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Assignment for viva.

Question: Write a note on cerebrospinal fluid, its circulation and absorption.

**cerebrospinal fluid:**

Cerebrospinal fluid (CSF) is a clear, colorless [body fluid](https://en.wikipedia.org/wiki/Extracellular_fluid" \l "Transcellular_fluid" \o "Extracellular fluid) found in the [brain](https://en.wikipedia.org/wiki/Human_brain" \o "Human brain) and [spinal cord](https://en.wikipedia.org/wiki/Spinal_cord" \o "Spinal cord). It is produced by specialised [ependymal cells](https://en.wikipedia.org/wiki/Ependyma" \o "Ependyma) in the [choroid plexuses](https://en.wikipedia.org/wiki/Choroid_plexus" \o "Choroid plexus) of the [ventricles](https://en.wikipedia.org/wiki/Ventricular_system" \o "Ventricular system) of the brain, and absorbed in the [arachnoid granulations](https://en.wikipedia.org/wiki/Arachnoid_granulation" \o "Arachnoid granulation).

### **Circulation:**

There is about 125–150 mL of CSF at any one time. This CSF circulates within the [ventricular system](https://en.wikipedia.org/wiki/Ventricular_system" \o "Ventricular system) of the brain. The ventricles are a series of cavities filled with CSF. The majority of CSF is produced from within the two [lateral ventricles](https://en.wikipedia.org/wiki/Lateral_ventricles" \o "Lateral ventricles). From here, CSF passes through the [interventricular foramina](https://en.wikipedia.org/wiki/Interventricular_foramina_(neuroanatomy)" \o "Interventricular foramina (neuroanatomy)) to the [third ventricle](https://en.wikipedia.org/wiki/Third_ventricle" \o "Third ventricle), then the [cerebral aqueduct](https://en.wikipedia.org/wiki/Cerebral_aqueduct" \o "Cerebral aqueduct) to the [fourth ventricle](https://en.wikipedia.org/wiki/Fourth_ventricle" \o "Fourth ventricle). From the fourth ventricle, the fluid passes into the [subarachnoid space](https://en.wikipedia.org/wiki/Subarachnoid_space" \o "Subarachnoid space) through four openings – the [central canal](https://en.wikipedia.org/wiki/Central_canal" \o "Central canal) of the spinal cord, the [median aperture](https://en.wikipedia.org/wiki/Median_aperture" \o "Median aperture), and the two [lateral apertures](https://en.wikipedia.org/wiki/Lateral_aperture" \o "Lateral aperture). CSF is present within the subarachnoid space, which covers the brain, spinal cord, and stretches below the end of the spinal cord to the [sacrum](https://en.wikipedia.org/wiki/Sacrum" \o "Sacrum).There is a connection from the subarachnoid space to the [bony labyrinth](https://en.wikipedia.org/wiki/Bony_labyrinth" \o "Bony labyrinth) of the [inner ear](https://en.wikipedia.org/wiki/Inner_ear" \o "Inner ear) making the cerebrospinal fluid continuous with the [perilymph](https://en.wikipedia.org/wiki/Perilymph" \o "Perilymph) in 93% of people

CSF moves in a single outward direction from the ventricles, but multidirectionally in the subarachnoid space. Fluid movement is pulsatile, matching the pressure waves generated in blood vessels by the beating of the heart. Some authors dispute this, posing that there is no unidirectional CSF circulation, but cardiac cycle-dependent bi-directional systolic-diastolic to-and-from cranio-spinal CSF movements.

**Absorption:**

 CSF is absorbed through blood vessels over the surface of the brain back into the bloodstream. Some absorption also occurs through the lymphatic system CSF returns to the vascular system by entering the [dural venous sinuses](https://en.wikipedia.org/wiki/Dural_venous_sinuses" \o "Dural venous sinuses) via [arachnoid granulations](https://en.wikipedia.org/wiki/Arachnoid_granulation" \o "Arachnoid granulation). These are outpouchings of the [arachnoid mater](https://en.wikipedia.org/wiki/Arachnoid_mater" \o "Arachnoid mater) into the venous sinuses around the brain, with valves to ensure one-way drainage. This occurs because of a pressure difference between the arachnoid mater and venous sinuses. CSF has also been seen to drain into [lymphatic](https://en.wikipedia.org/wiki/Lymph" \o "Lymph) vessels particularly those surrounding the nose via drainage along the [olfactory nerve](https://en.wikipedia.org/wiki/Olfactory_nerve" \o "Olfactory nerve) through the [cribriform plate](https://en.wikipedia.org/wiki/Cribriform_plate" \o "Cribriform plate). The pathway and extent are currently not known, but may involve CSF flow along some cranial nerves and be more prominent in the [neonate](https://en.wikipedia.org/wiki/Neonate" \o "Neonate). CSF turns over at a rate of three to four times a day. CSF has also been seen to be reabsorbed through the sheathes of [cranial](https://en.wikipedia.org/wiki/Cranial_nerves" \o "Cranial nerves) and [spinal nerve](https://en.wikipedia.org/wiki/Spinal_nerve" \o "Spinal nerve) sheathes, and through the ependyma.

**Clinical application:**

The term hydrocephalus is derived from the Greek words "hydro" meaning water and "cephalus" meaning head.It is excessive accumulation of fluid in the brain.