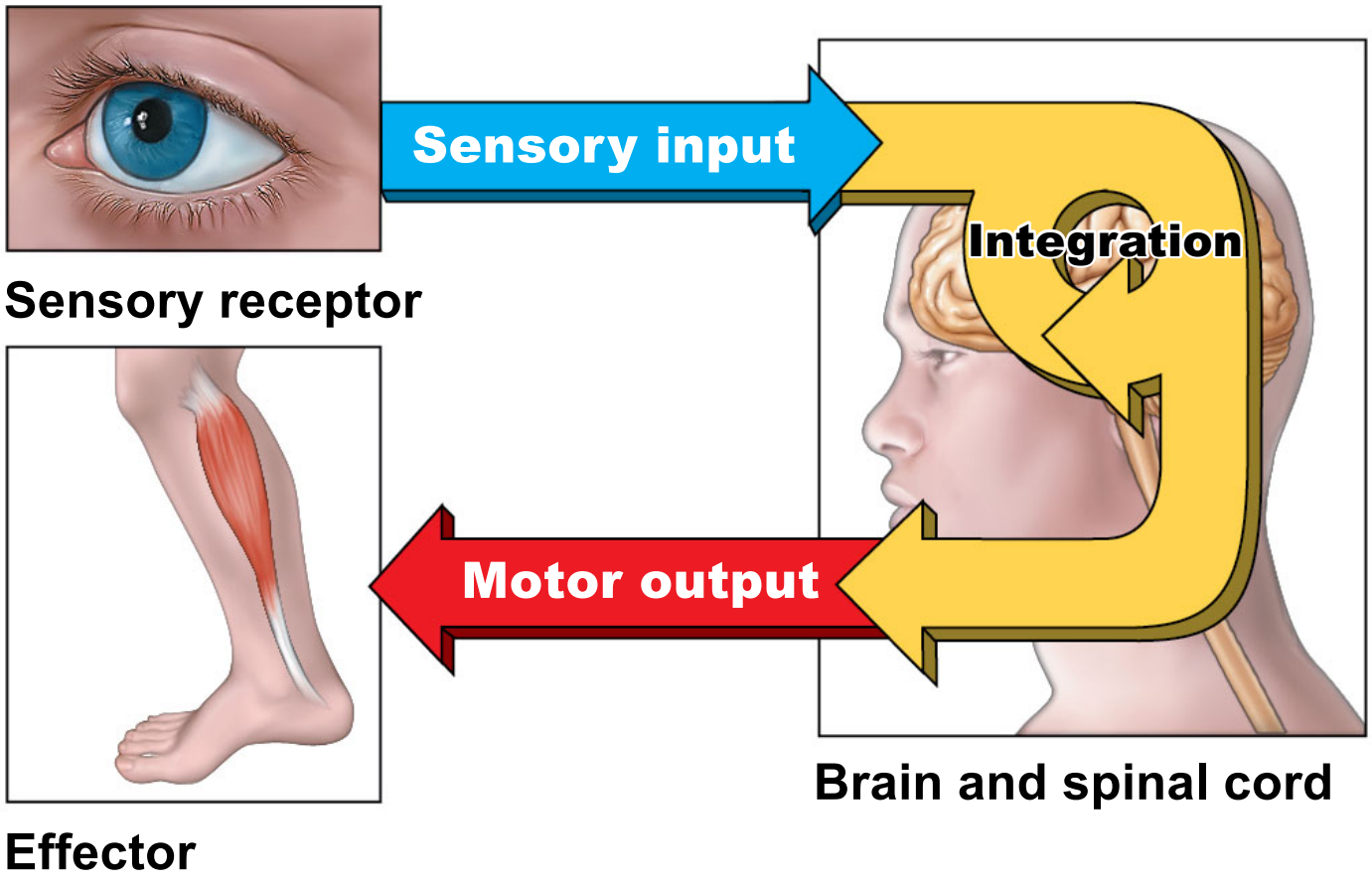
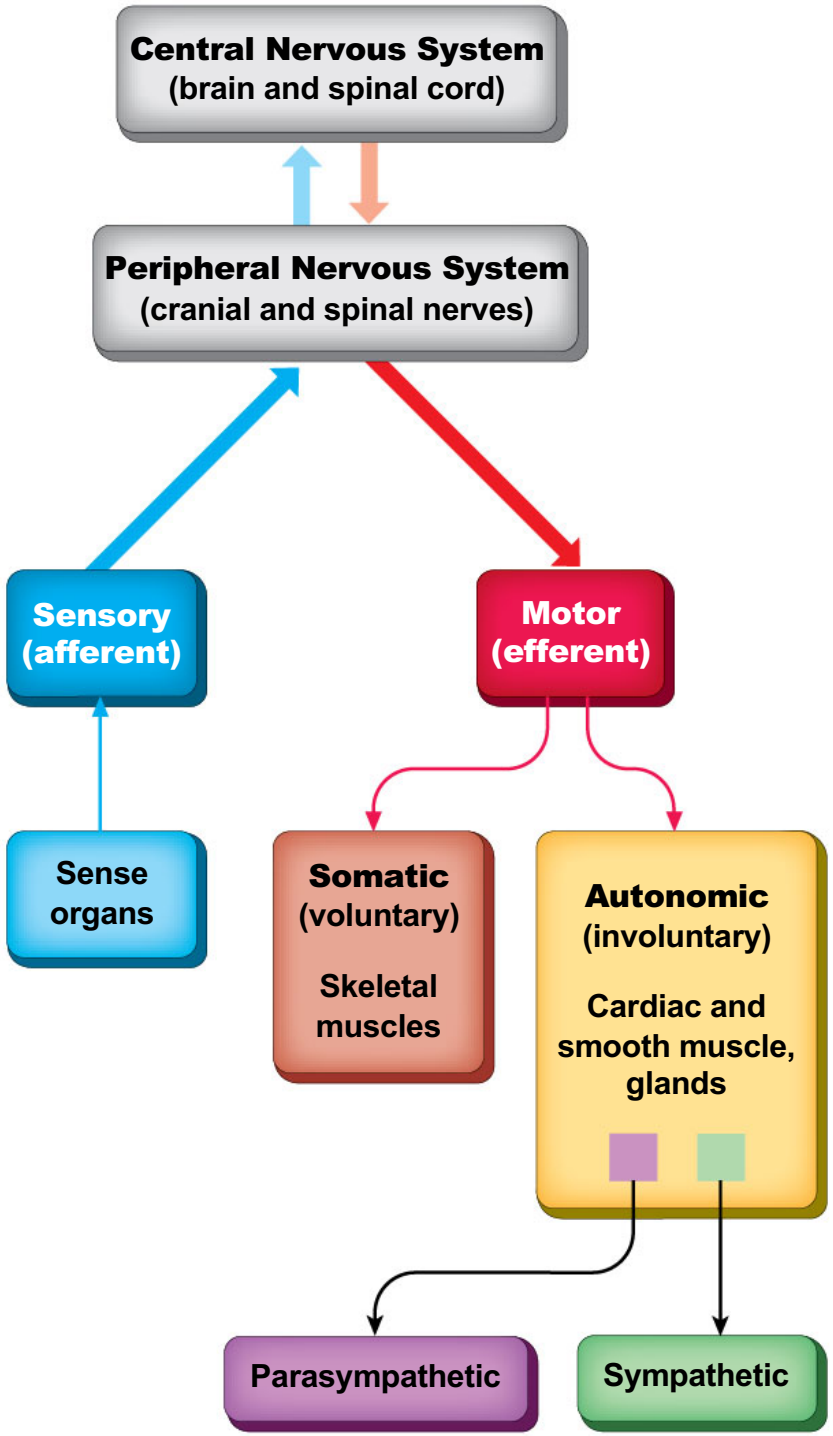
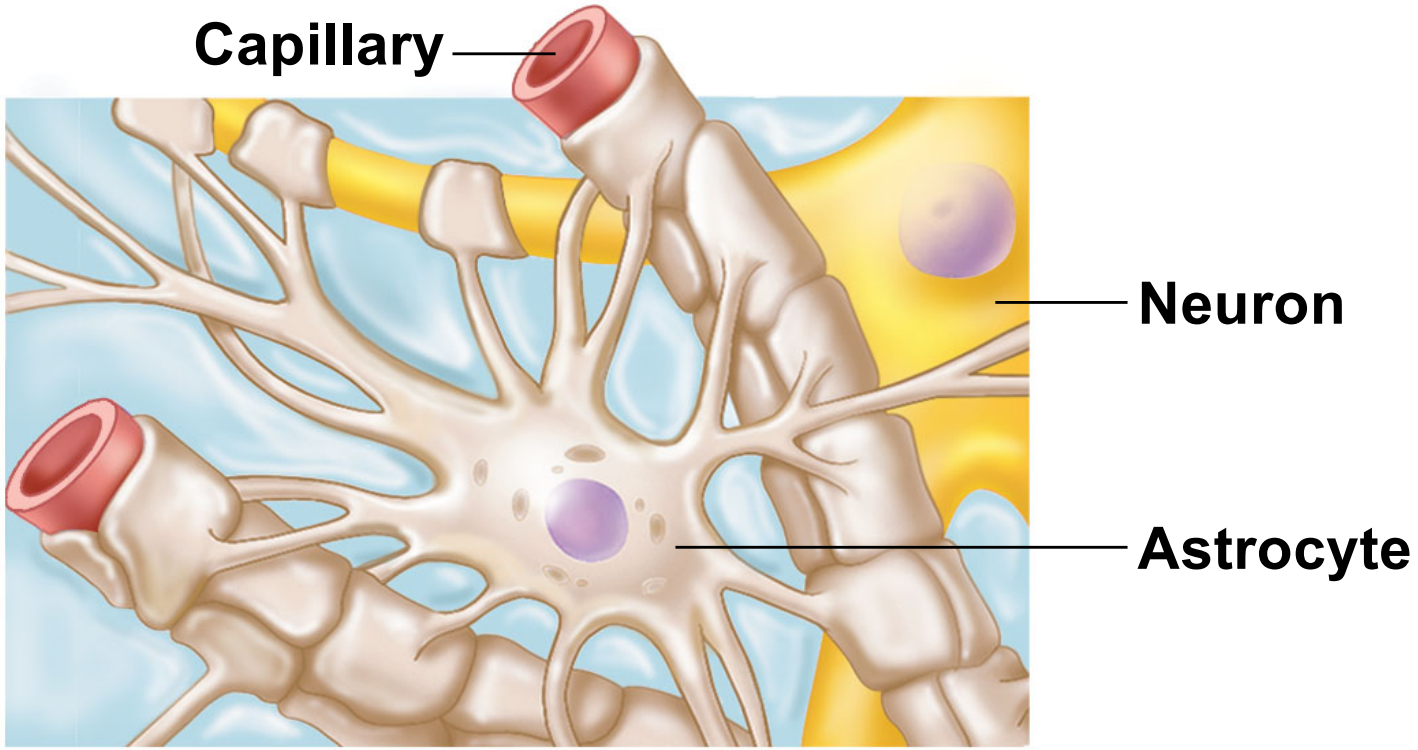
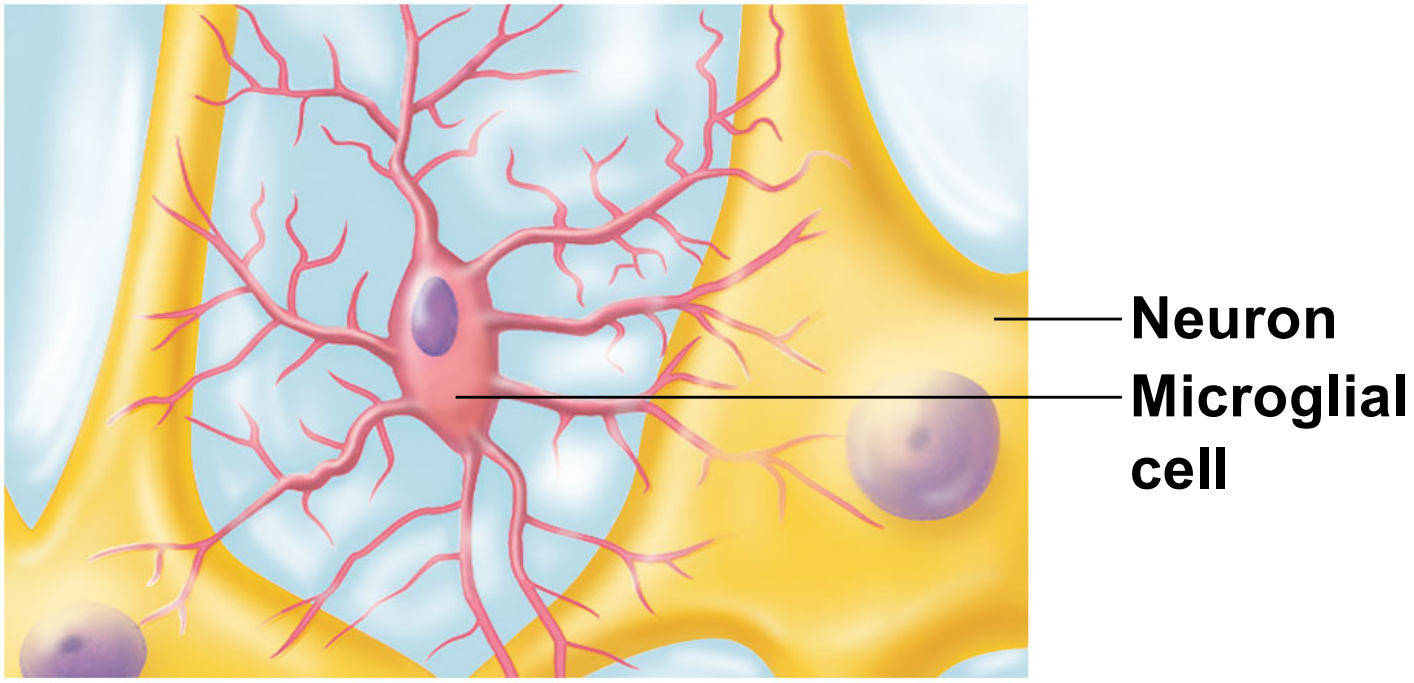


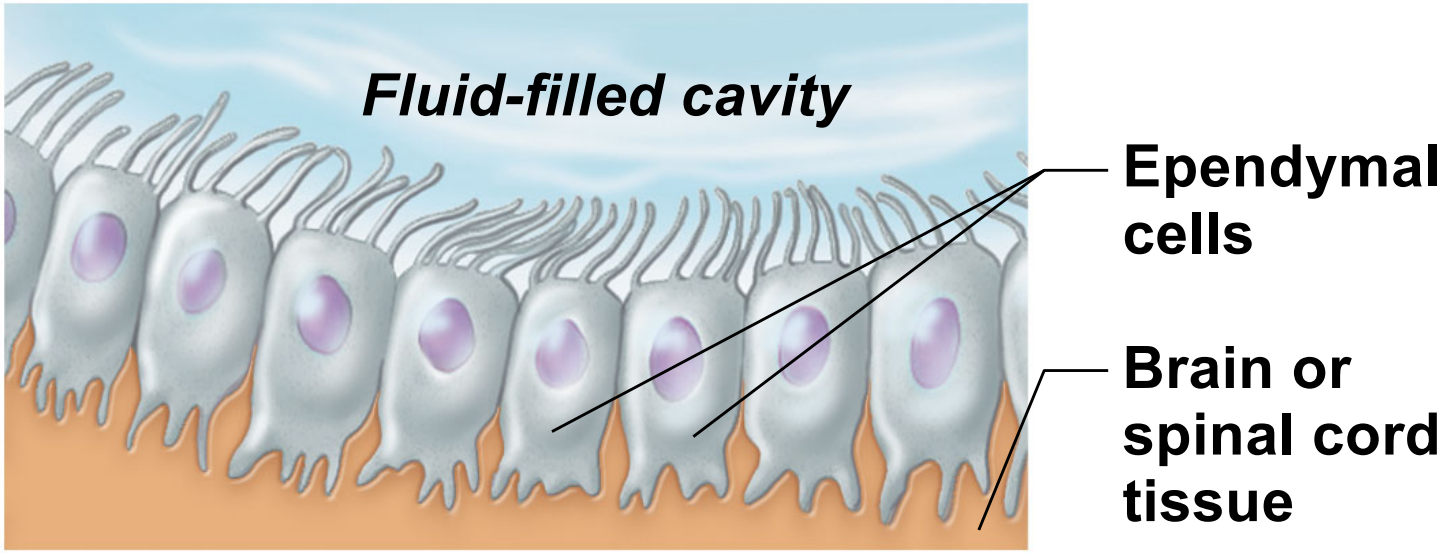




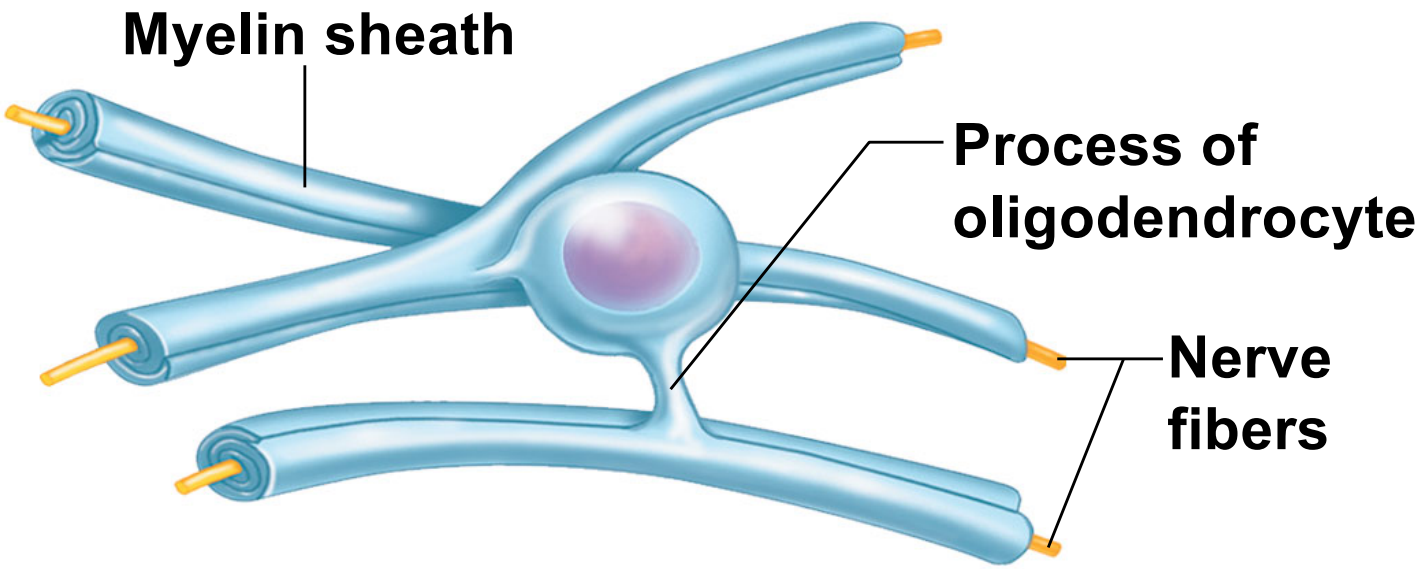
(a) Astrocytes are the most abundant and versatile neuroglia.



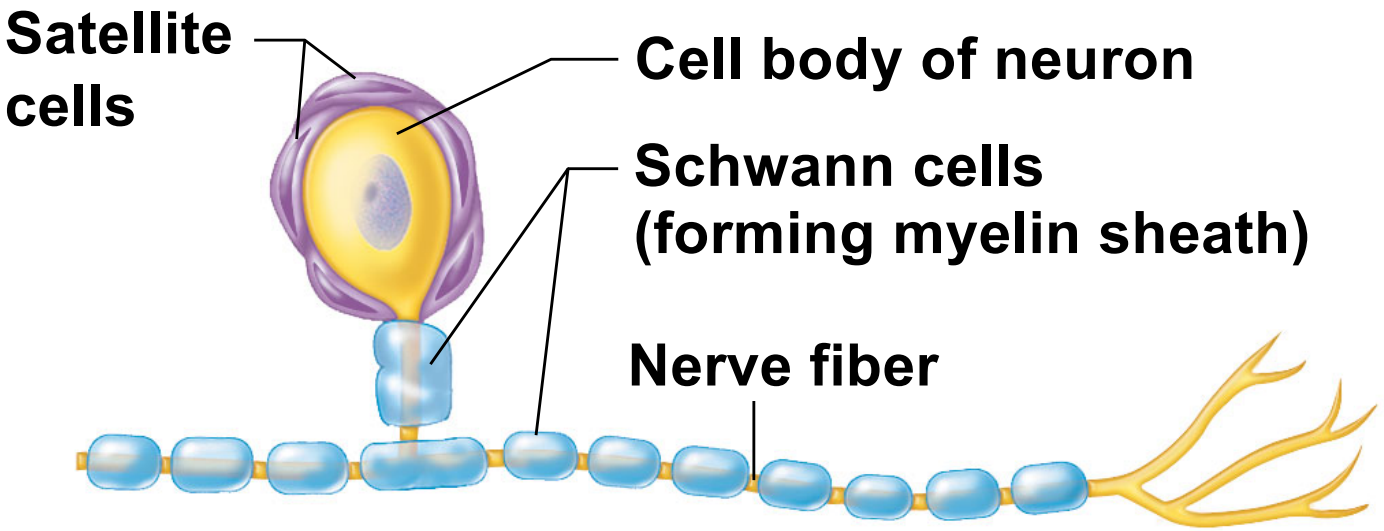
(b) Microglial cells are phagocytes that defend CNS cells.



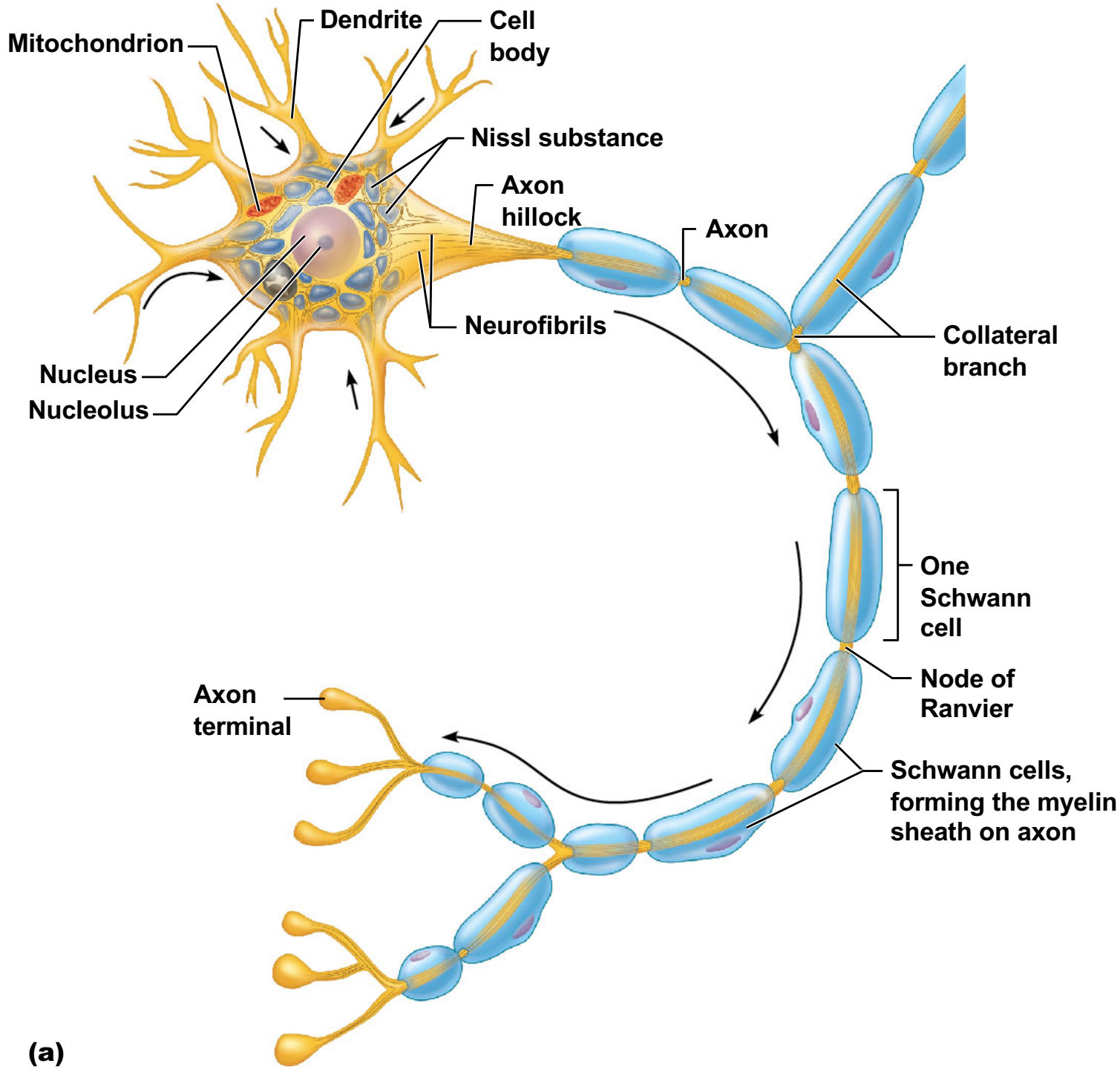
(c) Ependymal cells line cerebrospinal fluid–filled cavities.



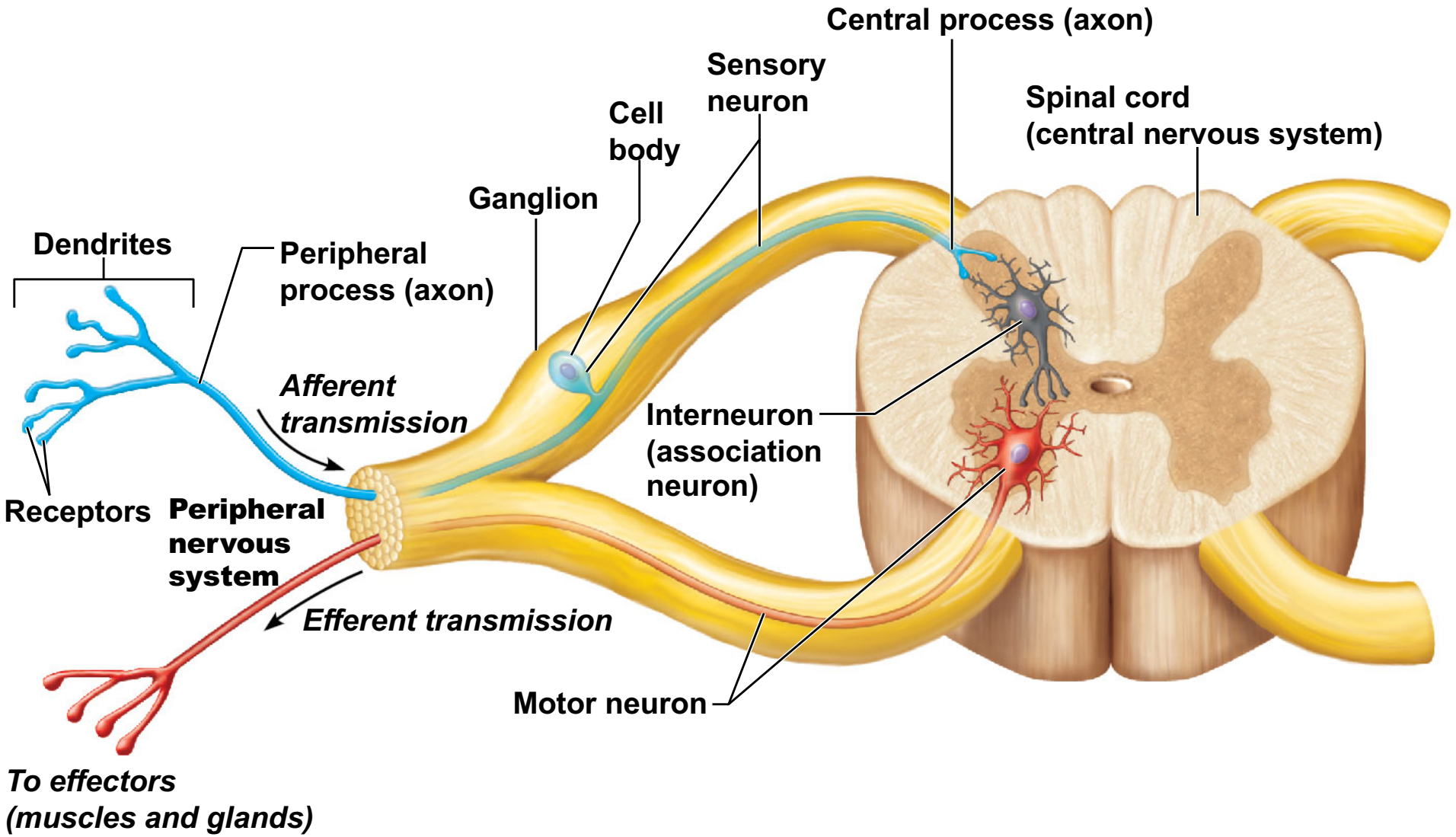
(d) Oligodendrocytes have processes that form myelin sheaths around CNS nerve fibers.

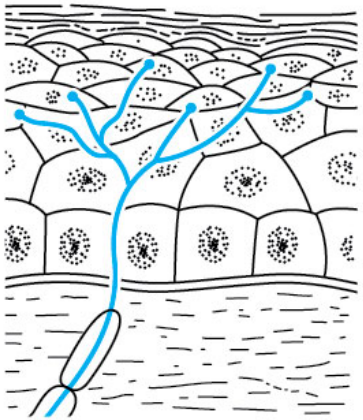


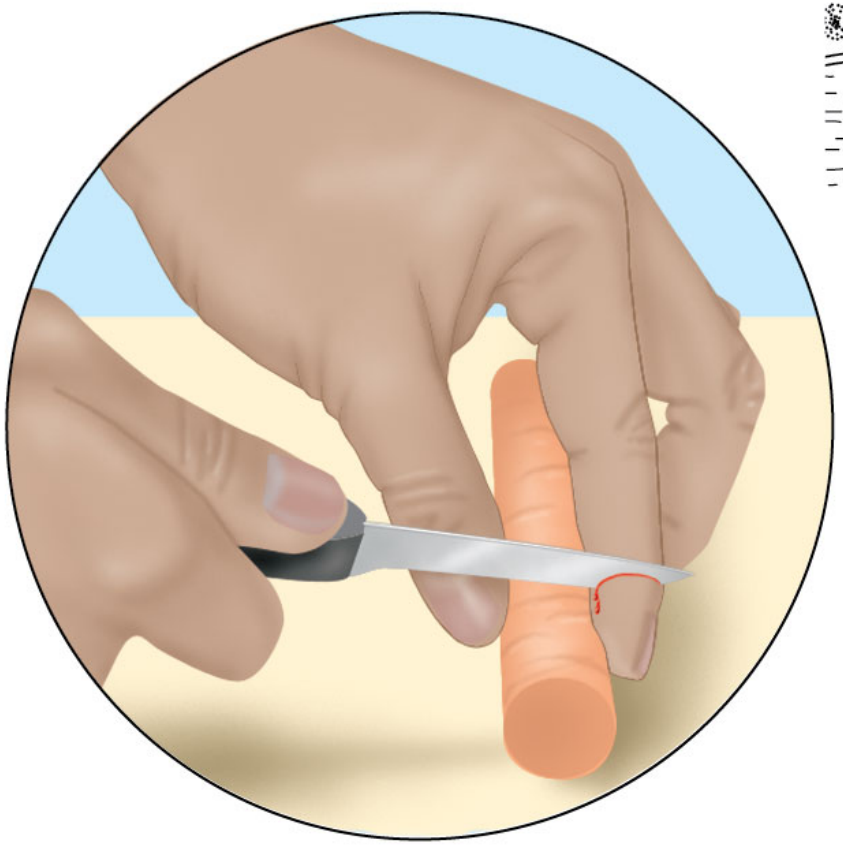
(e) Satellite cells and Schwann cells (which form myelin) surround neurons in the PNS.



(a)

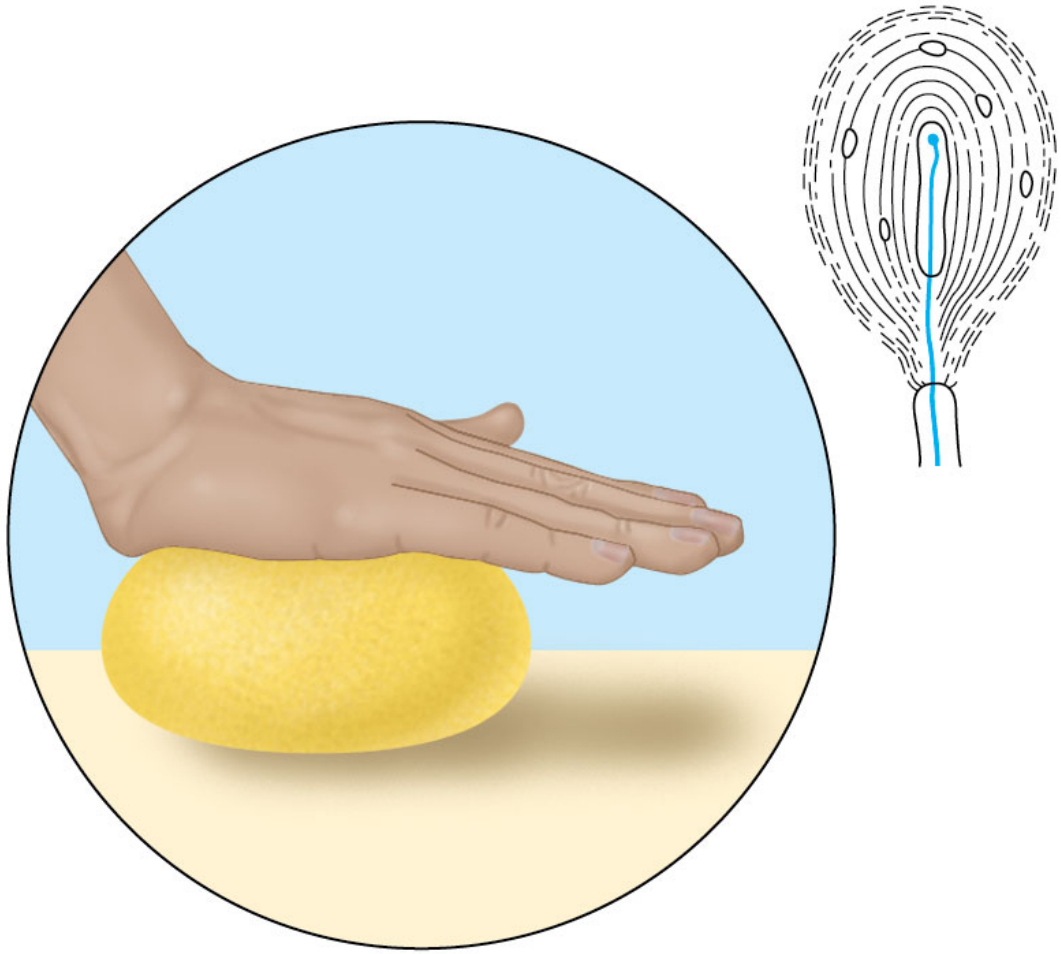




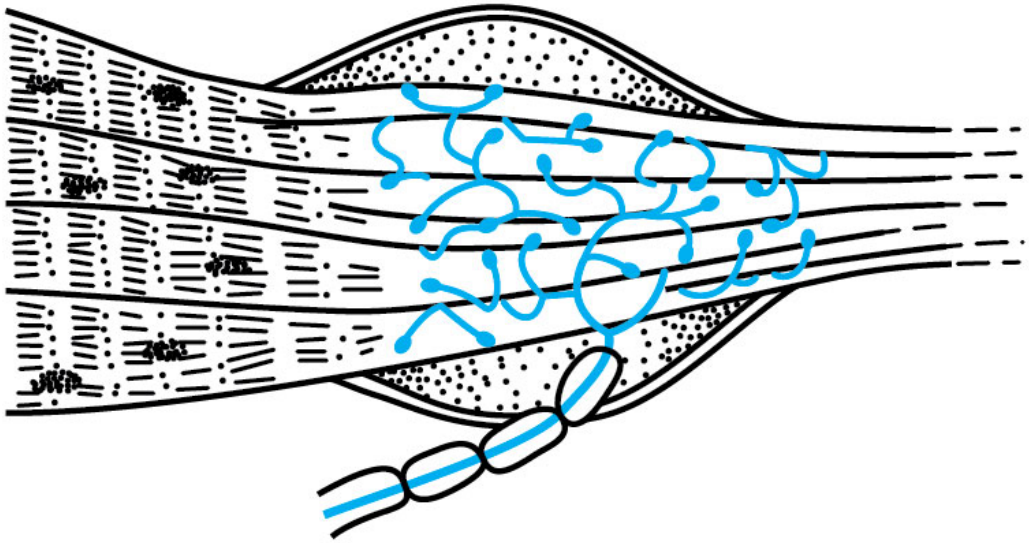


(a) Free nerve endings (pain and temperature receptors)

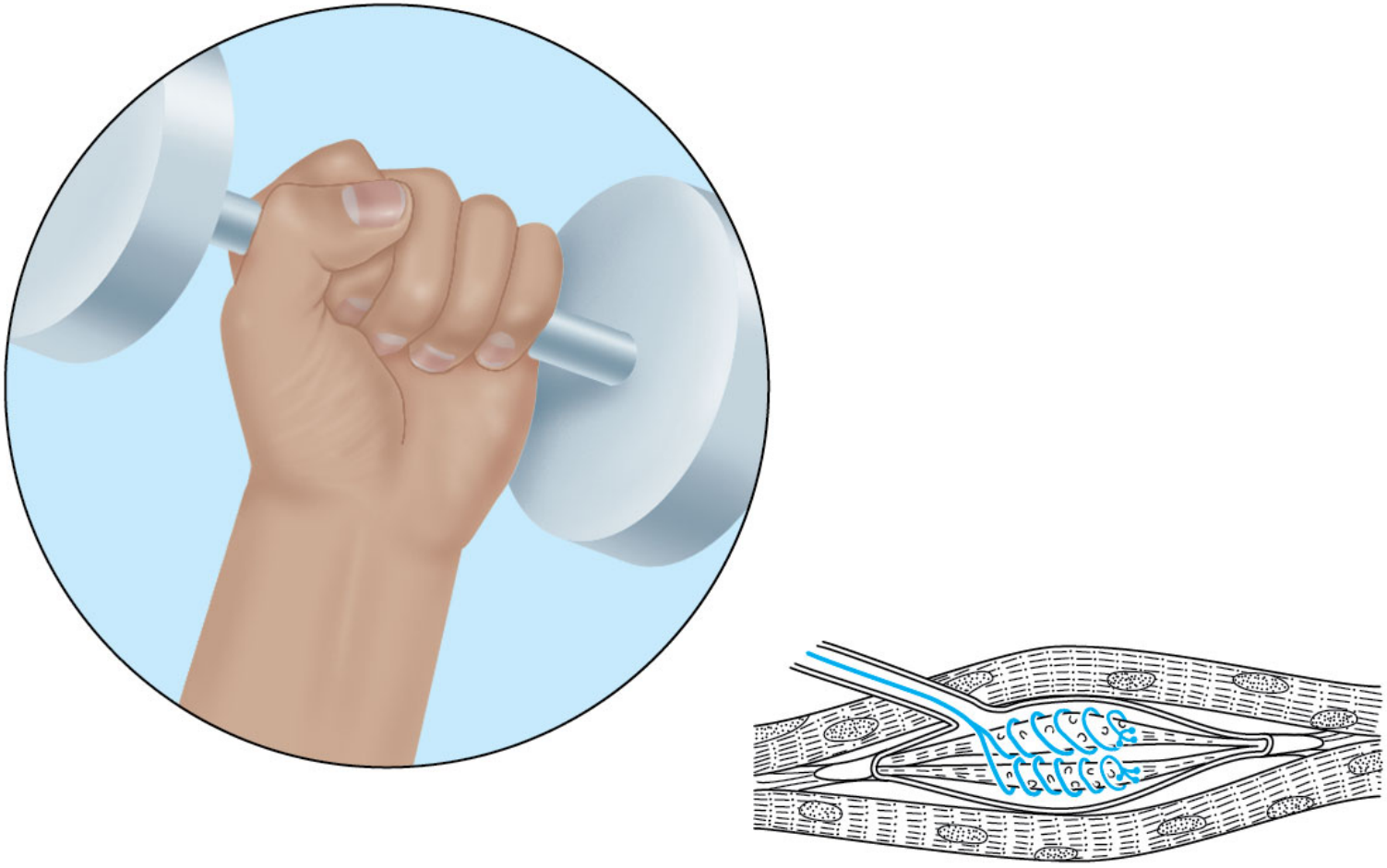
(b) Meissner's corpuscle (touch receptor)



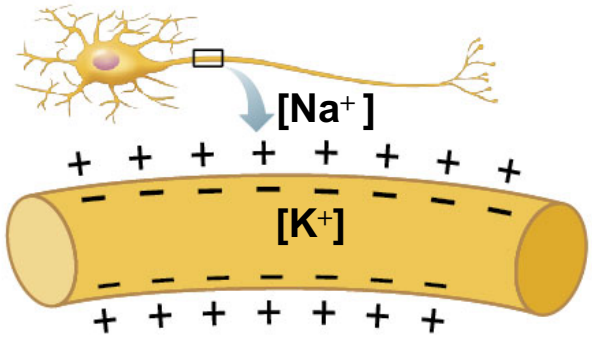
(c) Lamellar corpuscle (deep pressure receptor)



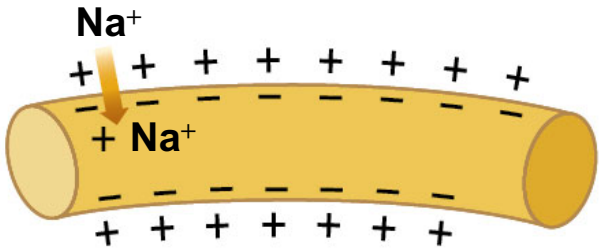
(d) Golgi tendon organ (proprioceptor)



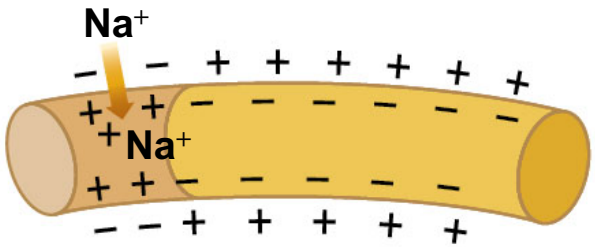
(e) Muscle spindle (proprioceptor)



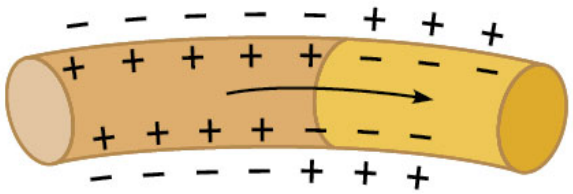
① Resting membrane is polarized. In the resting state, the external face of the membrane is slightly positive; its internal face is slightly negative. The chief extracellular ion is sodium (Na^+), whereas the chief intracellular ion is potassium (K^+). The membrane is relatively impermeable to both ions.



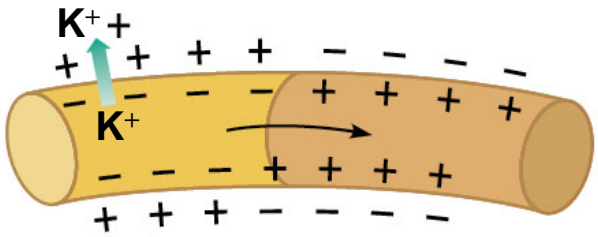
② Stimulus initiates local depolarization. A stimulus changes the permeability of a local "patch" of the membrane, and sodium ions diffuse rapidly into the cell. This changes the polarity of the membrane (the inside becomes more positive; the outside becomes more negative) at that site.



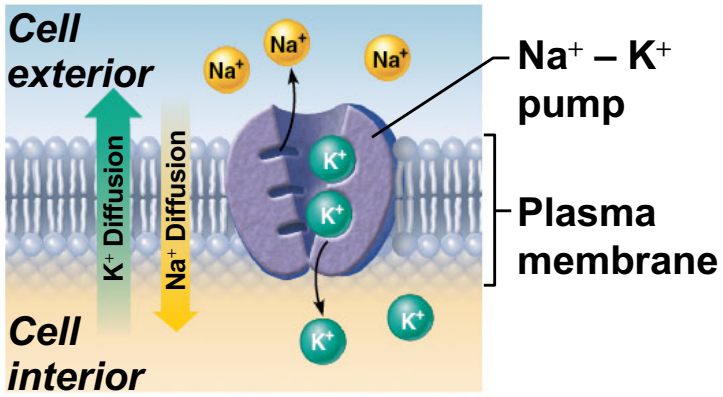
③ Depolarization and generation of an action potential.
If the stimulus is strong enough, depolarization causes membrane polarity to be completely reversed, and an action potential is initiated.



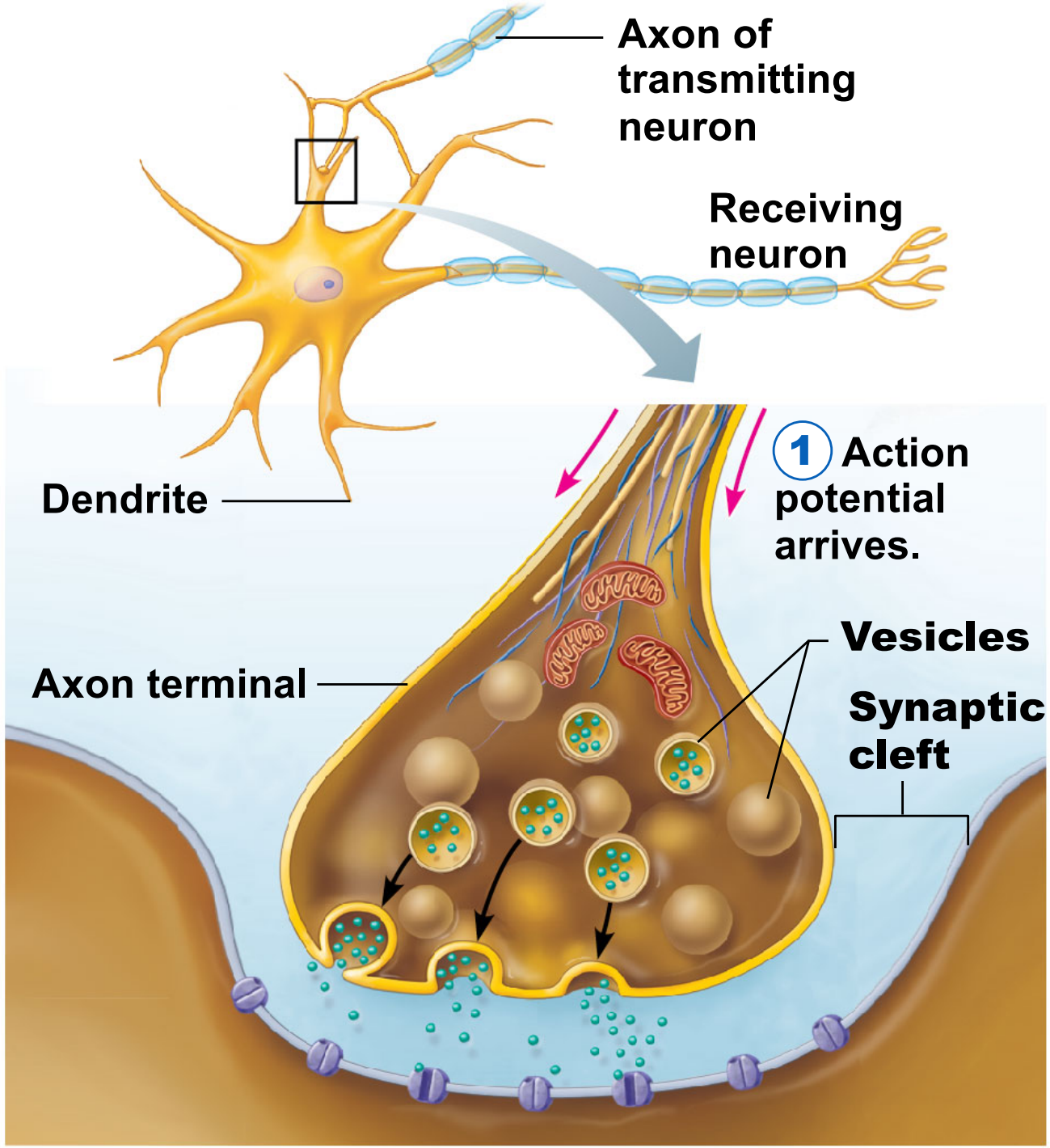
④ Propagation of the action potential. Depolarization of the first membrane patch causes permeability changes in the adjacent membrane, and the events described in step ② are repeated. Thus, the action potential propagates rapidly along the entire length of the membrane.

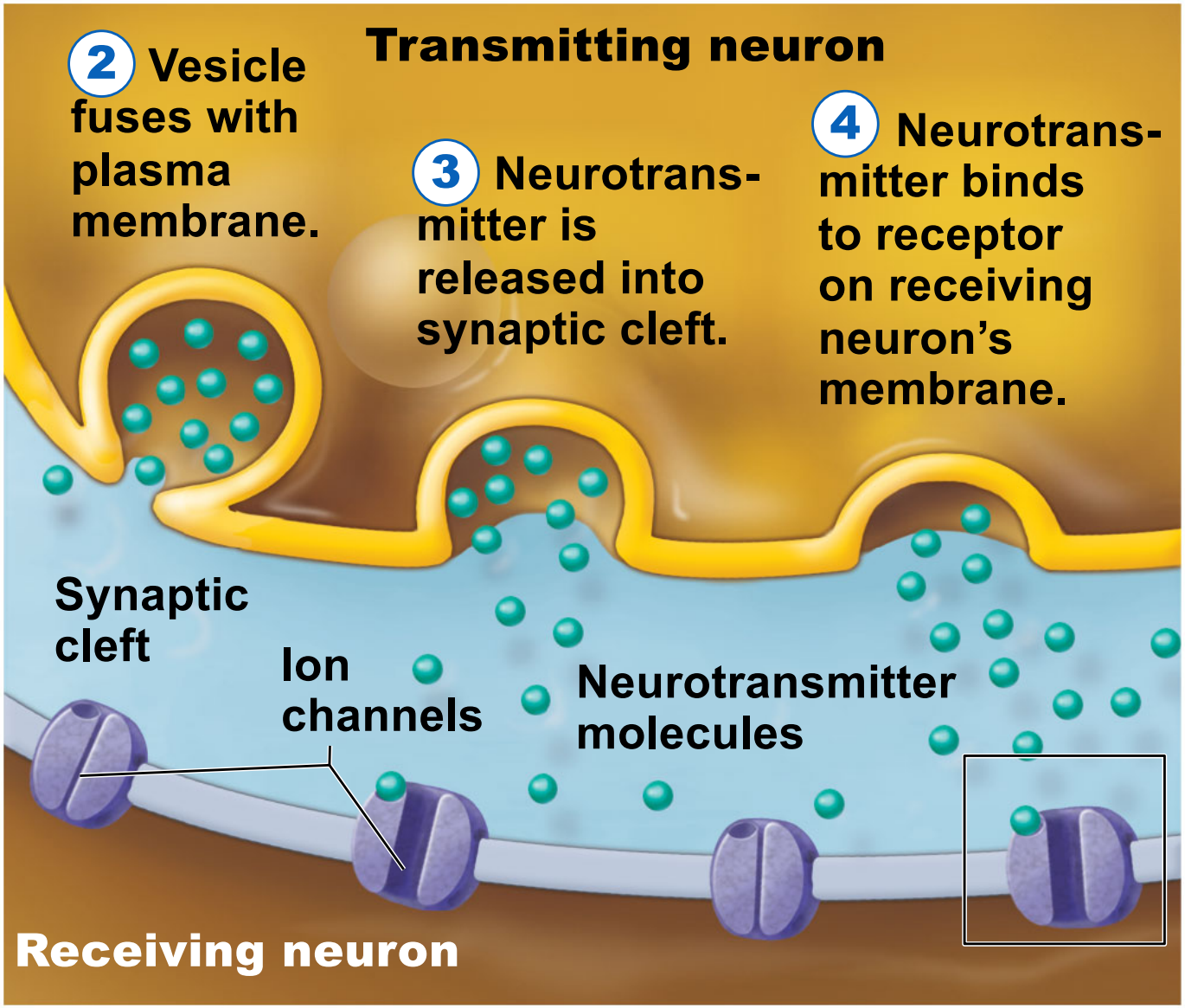


⑤ **Repolarization.** Potassium ions diffuse out of the cell as the membrane permeability changes again, restoring the negative charge on the inside of the membrane and the positive charge on the outside surface. Repolarization occurs in the same direction as depolarization.

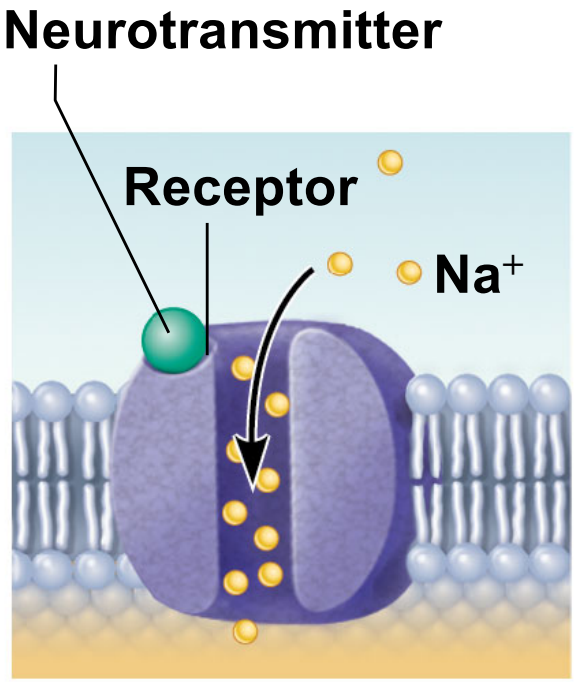


⑥ **Initial ionic conditions restored.** The ionic conditions of the resting state are restored later by the activity of the sodium-potassium pump. Three sodium ions are ejected for every two potassium ions carried back into the cell.



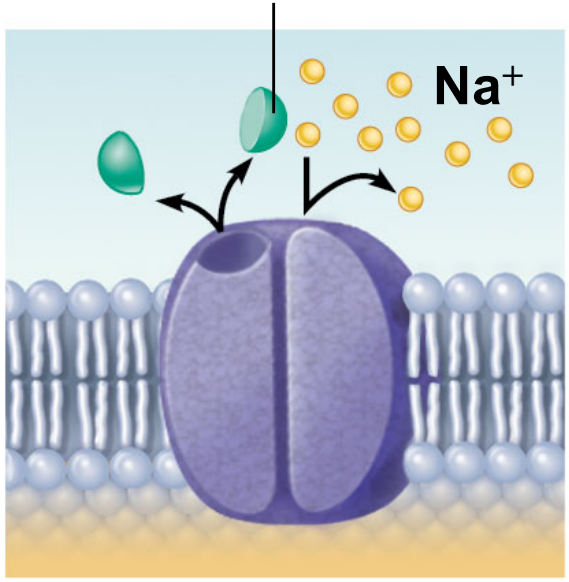


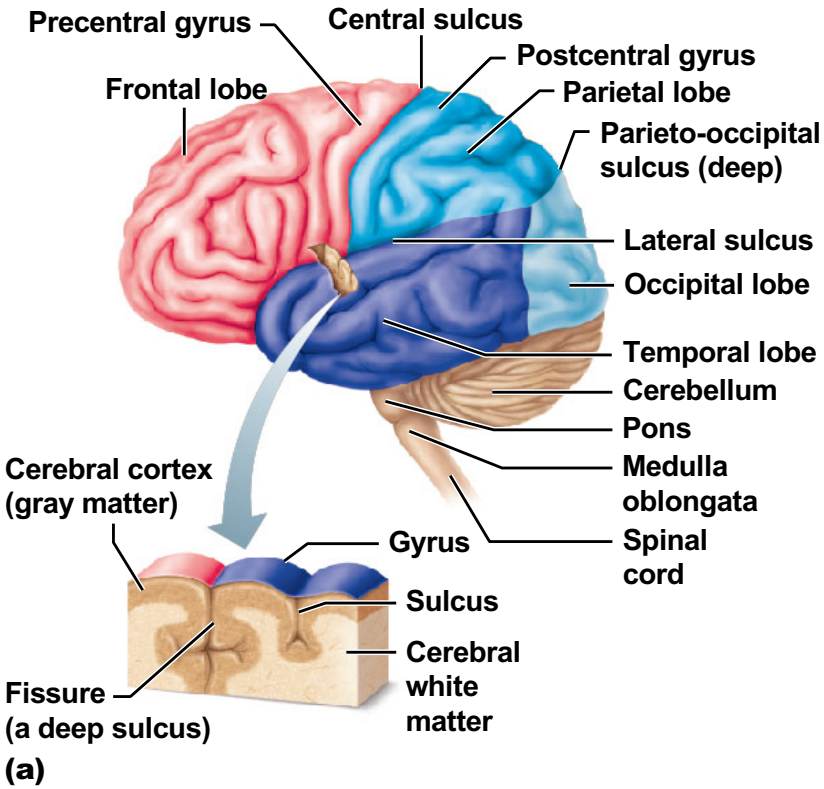
5 Ion channel opens.

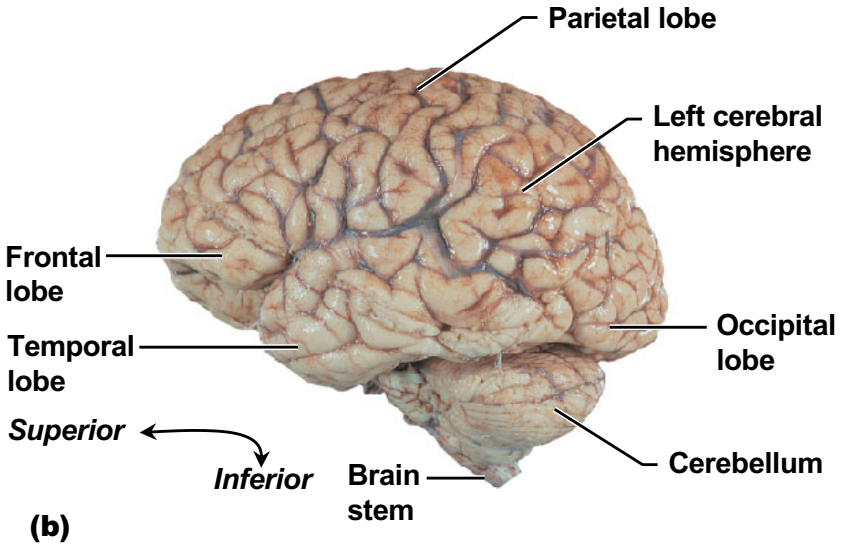


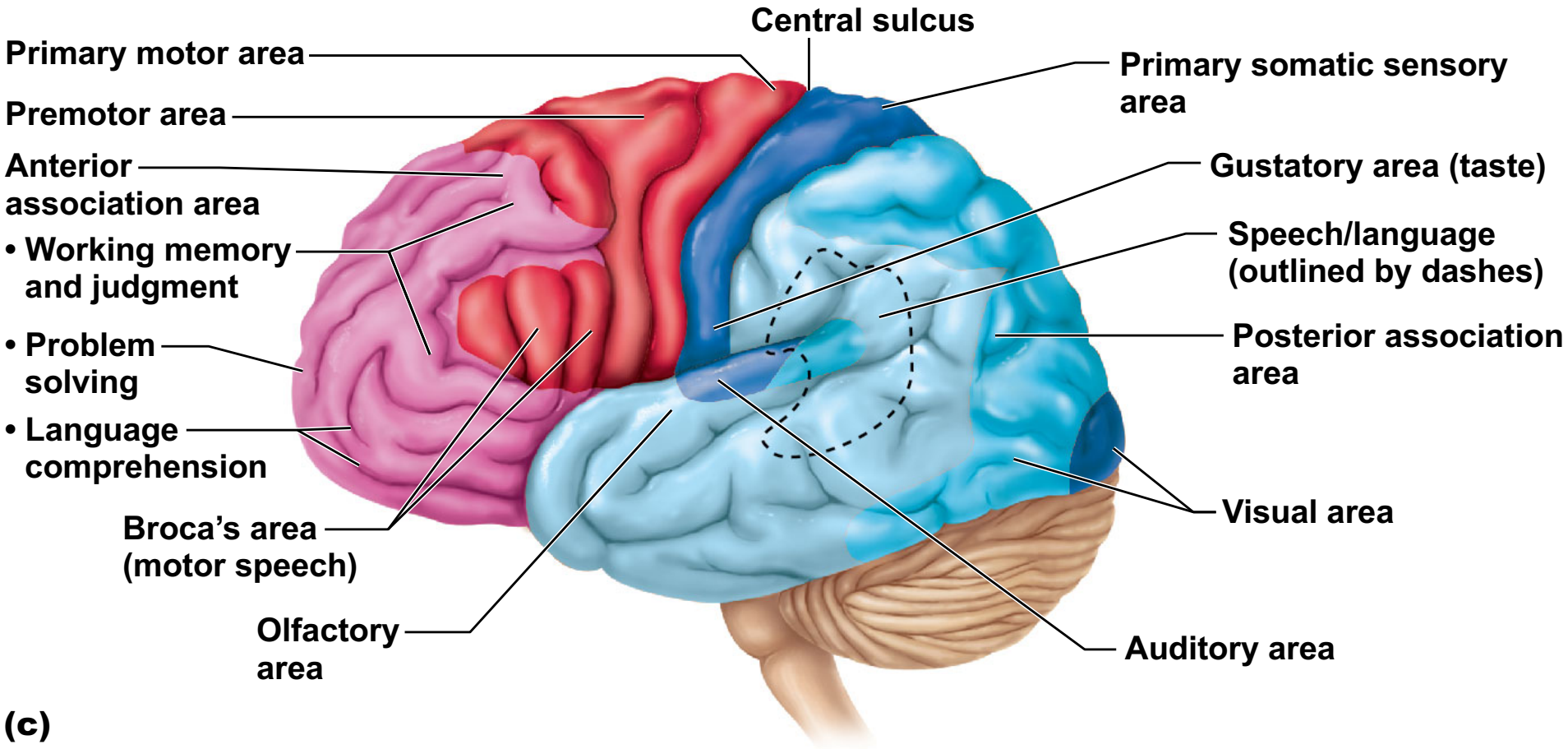
6 **Ion channel closes.**

Neurotransmitter is broken down and released.

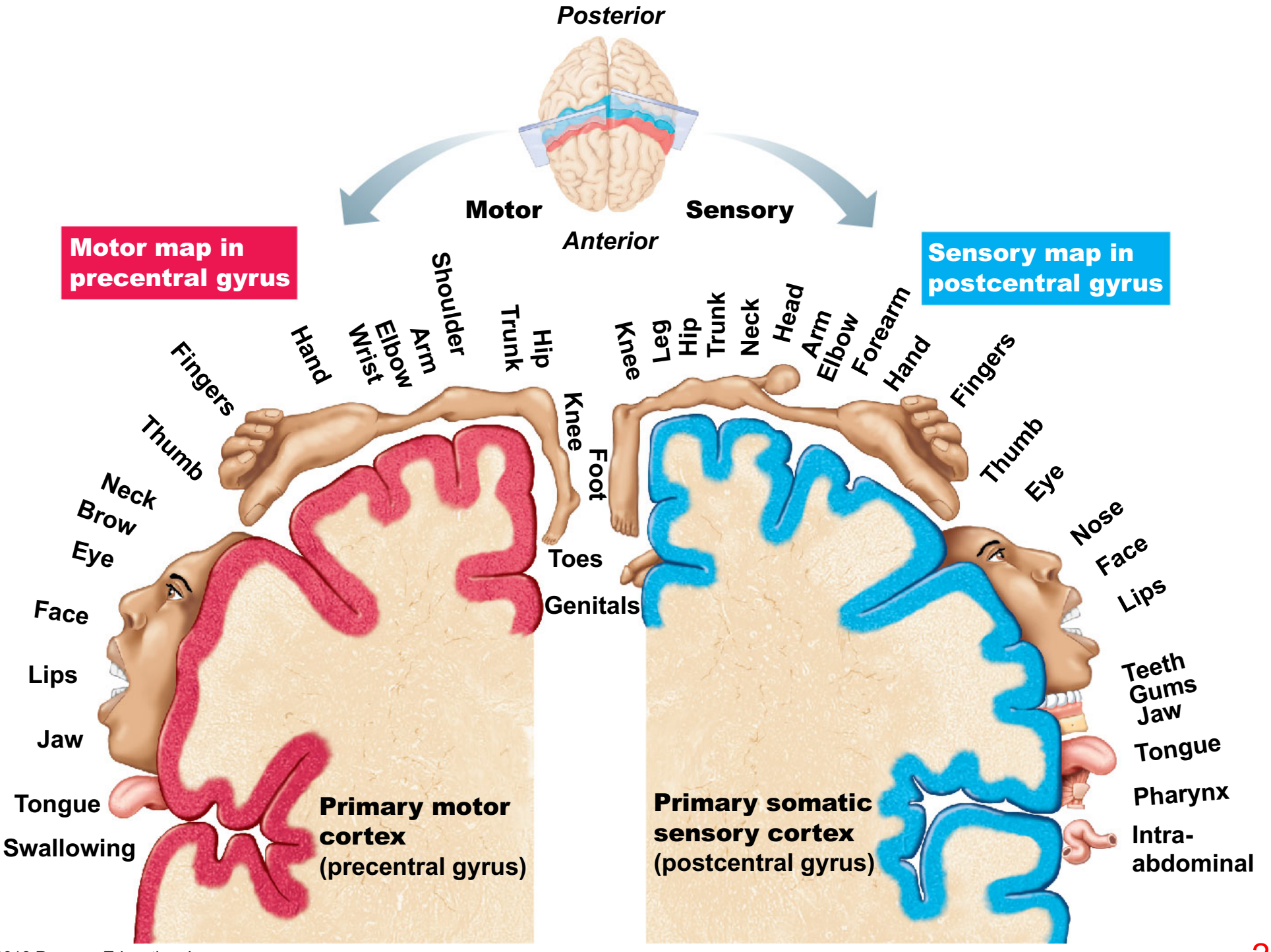


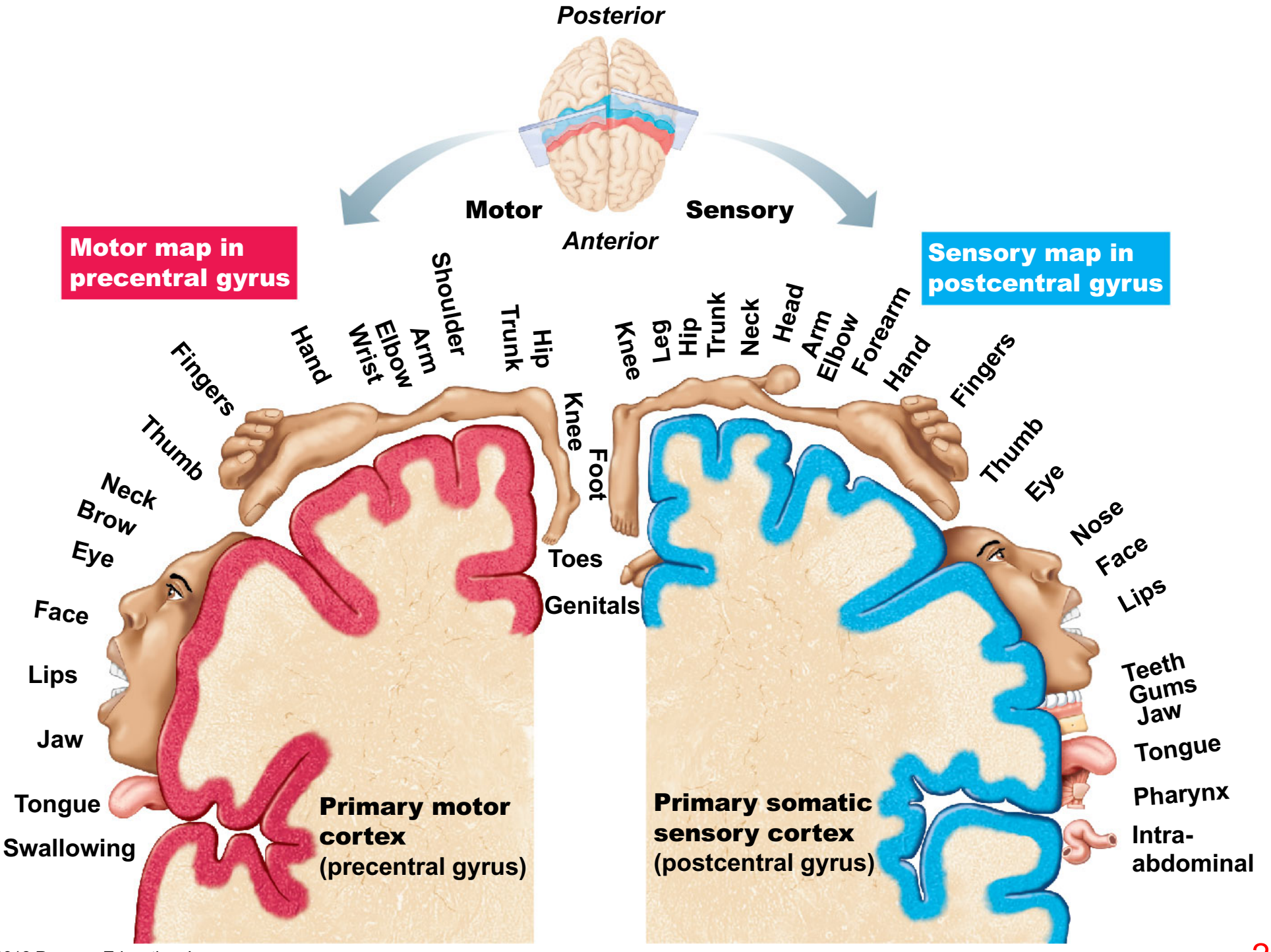


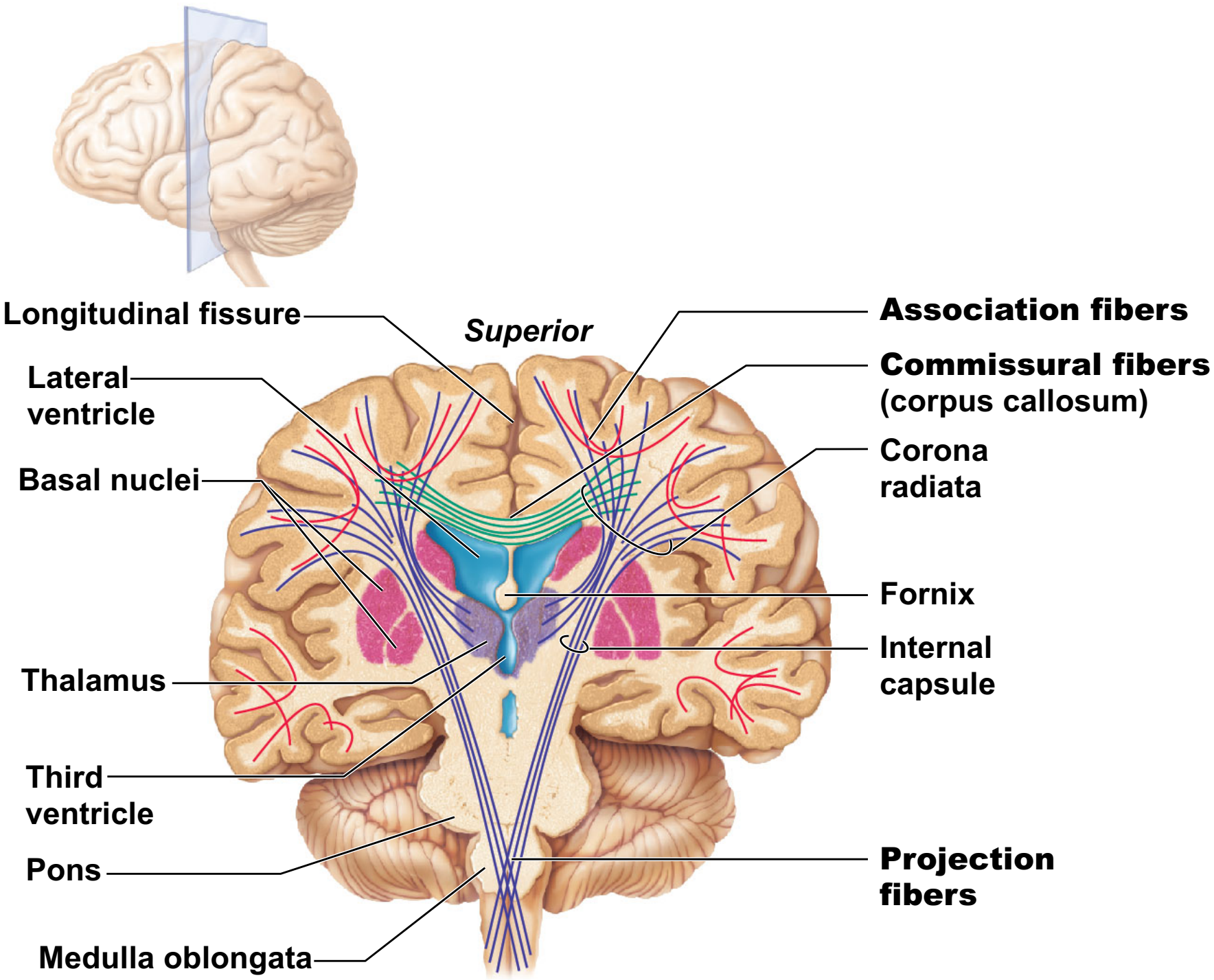


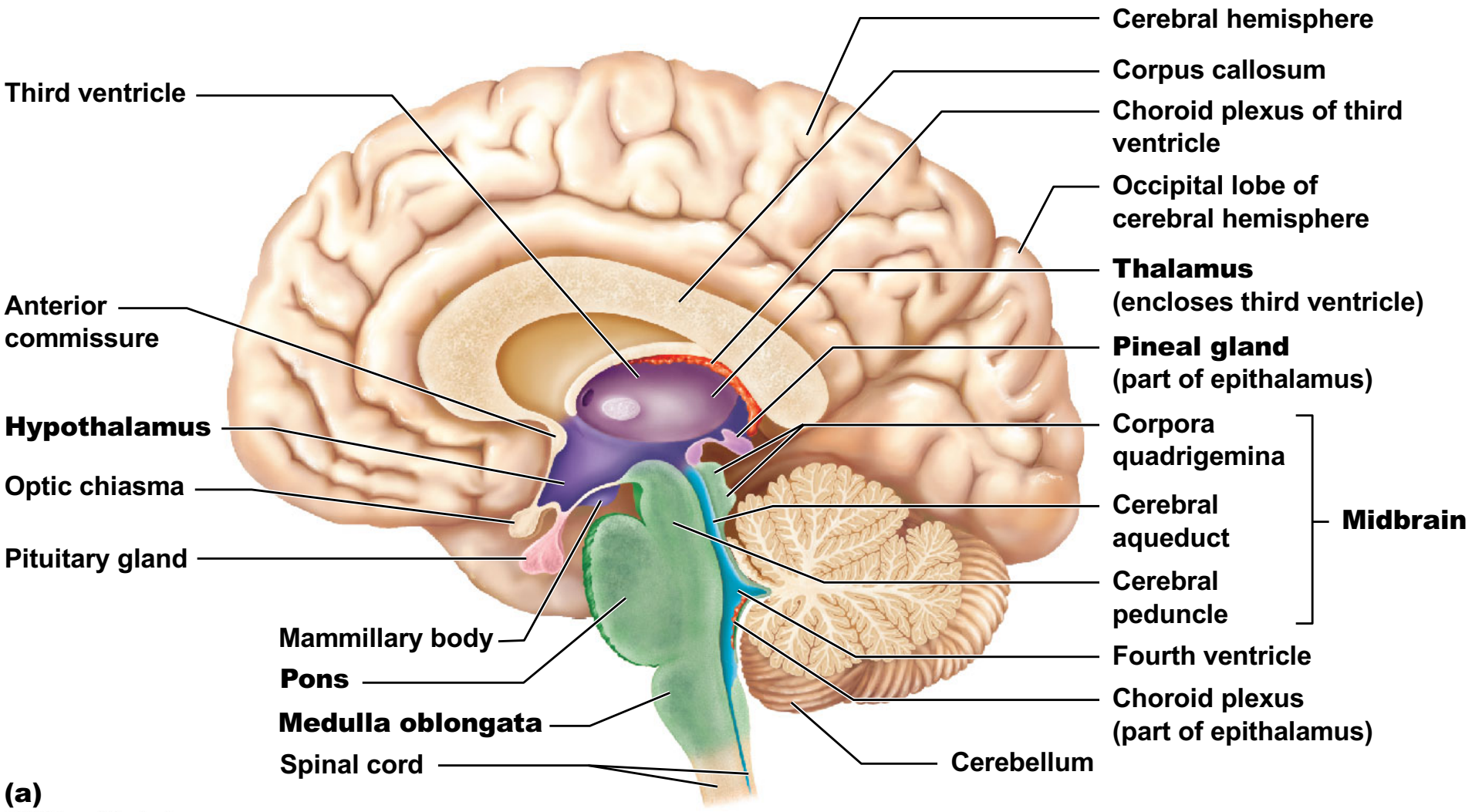


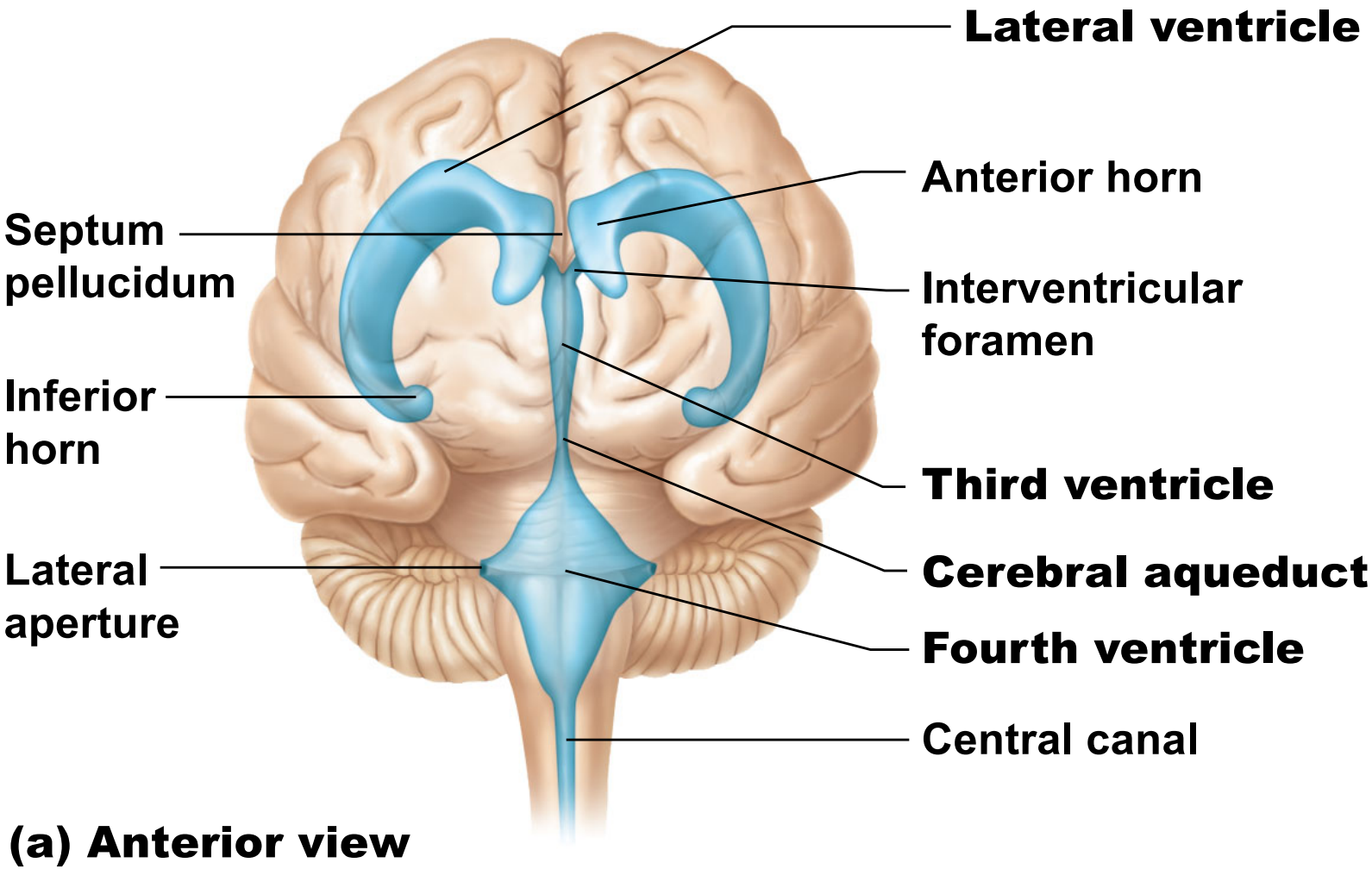
(c)

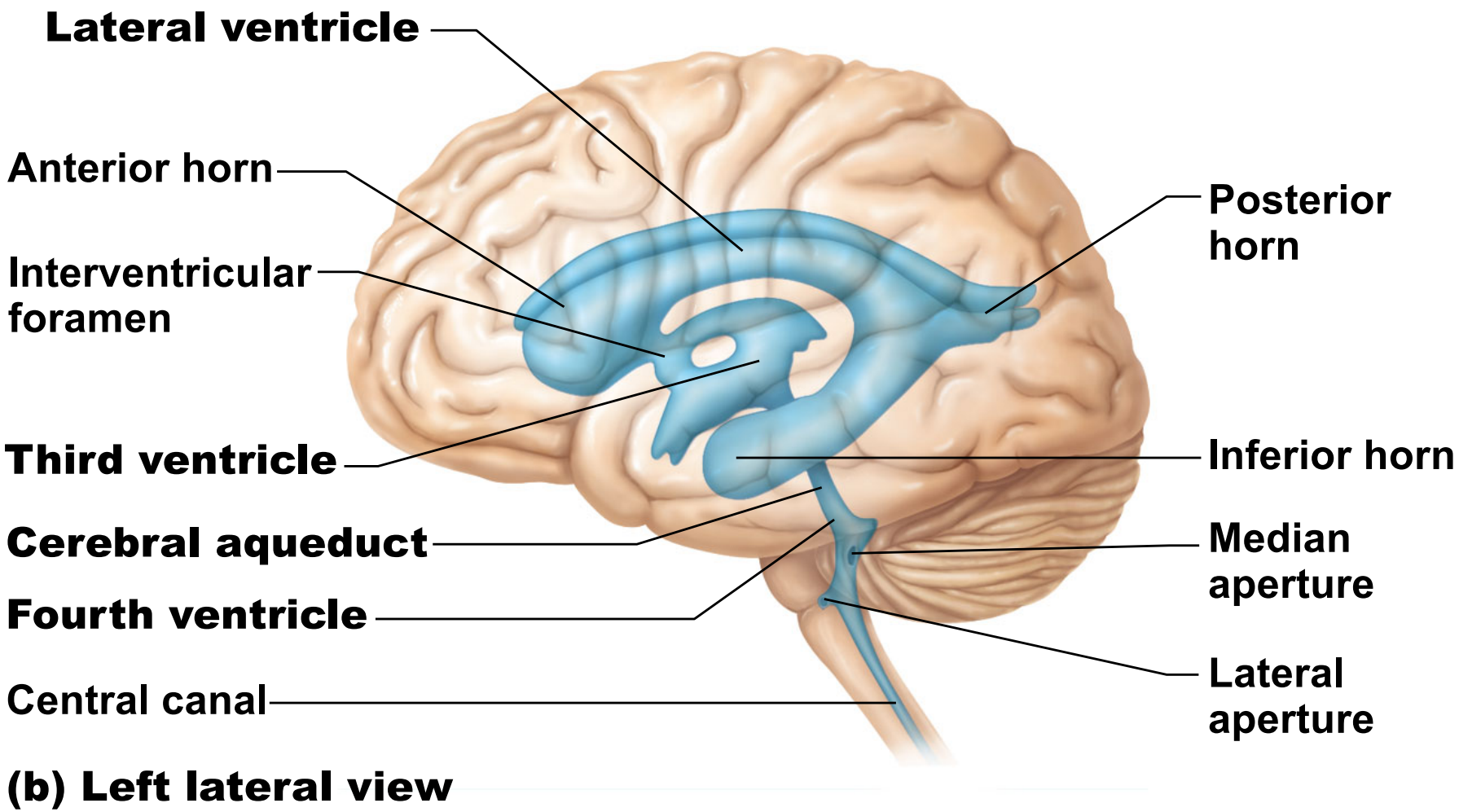


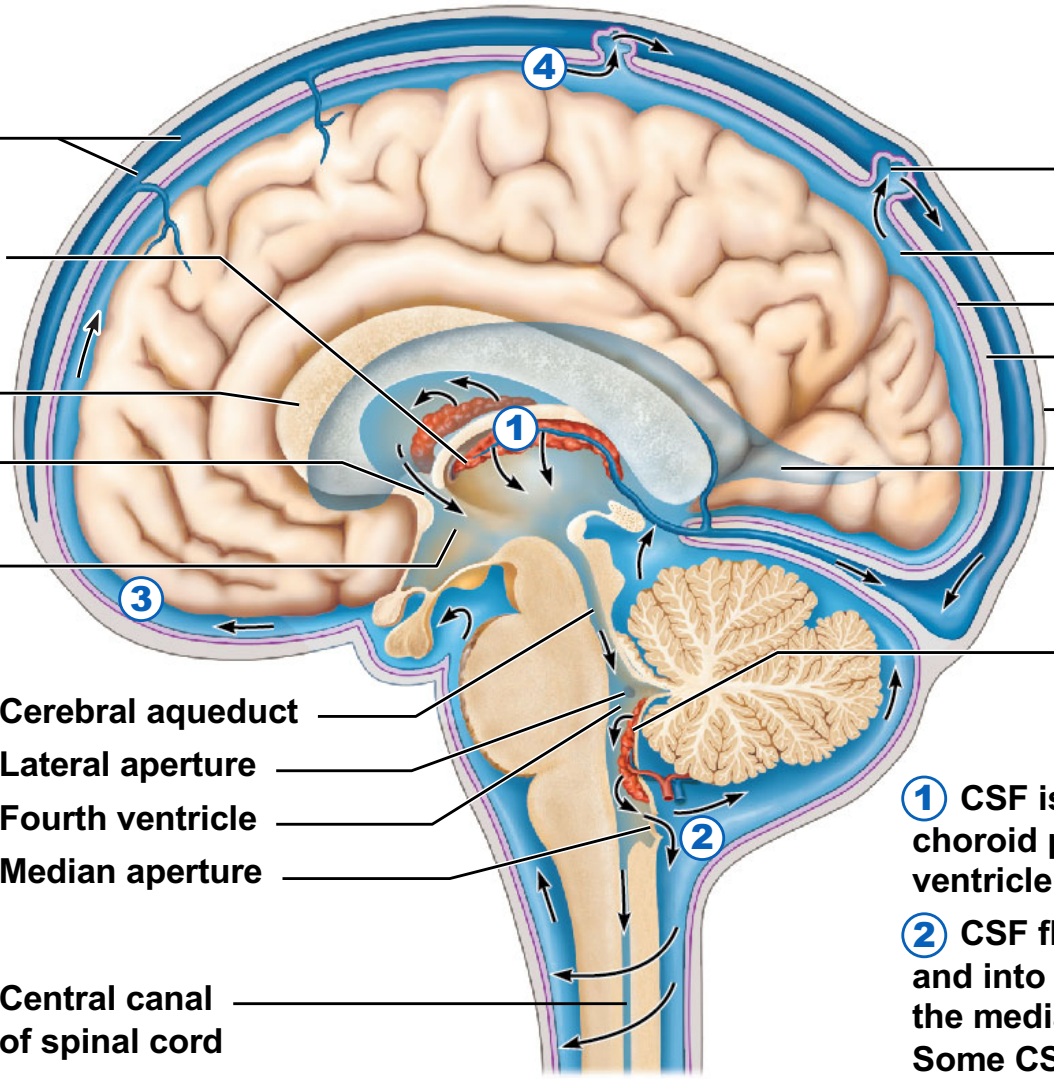












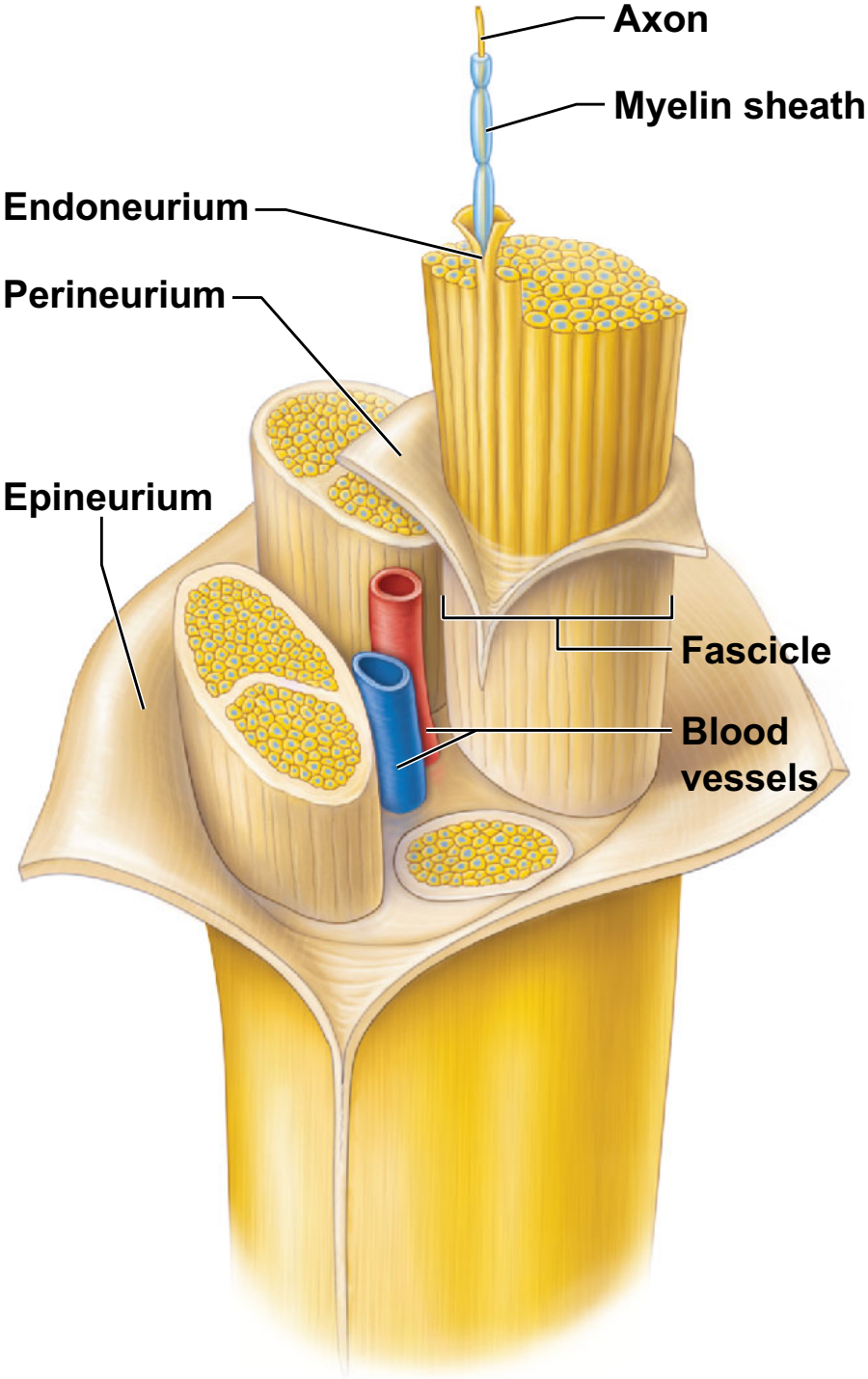
(1) CSF is produced by the choroid plexus of each ventricle.

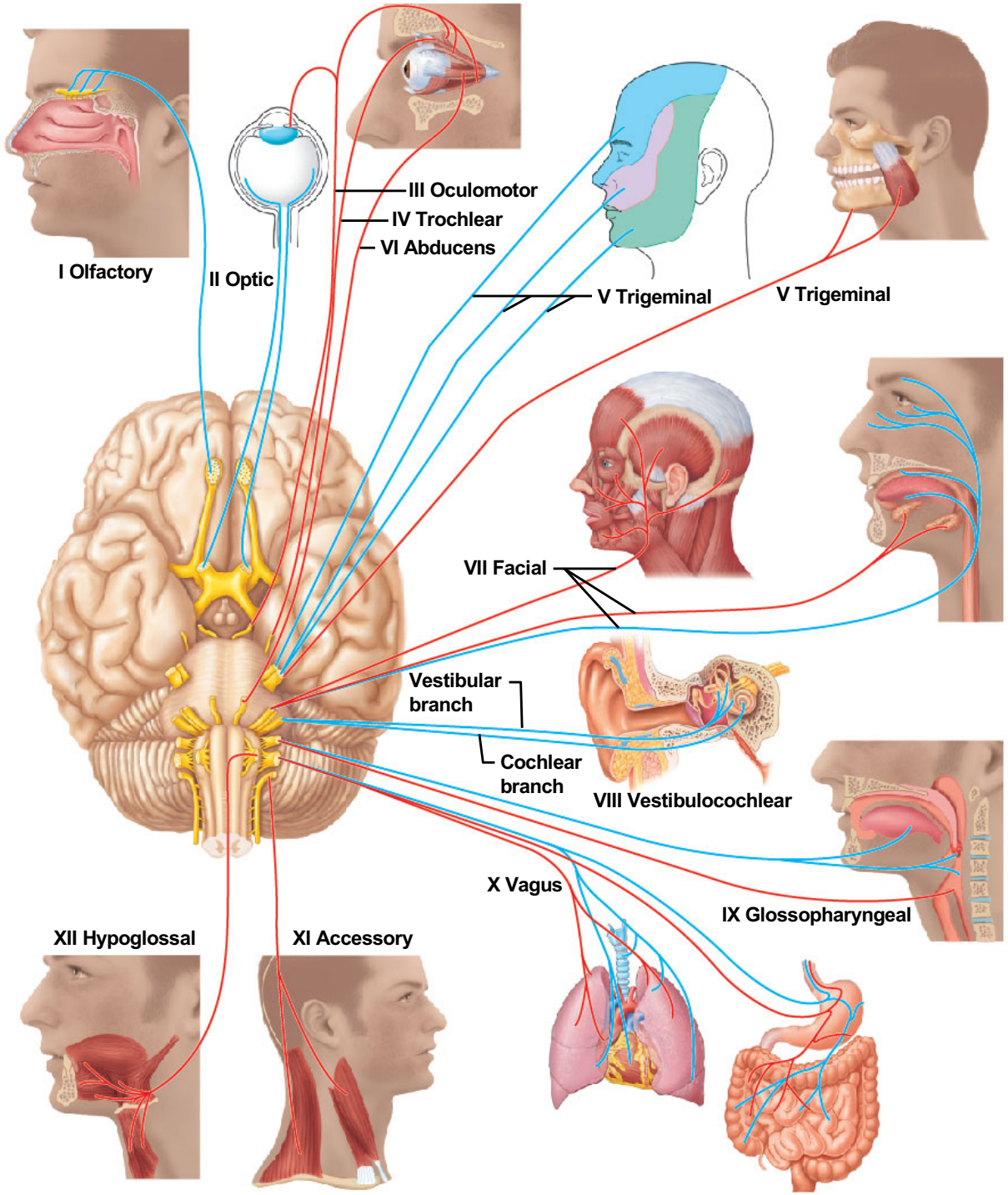
(2) CSF flows through the ventricles and into the subarachnoid space via the median and lateral apertures. Some CSF flows through the central canal of the spinal cord.

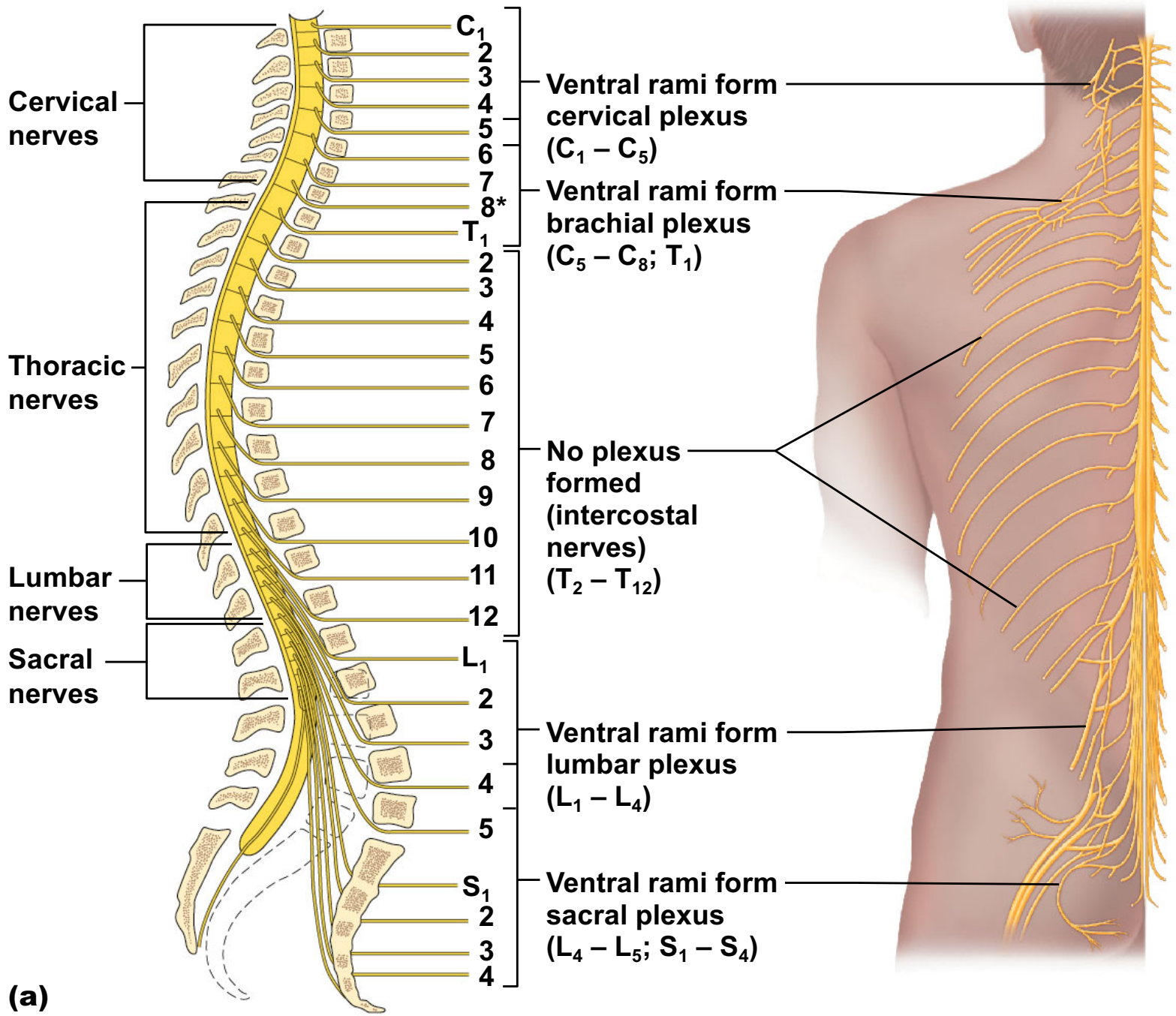
(3) CSF flows through the subarachnoid space.

(4) CSF is absorbed into the dural venous sinuses via the arachnoid granulations.

(c) CSF circulation







(a)

***Note that the cervical nerve C_8 emerges inferior to the C_7 vertebra, while the other seven cervical nerves emerge superior to the vertebrae for which they are named.**