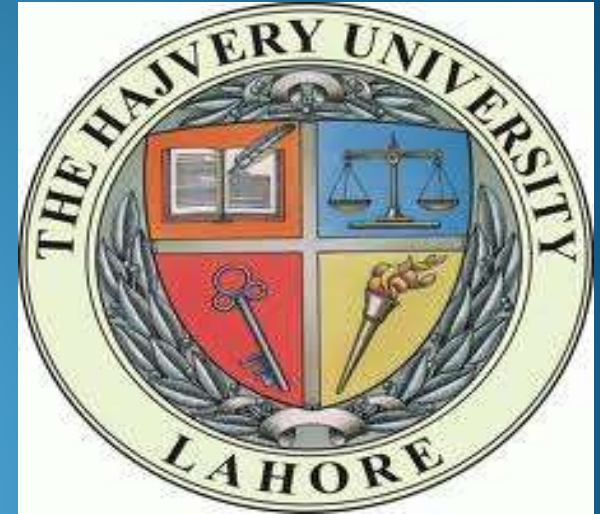
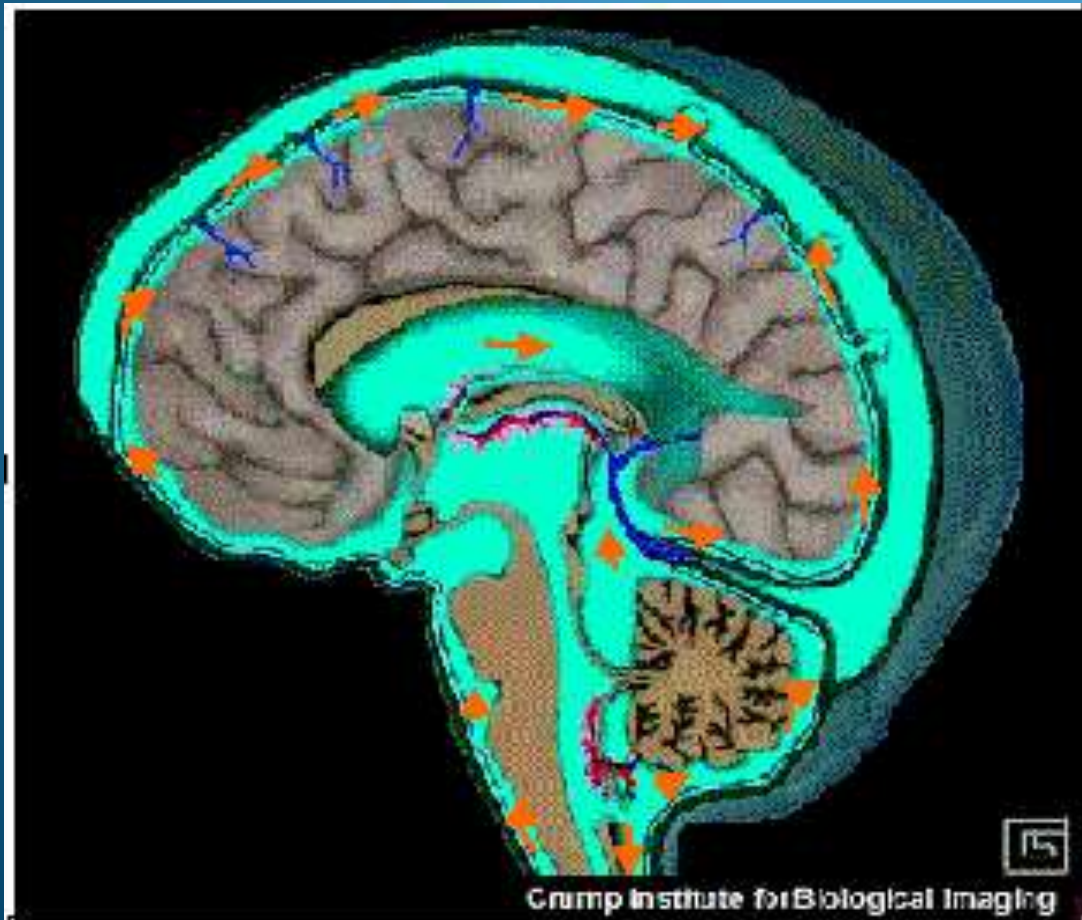


Presented by:
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Pharm-D



CEREBROSPINAL FLUID

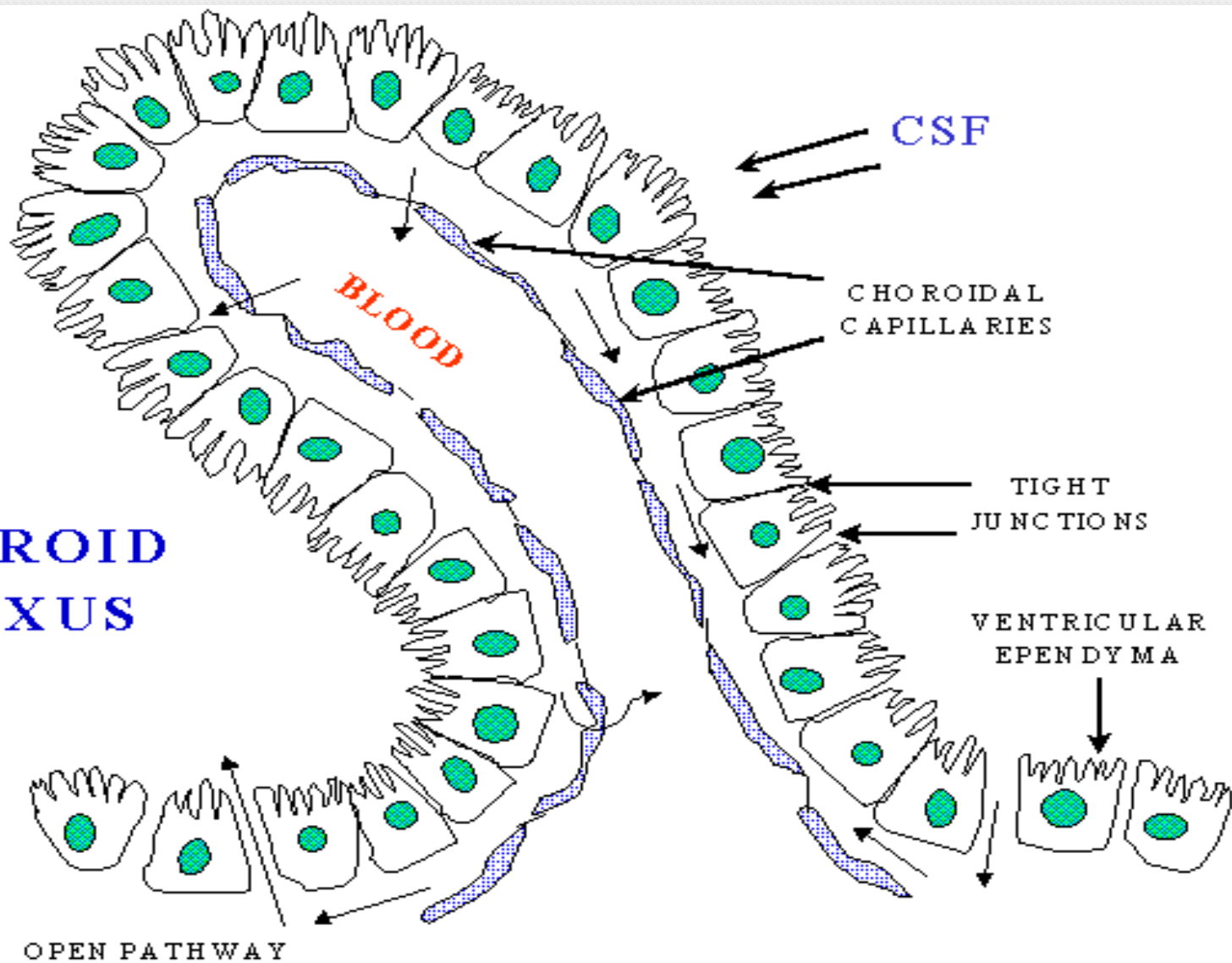
(CSF)



INTRODUCTION

- **Cerebrospinal fluid** (CSF) is the clear,colorless and transparent fluid that circulates through ventricles of brain,subarachnoid space and central canal of spinal cord.
- It is the part of extra cellular fluid (ECF).

CHOROID PLEXUS



PROPERTIES

- VOLUME : *150mL*
- RATE OF REACTION : 0.3mL per minute
- SPECIFIC GRAVITY : 1.005
- REACTION : ALKALINE
- LYMPHOCYTES : 6 / cu mm

COMPOSITION

- CSF contains more amount of sodium than potassium.
- Some lymphocytes.
- lymphocytes are added when CSF flows in the spinal cord.

CSF

Water – 99.13%

Solids – 0.87%

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 : 6 / cu mm

FORMATION OF (CSF)

- CSF is formed by choroid plexuses, situated within the ventricles.
- Choroid plexuses are tuft of capillaries present inside the ventricles.
- A large amount of CSF is formed in the lateral ventricles.

(A)

Central part of left lateral ventricle

Frontal horn of lateral ventricle

Choroid plexus

Interventricular foramen

Third ventricle

Temporal horn of lateral ventricle

Right lateral ventricle

Left lateral ventricle

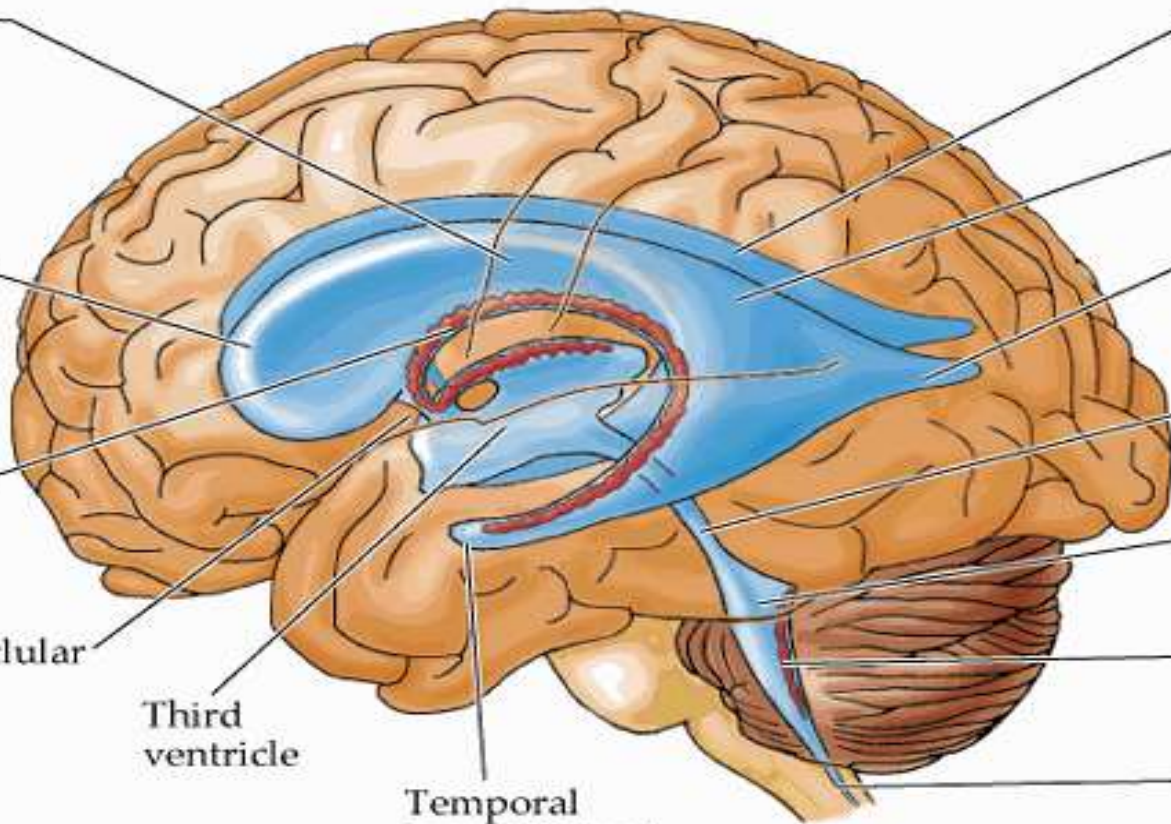
Occipital horn of lateral ventricle

Cerebral aqueduct

Fourth ventricle

Choroid plexus

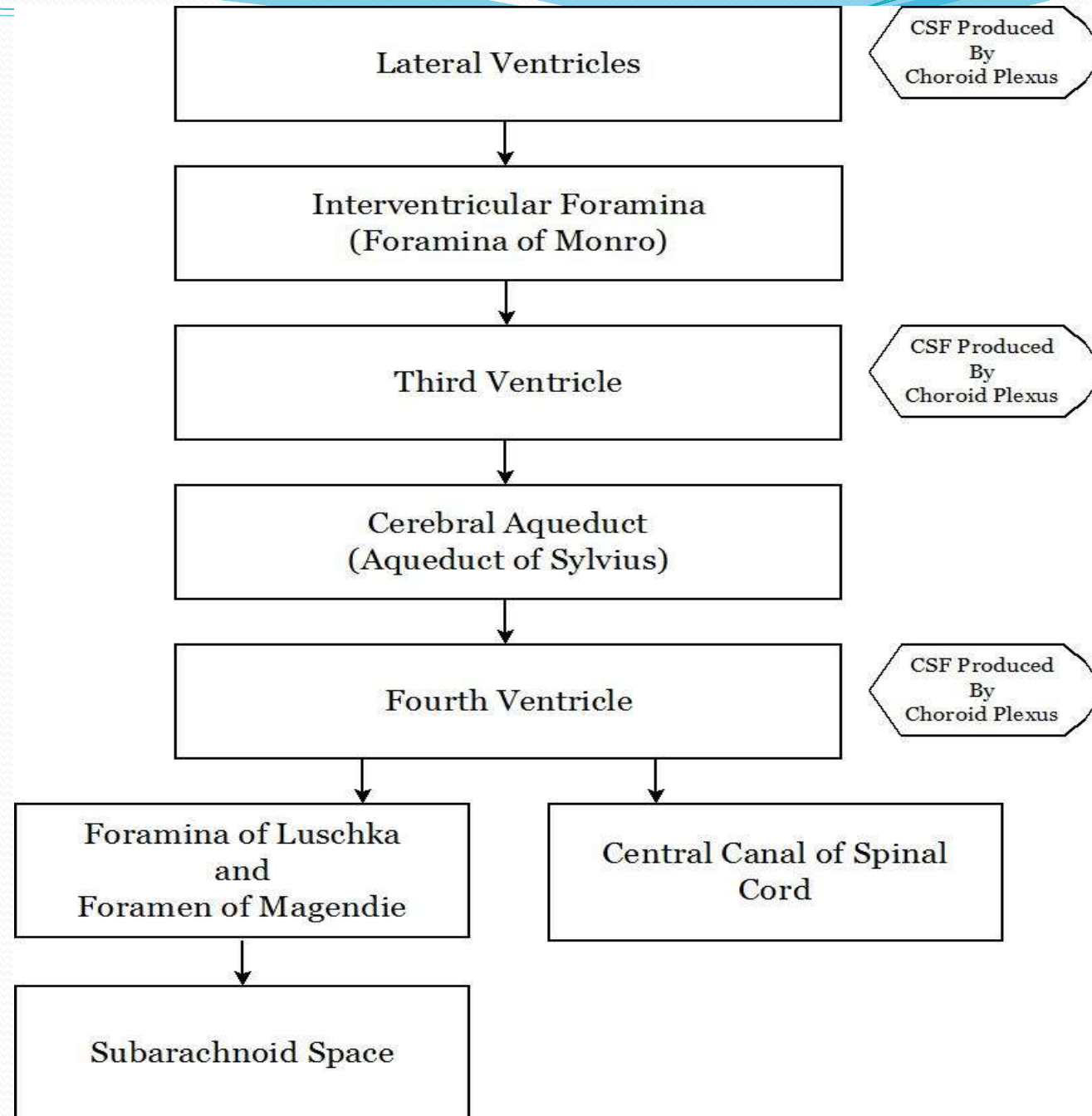
Central canal



SUBSTANCES AFFECTING THE FORMATION OF (CSF)

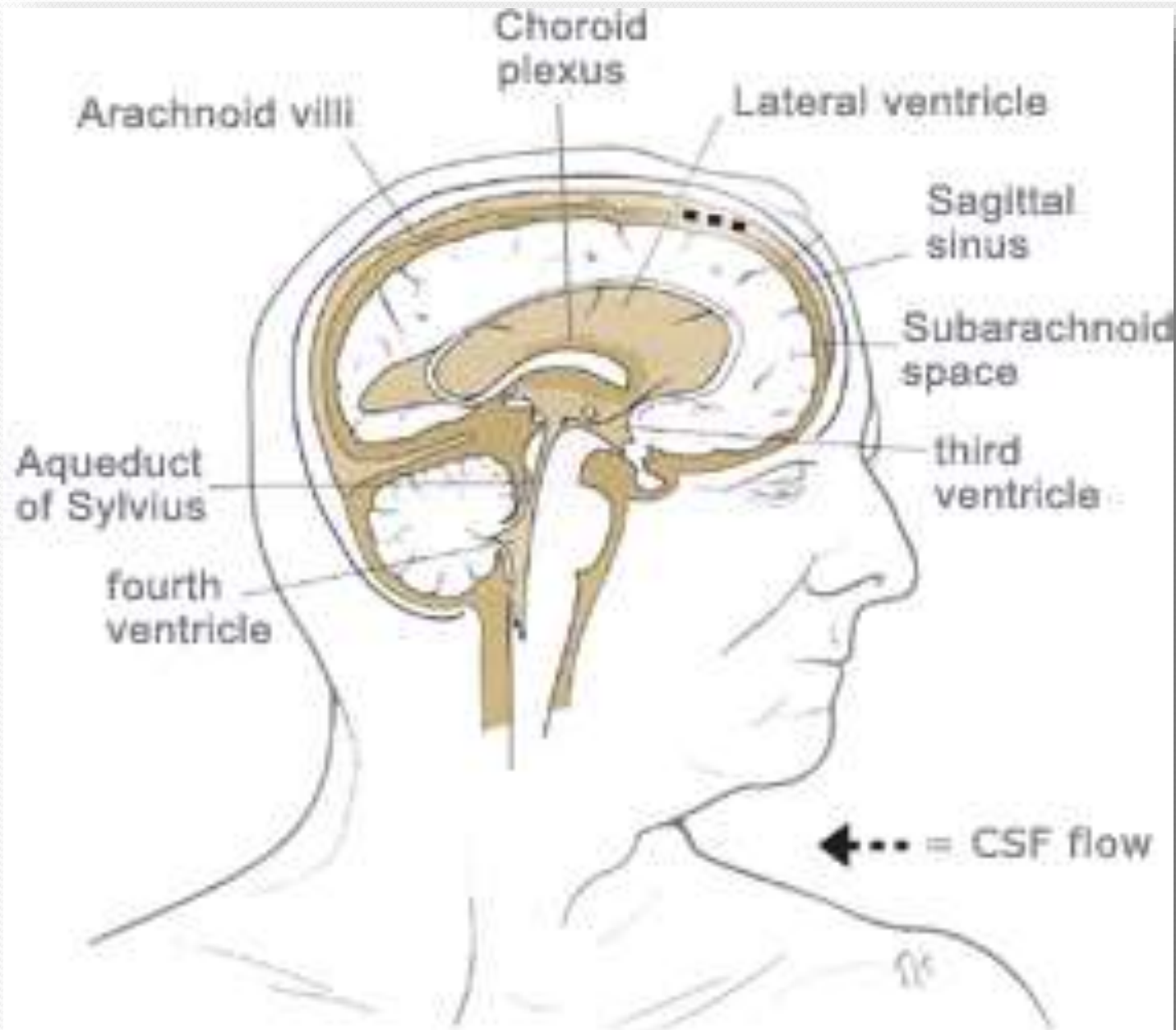
- **PILOCARPINE**, extract of pituitary gland stimulate the secretion of CSF.
- Injection of **isotonic saline** also stimulates CSF formation.
- Injection of **hypotonic saline** increases CSF formation.
- **Hypertonic saline** decreases CSF formation and CSF pressure.

CIRCULATION OF CEREBROSPINAL FLUID



ABSORPTION OF (CSF)

- CSF is mostly by the archnoid villi into dural sinuses and spinal veins.
- Small amount is absorbed along the perineural spaces into cervical lymphatics and into perivascular spaces.
- Normally , about 500 mL of CSF is formed everyday and an equal amount is absorbed.



PRESSURE EXCERTED BY (CSF)

- Lateral recumbent position : 10 to 18 cm of water
- Lying position : 13 cm of water
- Sitting position : 30 cm of water
- Certain events like *coughing* and *crying* increase the pressure by decreasing adsorption.

FUNCTIONS OF (CSF)

- **Protection**: the CSF protects the brain from damage by "buffering" the brain. In other words, the CSF acts to cushion a blow to the head and lessen the impact.
- **Buoyancy**: because the brain is immersed in fluid, the net weight of the brain is reduced from about 1,400 gm to about 50 gm. Therefore, pressure at the base of the brain is reduced.
- **Excretion of waste products**: the one-way flow from the CSF to the blood takes potentially harmful metabolites, drugs and other substances away from the brain.

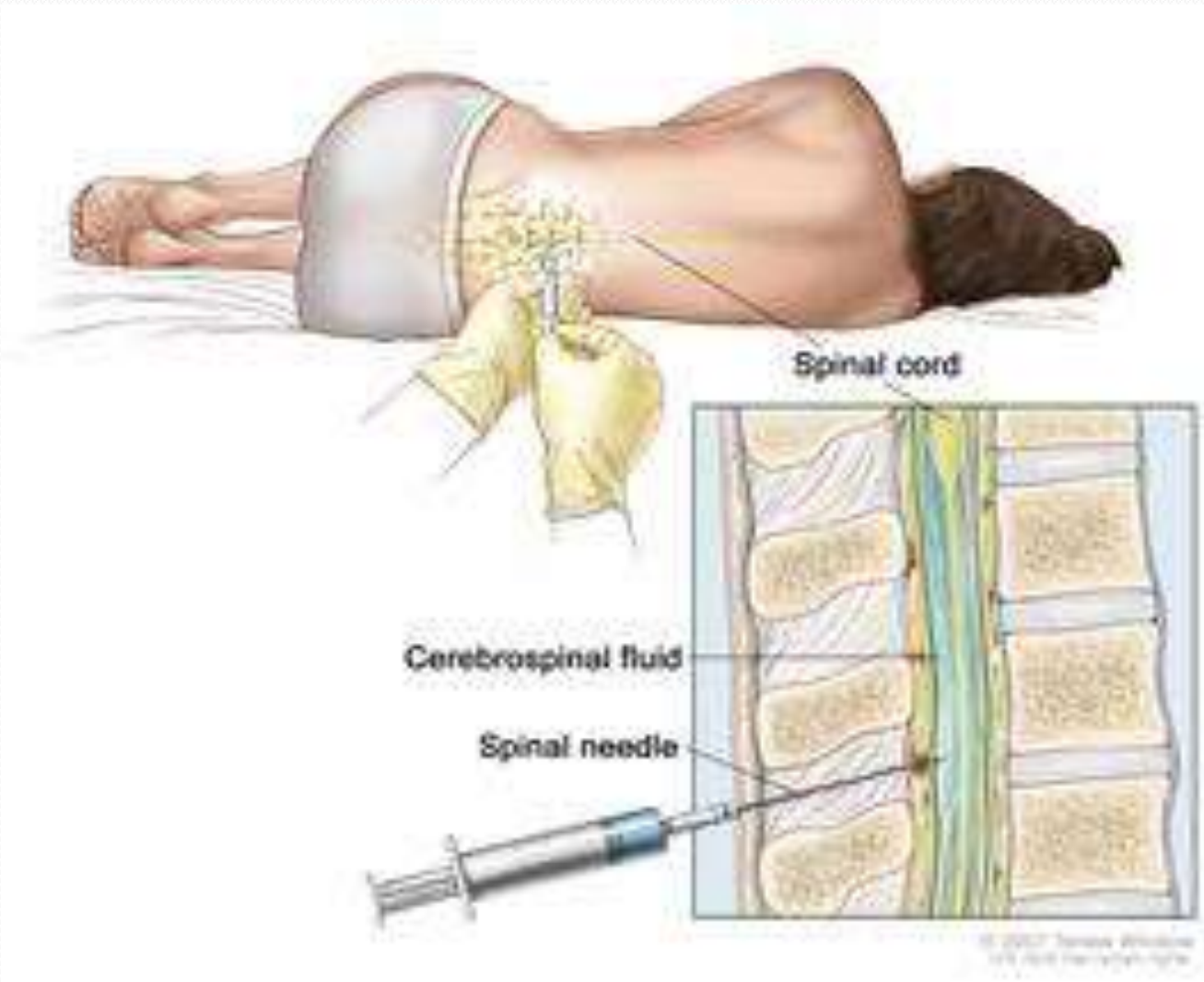
- **Regulation of cranial content volume:**

Regulation of this volume is essential, because brain may be affected if volume is increases . It is prevented by greater absorption of CSF to give space for the cranial contents.

COLLECTION OF CSF

- *CSF* is collected by two methods
- BY *LUMBAR PUNCTURE*
- BY *CISTERNAL PUNCTURE*
- **LUMBAR PUNCTURE**

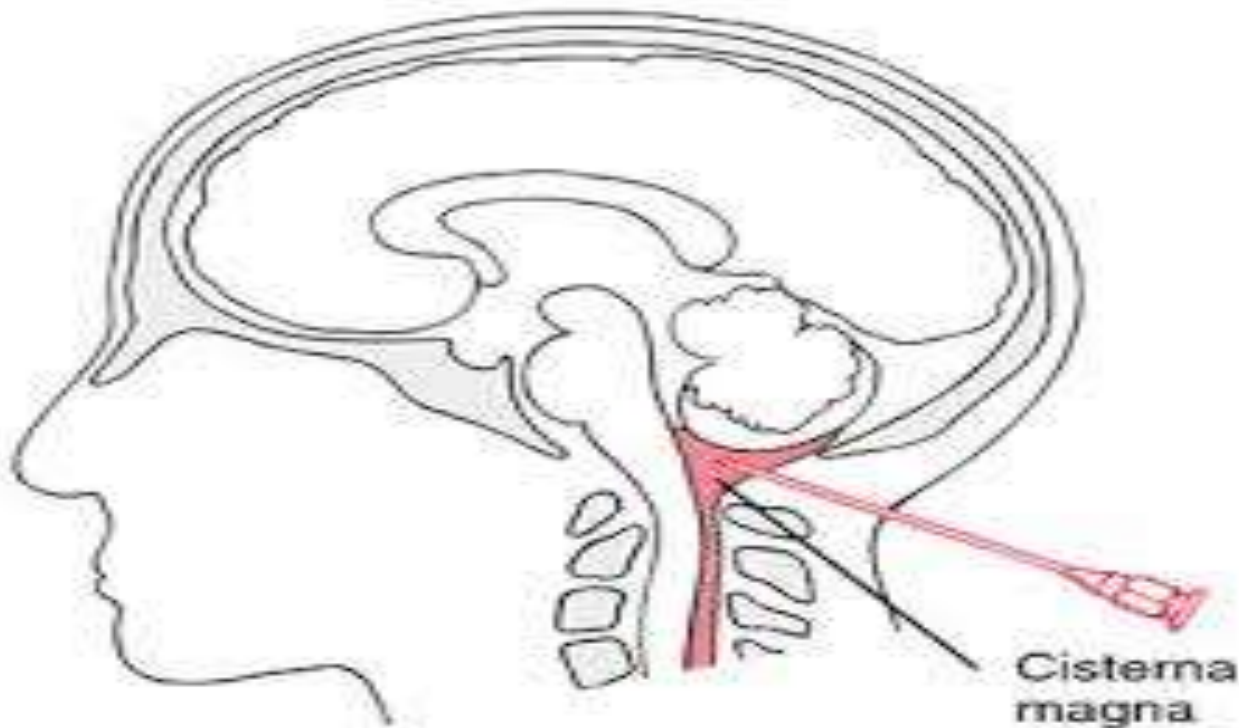
In this the needle is introduced into the subarachnoid space in the lumbar region.



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- **BY CISTERNAL PUNCTURE**

In this a needle between the occipital bone and atlas so that it enters the cisterna magna.



BLOOD-CEREBROSPINAL FLUID

BARRIER

- It is the barrier between the blood and cerebrospinal fluid that exists at the choroid plexus. The function of this barrier is same as of **BBB**. It does not allow the movement of following substances like **chemical agents, pathogens, bile pigments** etc. It allows the movement of only those substances which are allowed by BBB like **Oxygen, Carbon Dioxide, Water** etc

APPLIED PHYSIOLOGY

- **HYDROCEPHALUS :**

The abnormal accumulation of CSF in the skull associated with the *enlargement of head* is called hydrocephalus.

HYDROCEPHALUS along with increase intercranial pressure causes headache and vomiting. In severe conditions it leads to atrophy of brain, mental weakness and convulsions.



Enlarged head

Brain with normal ventricles



Brain with enlarged ventricles



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