

## CHAPTER FOURTEEN

### Content Review

1. The three structural types of neurons are unipolar (one process extends from the cell body), bipolar (two processes extend from the cell body), and multipolar (three or more processes extend from the cell body). The three functional types of neurons are sensory neurons (afferent, unipolar, and bipolar neurons), interneurons (multipolar neurons that lie entirely within the CNS and carry out integrative functions), and motor neurons (efferent, multipolar neurons).
2. Sensory neurons are called afferent neurons. They are unipolar neurons specialized to detect changes in their environment, such as pressure, heat, light, and chemicals, which they then transmit to the CNS.
3. Astrocytes are the most numerous and largest glial cells in the CNS. They help form the blood-brain barrier, regulate tissue fluid composition, strengthen and reinforce the nervous tissue in the CNS, replace damaged neurons, and assist with neuronal development. Ependymal cells and nearby blood capillaries form the choroid plexus, which produces CSF. The ependymal cells have patches of cilia on their apical surfaces that help circulate the CSF. Microglia are small phagocytic cells that wander through the CNS and phagocytize cellular debris from dead nervous tissue, microorganisms, waste products, and other foreign matter. Oligodendrocytes myelinate the axons in the CNS. Satellite cells, located in the PNS, separate peripheral nervous system neuron cell bodies from their surrounding interstitial fluid and regulate the continuous exchange of nutrients and waste products between peripheral neurons and their environment. Neurolemmocytes myelinate the axons in the PNS.
4. Oligodendrocytes form the myelin sheath in the CNS; neurolemmocytes form it in the PNS. Each oligodendrocyte can myelinate several small portions of different axons in the CNS; however, each neurolemmocyte can only myelinate a small portion of one axon in the PNS.
5. A PNS axon may repair itself through a process called Wallerian degeneration. After an axon in the PNS is severed, neurolemmocytes form a regeneration tube. The axon stump puts out several sprouts until one finds its way into the tube. The regeneration tube guides the growing axon back to its original destination until the axon reaches the cells with which it originally connected.
6. Individual axons in the PNS are surrounded by neurolemmocytes and then wrapped in a delicate layer of loose connective tissue called the endoneurium. Groups of axons are wrapped into bundles, called nerve fascicles, by a cellular connective tissue layer called the perineurium. All of the fascicles are bundled together by a superficial dense irregular connective tissue covering termed the epineurium.
7. Neurons are nerve cells. An axon is a process extending from the neuron's cell body. A nerve is a bundle of many parallel PNS axons, their myelin sheaths, and successive wrappings of connective tissue.
8. Electrical synapses permit direct physical contact between presynaptic and postsynaptic cells. They are connected by a gap junction, which allows ion flow between the cells. In a chemical synapse, the most common type in humans, a neurotransmitter passes between the presynaptic and postsynaptic cells.

9. In a converging circuit, a single postsynaptic neuron receives input from several presynaptic neurons. In a parallel-after-discharge circuit, several neurons or neuronal pools process the same information at one time. A single presynaptic neuron stimulates different groups of neurons, each of which passes the nerve impulse along a pathway that ultimately synapses with a common postsynaptic cell.
10. In the early embryo, a thickened region of ectoderm called the neural plate forms. During the process of neurulation, the neural plate grows, extends neural folds, and forms a neural tube. The neural tube develops into the central nervous system.