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<b>Neurotransmitter</b>	<b>Distribution</b>	<b>Proposed Impact</b>
<b>Acetylcholine</b>	It is the primary neurotransmitter of the peripheral nervous system (PNS) and important to the central nervous system (CNS) as well. It is concentrated in the basal forebrain, striatum, and reticular formation. It is also concentrated within regions of the brainstem involved with cognition and memory.	Involved in voluntary movement of skeletal muscles and viscera including spinal and cranial nerves. Drugs that affect cholinergic activity within the body impact heart rate, bladder function, digestion, and may cause dry mouth. This neurotransmitter is also important to sleep-wake cycles. Decreased cholinergic projections on muscle cells are found in myasthenia gravis. Decreased projections in the hippocampus and orbitofrontal cortex are related to Alzheimer's disease.
<b>Dopamine</b>	Concentrated in neuronal groups in the basal ganglia. Dopaminergic projections originate in the substantia nigra and have terminals in the cortex, amygdala, and nucleus accumbens.	Decreased dopamine in the brain is linked to Parkinson's disease. An increase of dopamine in the forebrain is linked to schizophrenia. Dopamine is involved in cognition and motivation and is related to wanting pleasure associated with love and addiction.
<b>Norepinephrine</b>	Norepinephrine neurons are found in the pons and medulla. Most are in the reticular formation and locus ceruleus.	Important to maintaining attention and focus. It increases excitation in the brain and is involved in wakefulness and arousal. It is also associated with the sympathetic nervous system and feelings of panic, fight, or flight.
<b>Serotonin</b>	Synthesized from the amino acid tryptophan and found in blood platelets and the gastrointestinal tract. Terminals are localized in nerve pathways from the nuclei at the center of the reticular formation.	Controls mood, regulates sleep, involved in perception of pain, body temperature, blood pressure, and hormonal functioning. Low levels are associated with depression. It is also involved in memory and emotion.
<b>GABA</b>	A major neurotransmitter with cells found in the cerebral cortex, cerebellum, and hippocampus. GABA projections are inhibitory from the striatum to the globus pallidus and substantia nigra to the thalamus.	Loss of GABA in the striatum is linked to a degenerative disease that causes involuntary abnormal movements (Huntington's chorea). It is associated with the inhibition of motor neurons.

childhood, neurons create new connections with other neurons. At birth, the brain weighs about 350 grams (12 ounces) and is about 1,000 grams (2.2 pounds) at 1 year old. As an adult, the brain weighs approximately 1,200 to 1,400 grams (2.6 to 3.1 pounds) and does not have the ability to create new connections with other neurons, as most neurons cannot be replaced. This section discusses the brain's covering, the ventricles, and the following major structures of the central nervous system: the

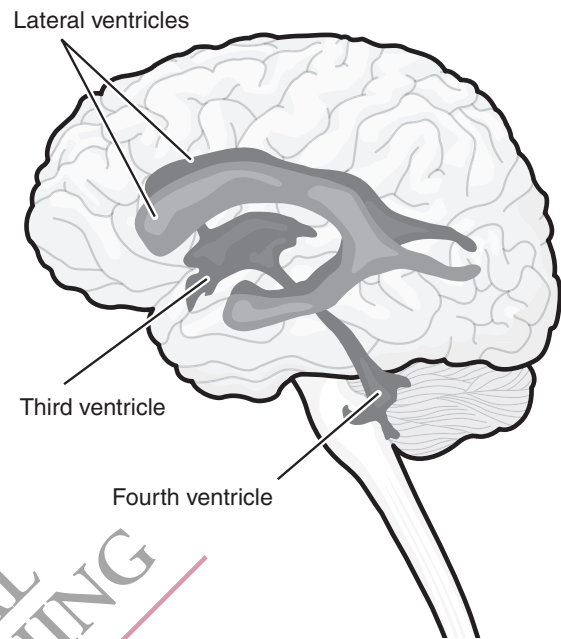
cerebral cortex, brainstem, subcortical structures, cerebellum, and the neural pathways.

### **The Coverings of the Brain, Ventricles, and Cerebrospinal Fluid**

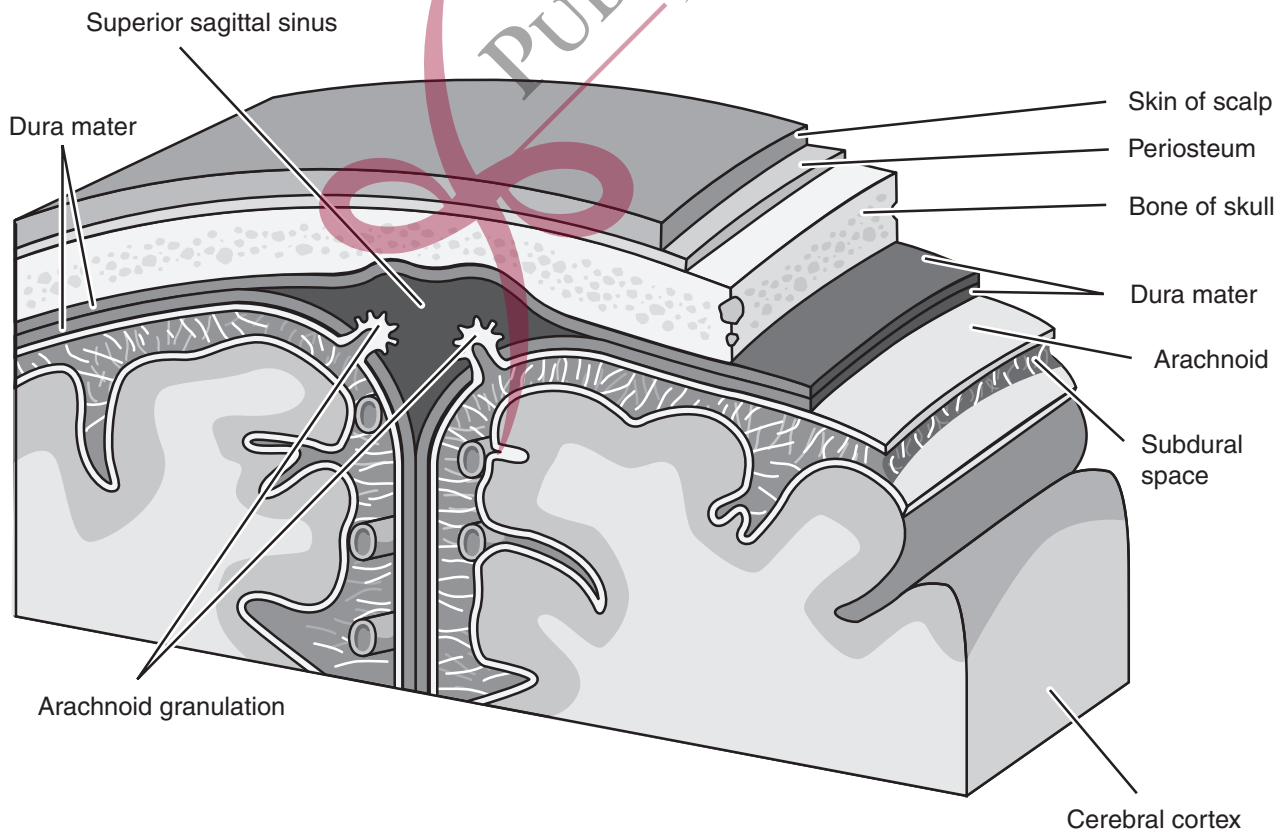
There are three layers of tissues, the meninges, that protect the brain. They include the dura mater, arachnoid membrane, and pia mater. Between the

arachnoid membrane and pia mater is the subarachnoid space. This space contains blood vessels and cerebrospinal fluid (CSF).

The CSF protects the brain. It is a clear and colorless fluid that circulates throughout the brain and the spinal cord cushioning and protecting them from injury. There are four ventricles within the brain: two lateral ventricles, the third ventricle, and the fourth ventricle. Each ventricle contains the choroid plexus, which is the structure that produces the CSF. The CSF flows from one ventricle to the next and finally into the subarachnoid space. It is reabsorbed back into the blood. The lateral ventricles are connected to the third ventricle, and the third ventricle is connected to the fourth. Blockage in any of the spaces can cause CSF to back up, leading to a number of serious medical conditions including hydrocephalus, which increases pressure on the brain (<http://www.sickkids.ca/childphysiology/cpw/brain/csf.htm>; Figures 1-4 and 1-5).



**Figure 1-4.** Ventricles.



**Figure 1-5.** Meninges.

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# Appendix G

## TEST YOUR KNOWLEDGE

- This examination focuses on *critical thinking*, given detailed clinical information.
- There are 50 questions on this examination, based on seven case scenarios. Read the case scenarios very carefully. This is a skill that you must master in this discipline.
- Choose the one best response and circle your response on the answer sheet below and darken the appropriate corresponding responses.

### Case #1

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This patient is a 60-year-old WM found down by his son in the living room of a house that they share. The patient was not breathing and had no pulse. The patient's son started CPR after calling 911, and he continued with CPR until EMS arrived, 10 minutes later. EMS found the patient to be unconscious, not breathing, and pulseless. They implemented the cardiac arrest protocol. A respiration and a pulse were restored. The son told EMS that the patient must have been down "for at least 10 minutes" before he called 911. The patient was transferred to the EMS vehicle and taken to the local hospital.

The patient was stabilized in the emergency department and transferred to the cardiac care unit. Two weeks post-event, the critical care attending consulted speech-language pathology to assess the patient's cognitive-linguistic status in preparation for eventual transfer to the next level of care. The chart review indicated that the patient had variable levels of alertness; mumbles "occasionally"; is totally

dependent on nursing for his activities of daily living. Nursing reports that he "just lays there most of the day." His family is present in the afternoon hours, and they are asking for "rehab."

1. Based on the history above, it is most likely that this patient is presenting with:
  - a. Lewy body dementia
  - b. PPA
  - c. Anoxic encephalopathy
  - d. RHD
2. As the family is asking for "rehab," is it reasonable to assume that the DRS would be the appropriate rating scale for this patient as part of your assessment?
  - a. Yes, because the DRS is a scale related to functioning post-hospitalization and therefore describes the patient from a rehab potential perspective.
  - b. Yes, because the DRS assesses brain injury.
  - c. Yes, because the DRS is the best and most efficacious assessment instrument for all anoxic patients.
  - d. No, I would still use the Rancho rating system for this patient.
3. This family is asking for inpatient rehab services at a free-standing rehabilitation hospital 2 weeks post event. This may pose a counseling and education problem for you. How would you handle this?
  - a. I would refer to social work and step aside.
  - b. I would notify the resident and tell her that this family is irate and unrealistic and demand a social work consult from her.