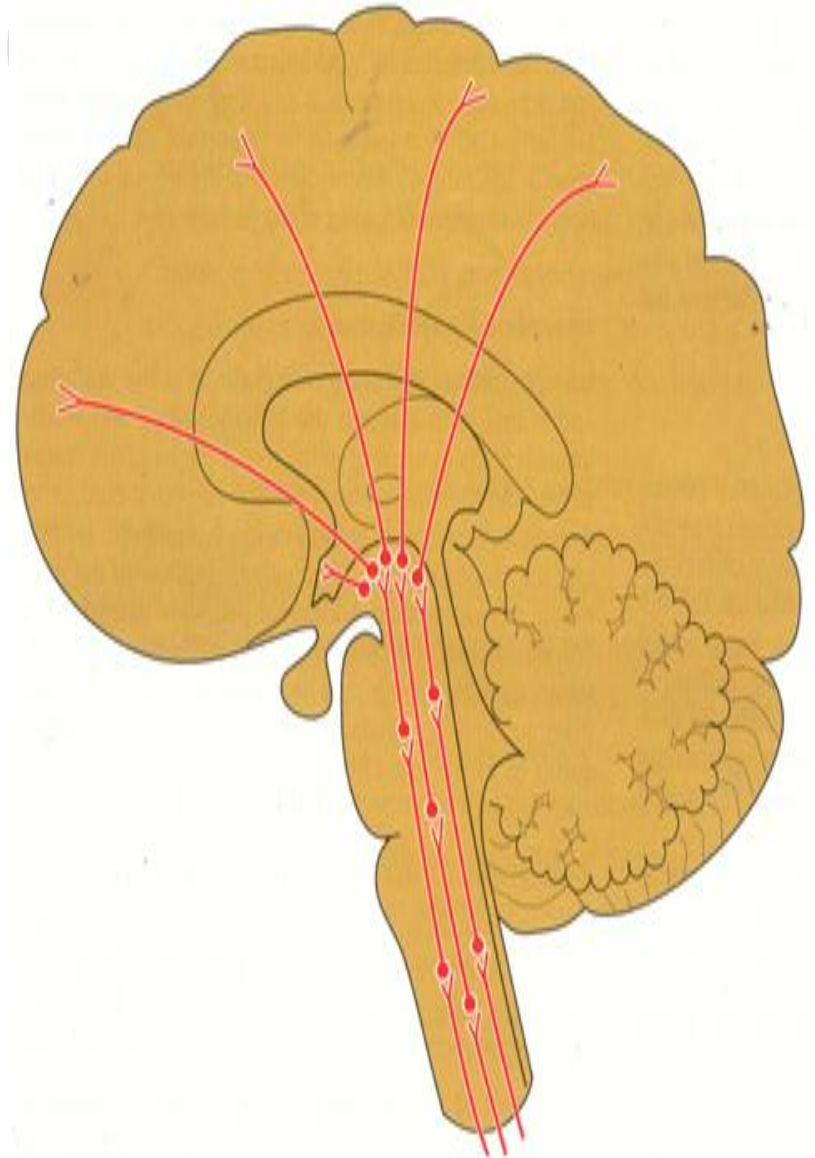
** it shows highly organized group of **transmitter specific cells** that can influence functions in specific area of CNS.

Components

Crossed and uncrossed tracts with ascending and descending tracts.

Inf : reticular formation is continuous with grey matter of spinal cord

Sup: to C-C , cerebellum -



Functions;

**** vast amount of connection of reticular formation to all parts of nervous system.**

1. Control of skeletal muscles .
by **reticulospinal** and **reticulubulbar** tracts.
* the alpha and Gamma motor neurons
- modulation of **muscle tone** and **reflex activity** by association to vestibular apparatus of inner ear and vestibular spinal tract.
 - play an important role in maintaining **tone** of **antigravity muscles** when standing
 - Respiratory centers of brain stem which control respiratory muscles are part of reticular system.
 - control muscles of face(associated with emotion)



2. Control of **somatic** and **visceral sensations**

Influence all ascending tracts passing to supra spinal level = control of pain

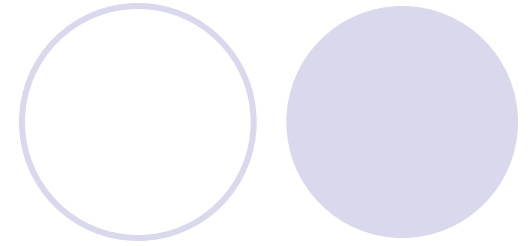
3. Control of autonomic .n. system

by reticulobulbar

reticulospinal tracts

that descend to sympathetic outflow and
parasympathetic cranio- sacral outflow.

**4 . Control of endocrine n. system
through hypothalamic nuclei,
hypophyseal releasing factors**



**5. Influence biological blocks
to hypothalamus,**

**6. Reticular activating system
level of conciusness
sleeping person to awaken**

**** state of conciousness depend on continous
projection of sensory information to the
cortex.**

Limbic system

Limbic = border = margin

Def :

Group of structures lie in border or zone

between Corpus –callosum and hypothalamus

Now

Limbic system is involved with many other structures beyond border or zone in control of emotion, behaviour and memory

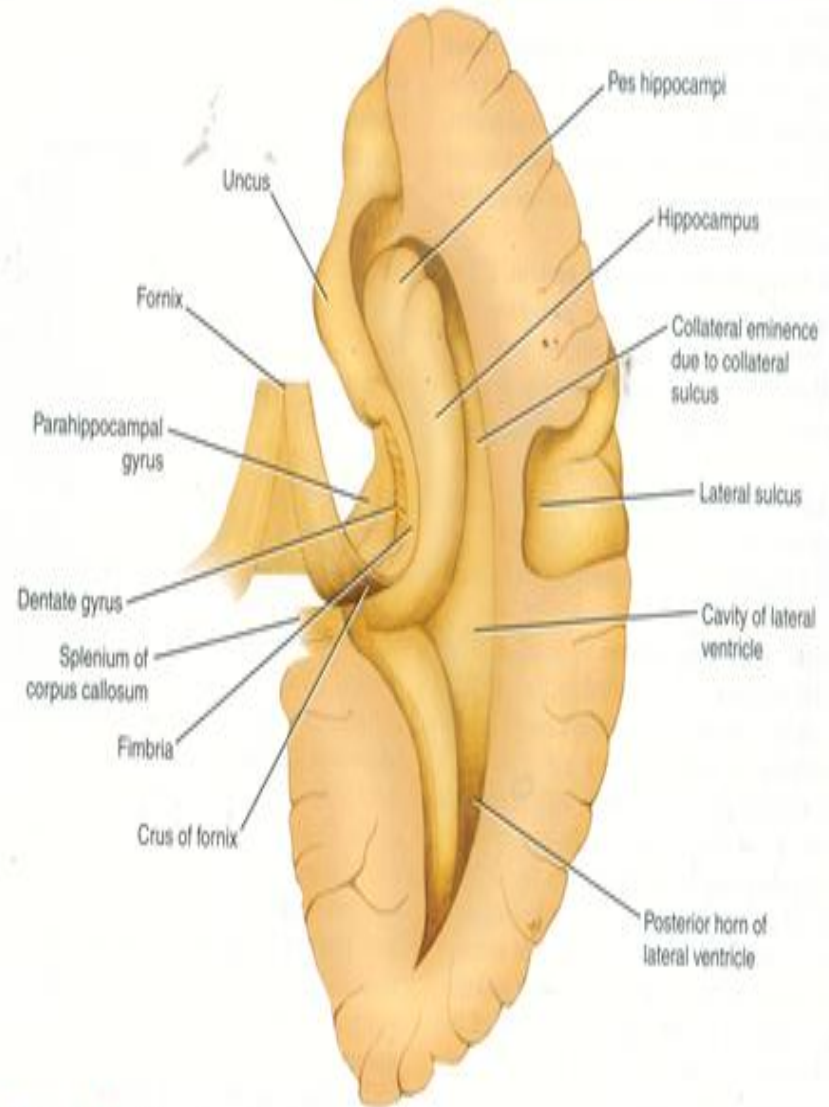
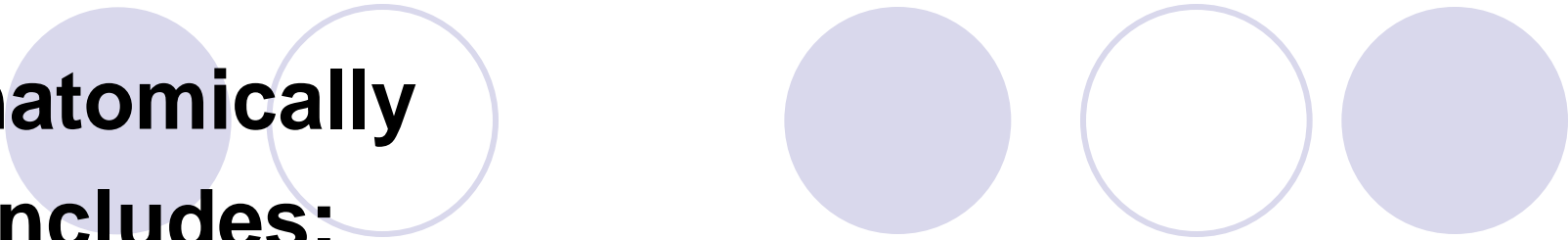


Figure 9-4 Dissection of the right cerebral hemisphere exposing the cavity of the lateral ventricle



**Anatomically
it includes:**

Sub callosal structures. -

Cingulate -

Parahippocampal gyrus -

Anterior thalamic nuclei -

Mammillary bodies -

Hypocampal formation -

Mammillo thalamic tracts -

Amygdaloid nucleus. -

Hippocampal formation

Includes

Hippocampus,
dentate gyrus
parahippocampal gyrus.

Hippocampus

Curved elevation of grey matter extend the entire length of the floor of inferior horn of lateral ventricle

Hippo = sea-horse

Parahippocampus :
lie between hippocampal fissure and callosal sulcus.

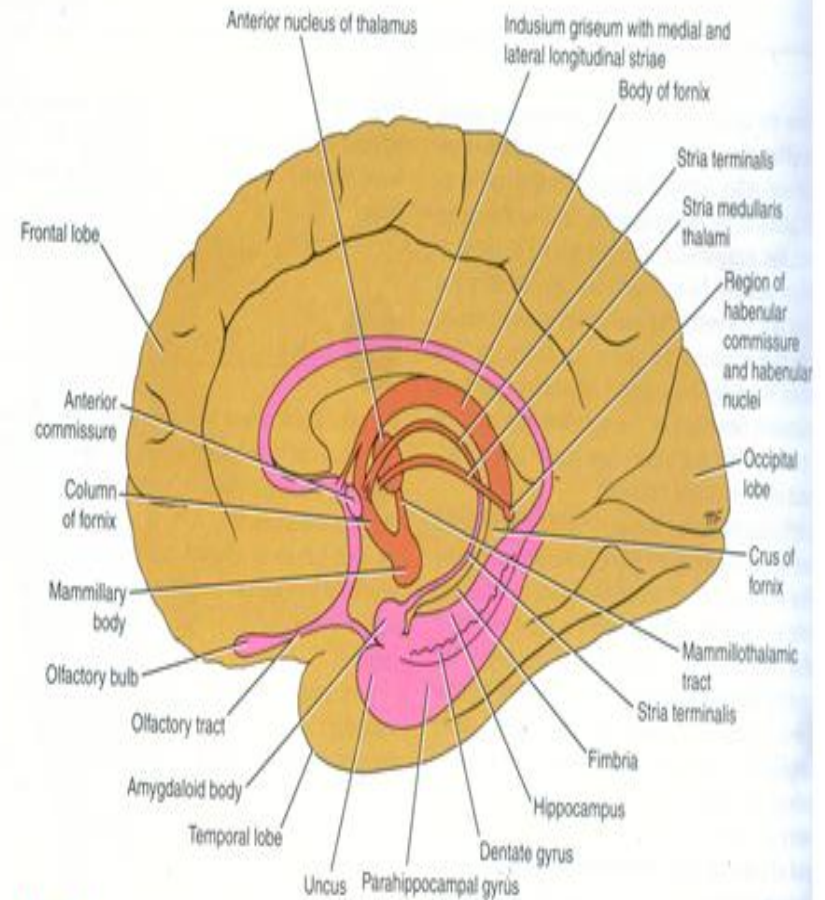


Figure 9-3 Medial aspect of the right cerebral hemisphere showing structures that form the limbic system.

Functions;

Via hypothalamus and its connection with autonomic and control of endocrine system-----

- ▶ Is able to influence many aspects of **emotional** and **behaviour** reaction to fear, anger, emotion related to sexual behaviour.

Hipocamus :

- ▶ convert recent to long term memory
- ** Injury to amygdeloid and hippocampus produce **great memory loss**.
- *** Amygdeloid destruction in animals decrease aggeassivness
- Limbic ? Olfactory ▶ no evidence.

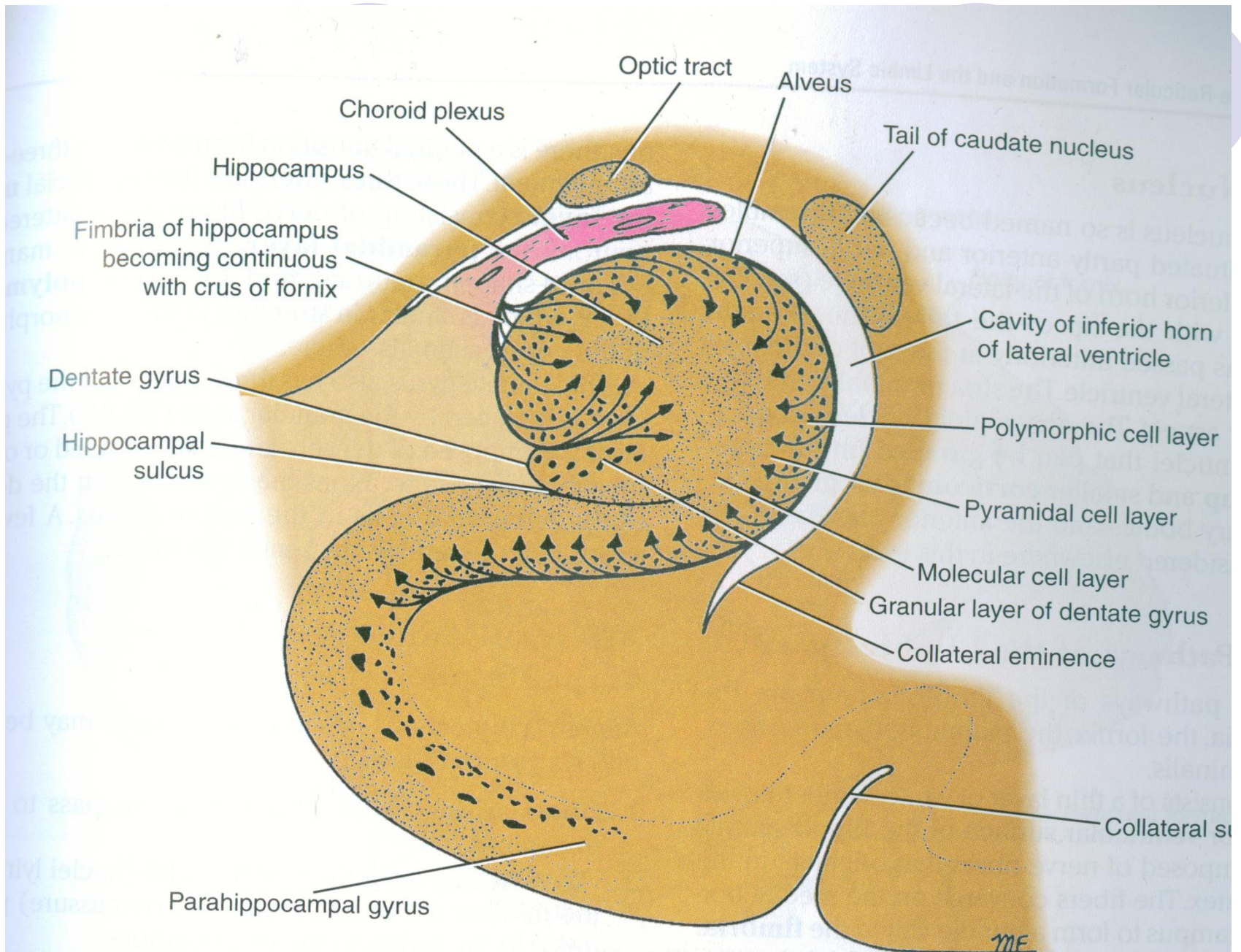


Figure 9-5 Coronal section of the hippocampus and related structures.



Internal capsule

Def:

Wide thick compact band of white neocortical projectional fibers

Situation:

between head of caudate nucleus and thalamus medially and the lentiform n. laterally

Shape:

V - shaped

Boundaries:

Above	corona radiata
Below	crus cerebri of midbrain
Med :	head of caudate and thalamus.
Laterally	lentiform n.

Internal capsule

Def:

Wide thick compact band of white neocortical projectional fibers

Situation:

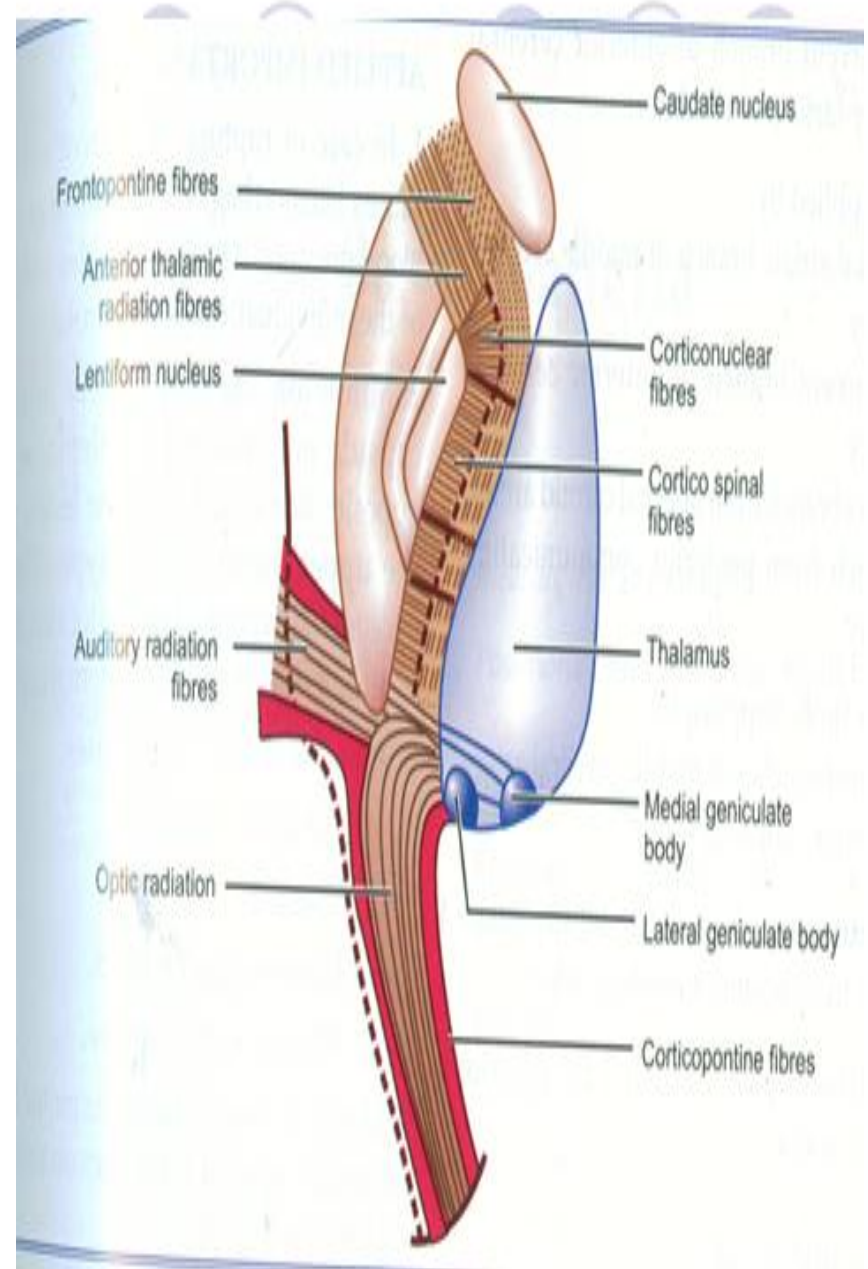
between head of caudate nucleus and thalamus
medially and the lentiform n.
laterally

Shape:

V - shaped

Boundaries:

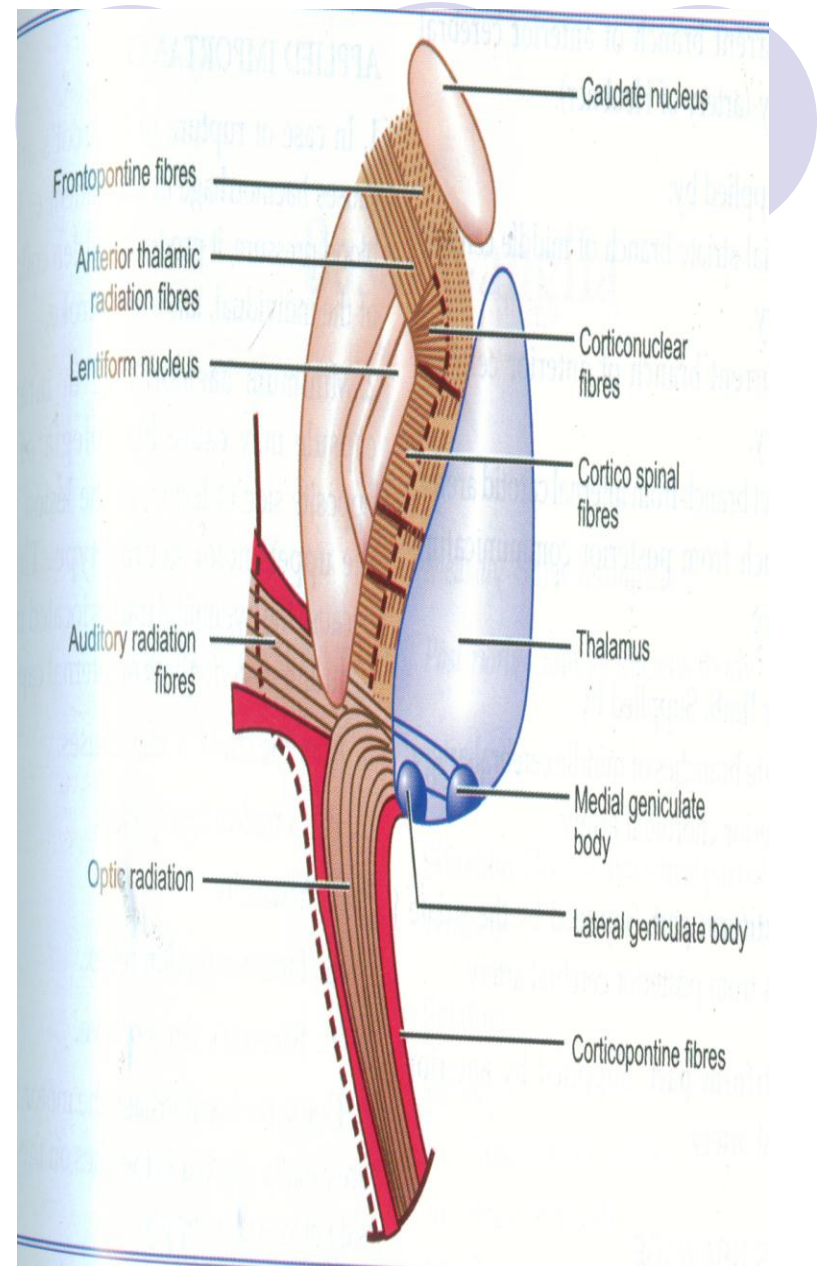
Above	corona radiata
Below	crus cerebri of midbrain
Med :	head of caudate and thalamus.
Laterally	lentiform n.



Parts:

From ant to post

1. ant limb
2. Genu
3. post limb
4. Retro lentiform part
5. Sub lentiform part



Arterial supply

1. Branches of **middle cerebral art.**
2. Recurrent branches of **ant cerebral artery.**
3. **Internal carotid art.**
4. **Post com.art.**

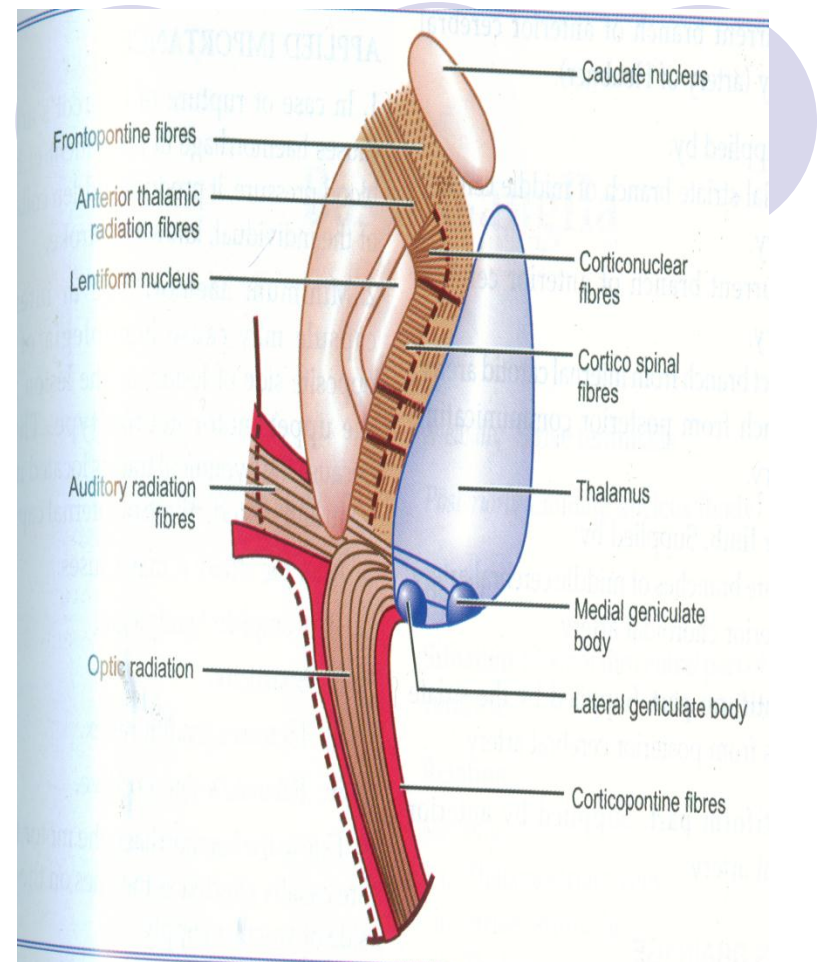
Veins:

Choroidal veins

Thalamostriate veins

Lesion:

minimum bleeding cause hemiplegia of opposite side



Ventricles of brain

Lateral ventricles :

Roof = corpus callosum

Floor = thalamus

Laterally = body of caudate

3rd ventricle

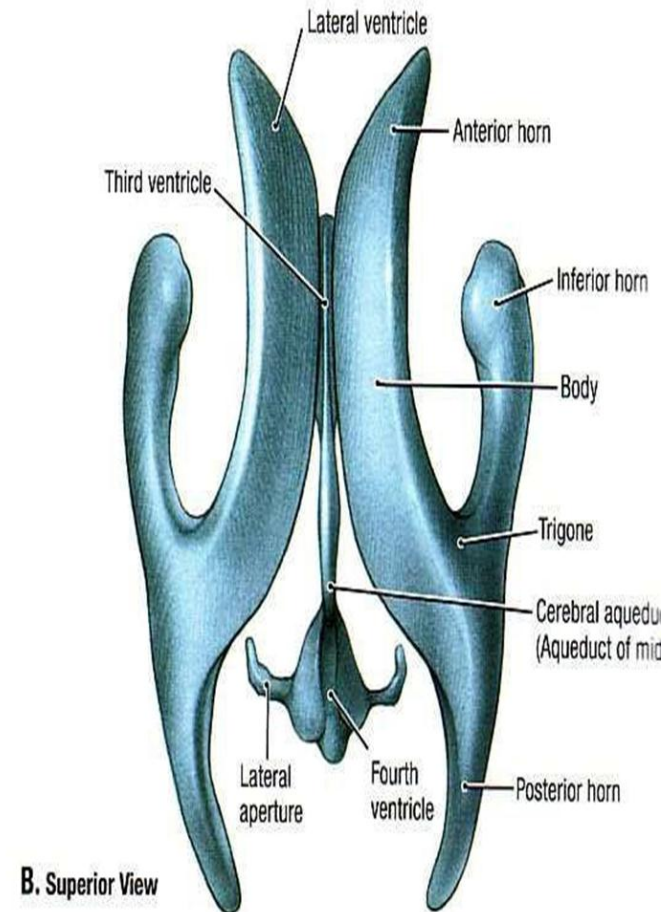
Floor = infundibulum and optic chiasma

Lateral = thalamus + hypothalamus

4th ventricle:

Roof = cerebellum

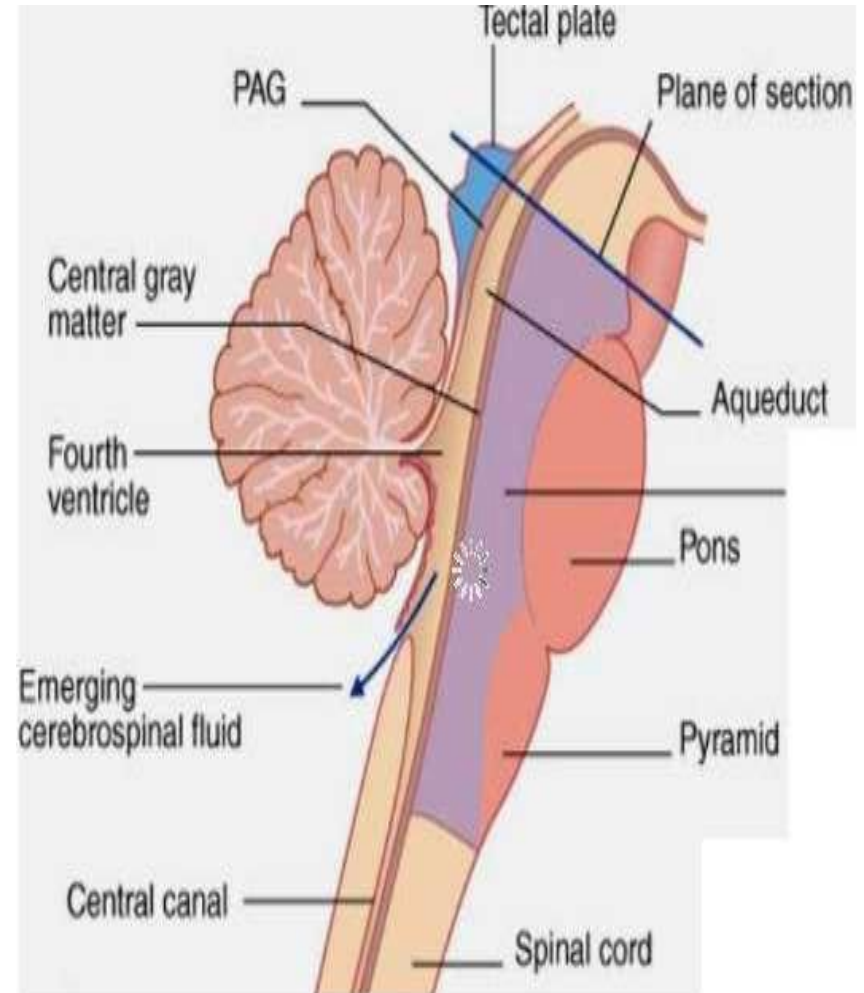
Floor = pons & medulla



Third ventricle

Def:

- Slit –like cavity in the median plane between the two halves of the diencephalon
- extend from lamina terminalis anterior to the superior end of aqueduct and root of the pineal gland posteriorly

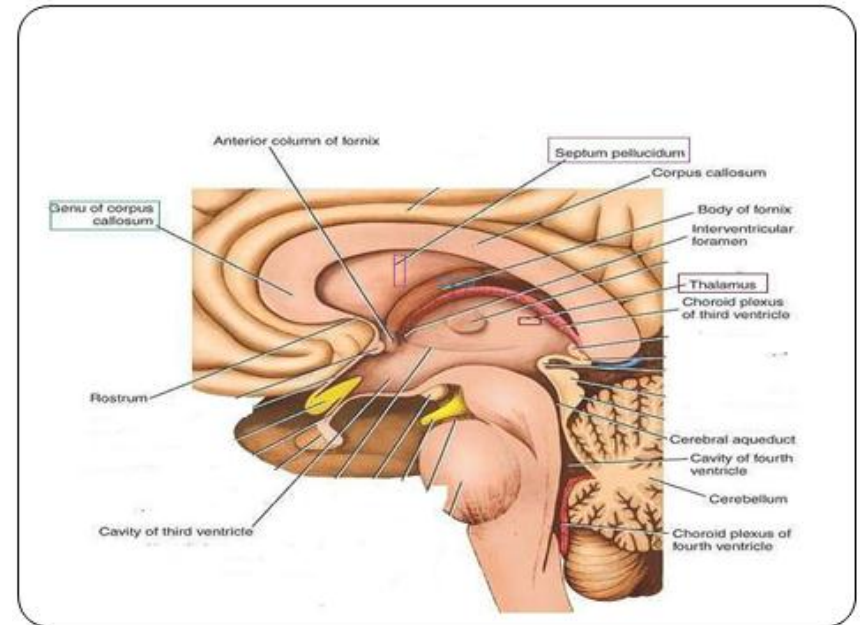


4th ventricle

Def:

a diamond shaped cavity of the hindbrain which extend from superior border of pons to the middle of medulla oblongata and lies

behind these structures and in front of cerebellum.



Cerebrospinal fluid (CSF)

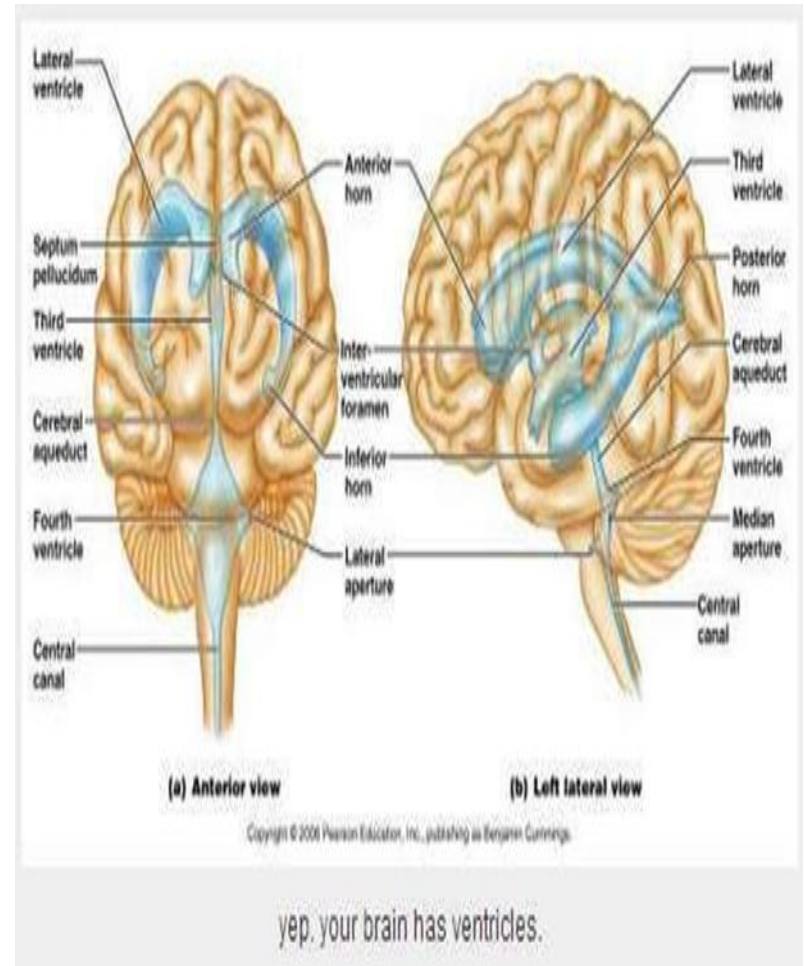
CSF is clear, colorless
and transparent

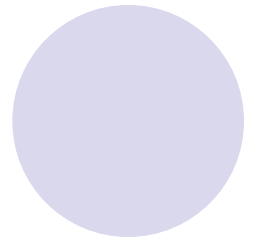
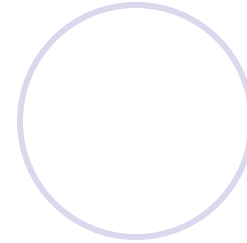
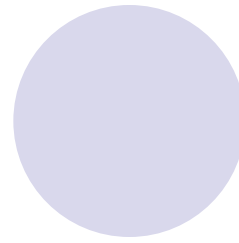
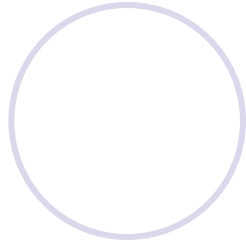
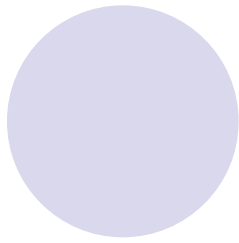
Circulates through
cavity of the:

Brain —

Subarachnoid space —

Central canal of —
spinal cord





Functions CSF . seems to

act as a fluid cushion for the brain

transports some substances into/out of the
brain

.maintains pressure around the brain

Properties

- Volume • mL150 approximately :
- mL/min0.3 Rate of formation: approximately •
- Specific gravity • 1.005 :
- Reaction • Alkaline :

Formation

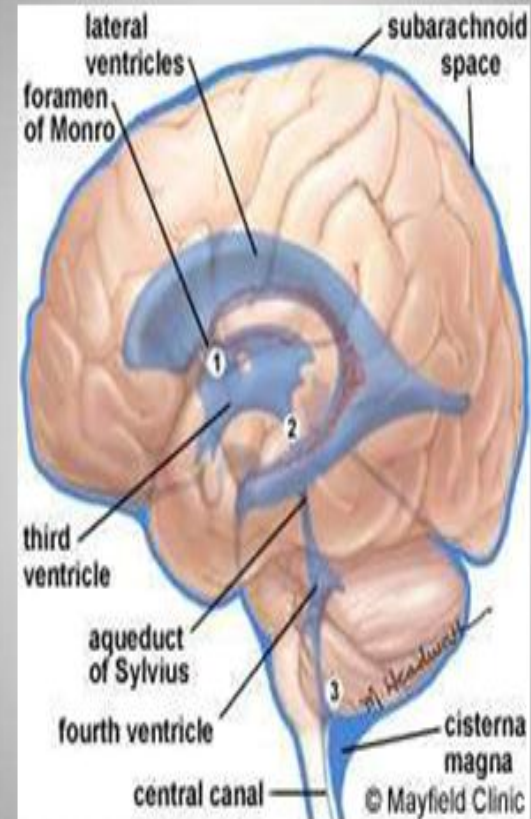
Site of formation •

Formed by the choroid plexus situated within the ventricles.

The choroid plexus are tuft of capillary projections present inside ventricles and covered by:

Pia mater •

Ependymal covering •



Composition

Fluid Cerebrospinal

99.13%- Water

0.87% Solids -

Organic substances

1. Proteins

2. Amino acids

3. Sugar

4. Cholesterol

5. Urea

6. Uric acid

7. Creatinine

8. Lactic acid

Inorganic substances

1. Sodium

2. Calcium

3. Potassium

4. Magnesium

5. Chlorides

6. Phosphate

7. Bicarbonates

8. Sulfates

Lymphocytes in CSF

cu mm /6:

Circulation of CSF

Formation of CSF in lateral ventricles

Foramen of Monro

Third ventricle

Aqueductus Sylvius

Fourth ventricle

Foramen of magendie and foramen
of Luschka

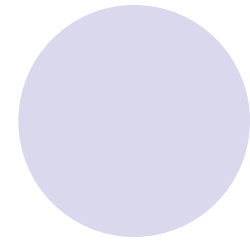
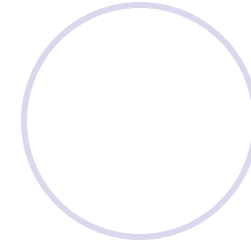
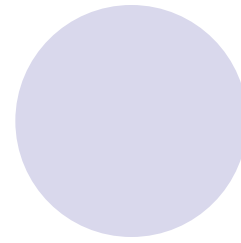
Cisterna magna and Cisterna lateralis

Subarachnoid spaces

To the spinal cord

To cerebral hemispheres

Absorption of CSF



1. Mostly absorbed by the Arachnoid villi into
2. Dural sinuses and Spinal veins.
3. Small amount is absorbed along perineural spaces into cervical lymphatics and in to the perivascular spaces.

Normally, **500 mL** of CSF is formed everyday

and equal amount is absorbed

Collection of CSF

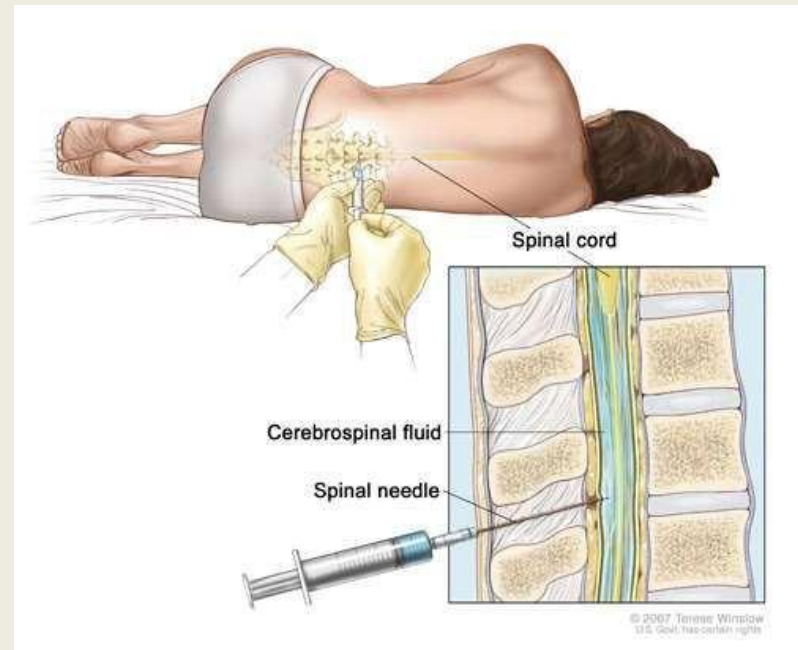
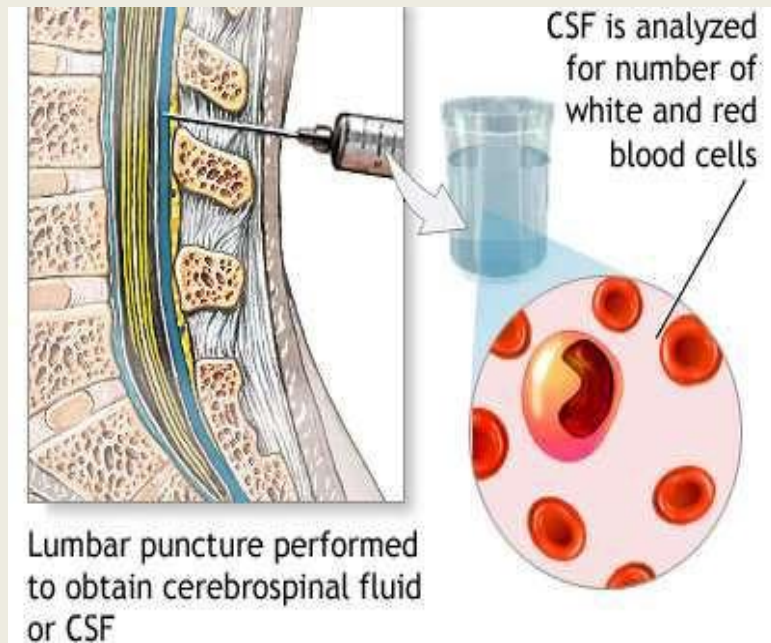
- The Lumbar puncture needle is introduced into the subarachnoid space in the Lumbar region, between the **third and fourth** Lumbar spines.

Uses of Lumbar puncture –

- Collecting CSF for diagnostic purpose.
- Injecting drugs for spinal anesthesia, analgesia and chemotherapy.
- Measuring pressure exerted by CSF.

CSF analysis

Cerebrospinal fluid (CSF) analysis is a way of looking for conditions that affect the brain and spine.



A **lumbar puncture**, also called a **spinal tap**

CSF pressure
mm Hg 8-15 O (2mm of H 180-100)