

Ventricles and Cerebrospinal Fluid

1. Where and how is CSF produced?
2. Functions of CSF in brain and spinal cord
3. Main arteries that supply brain with blood
4. Main veins that drain blood from brain
5. Sinus name that fills the valley of separation between the left and right cerebral hemispheres
6. Ventricle names and pathways connecting them
7. Circulation of CSF starting in lateral ventricle and ending at reabsorption in brain or spinal cord
8. At any moment, locations in the brain and spinal cord that CSF can be found.
9. How CSF returns to the bloodstream in the brain and in the spinal cord
10. Lumbar puncture—technique and purpose
11. Hydrocephalus—define it and typical causes

Answers:

Ventricles and Cerebrospinal Fluid

1. Where and how is CSF produced?
CSF is produced partly by the choroid plexus capillaries in the roof of each ventricle, and partly by astrocytes. Other brain areas may contribute to formation of CSF, as well (current research).
2. Functions of CSF in brain and spinal cord
Buoyancy, Cushion, Communication, Bathe brain in nutrients
3. Main arteries that supply brain with blood
 - **Vertebral arteries (travel up transverse foramen in the cervical vertebrae)**
 - **carotid arteries (travel up the side of the neck)**
4. Main veins that drain blood from brain
Jugular veins
5. Sinus name that fills the valley of separation between the left and right cerebral hemispheres
Superior Sagittal Sinus
6. Ventricle names and pathways connecting them
The lateral ventricles through the interventricular foramen to the 3rd ventricle through the cerebral aqueduct to the 4th ventricle.
7. Circulation of CSF starting in lateral ventricle and ending at reabsorption in brain or spinal cord
CSF can pass from the lateral ventricles through the interventricular foramen to the 3rd ventricle through the cerebral aqueduct to the 4th ventricle. CSF may exit through apertures in the 4th ventricle to travel in the subarachnoid space up and around the brain. CSF may then filter through arachnoid villi to be reabsorbed into blood sinuses such as the superior sagittal sinus and the transverse sinus. CSF can also exit the 4th ventricle and flow down the spinal cord in the central canal, or in the subarachnoid space around the spinal cord. At the base of the spinal cord, CSF pools in a sac of meninges. Current research suggests that CSF can move back and forth between the blood and the subarachnoid space more than was previously believed.
8. At any moment, locations in the brain and spinal cord that CSF can be found.
 - **Ventricles of the brain**
 - **Subarachnoid space of the brain and spinal cord**
 - **Central canal of the spinal cord**
9. How CSF returns to the bloodstream in the brain and in the spinal cord
CSF is reabsorbed into blood sinuses in the brain, and veins in the spinal cord. In the brain, the blood sinuses eventually drain into the jugular veins.
10. Lumbar puncture—technique and purpose
 - **Purpose: To remove a sampling of CSF to check for infection.**
 - **Usually done between L4/L5.**
 - **Needle inserted between the vertebrae. The needle passes through the ligaments and the joint capsule into the epidural space. Then the needle is pushed through the dura mater and the tightly adhered arachnoid mater. Now the needle is in the subarachnoid space and a sample of CSF can be removed. The spinal cord cannot be damaged because it actually ends at L2.**
11. Hydrocephalus—define it and typical causes
Literally, "Water on the head". Hydrocephalus is an excess of CSF in the ventricles of the brain. Causes: *in babies and children, developmental abnormalities or a tumor may prevent CSF from draining properly. *In adults, head trauma or a tumor may block draining. A surgical shunt can be placed to allow drainage.