

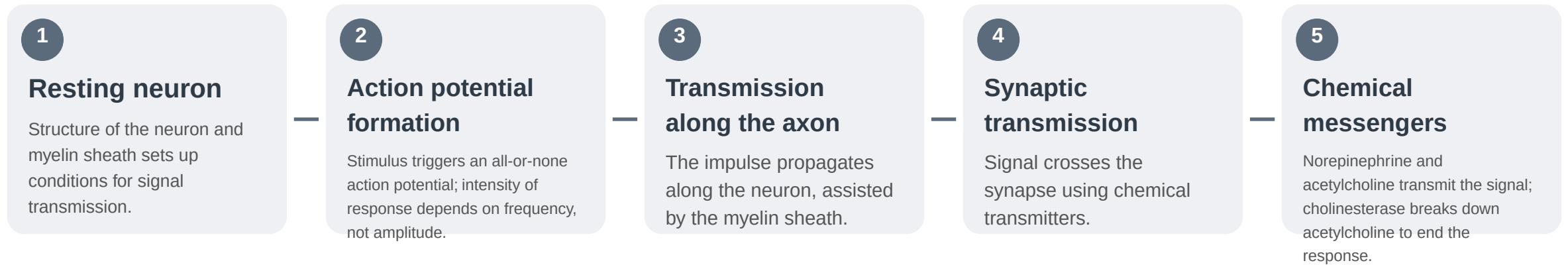
The Nervous System

Biology 30, Unit A: Equilibrium and Systems

Unit Overview and Learning Outcomes

- The nervous system contributes to homeostasis through its response to internal and external stimuli.
- Students will explain how the nervous system controls physiological processes.
- This unit builds on Biology 20, Unit D: Human Systems, and Science 10, Unit C: Cycling of Matter in Living Systems.
- Key concepts include neurons, nerve impulse transmission, reflex arcs, and sensory receptors.
- Unit A occupies approximately 25 percent of instructional time in Biology 30.

The Neuron and the Nerve Impulse



Organizing the Nervous System

Central nervous system

Cerebral hemispheres and lobes, cerebellum, pons, medulla oblongata, hypothalamus, and spinal cord regulate voluntary and involuntary processes.

Peripheral nervous system

Sympathetic and parasympathetic divisions, along with the sensory-somatic nervous system, carry signals to and from the CNS.

Reflex arcs

Neurons organize into nerves and reflex arcs, illustrated by the patellar and pupillary reflexes.

The eye

Cornea, lens, sclera, choroid, retina, rods and cones, fovea centralis, pupil, iris, and optic nerve each perform a distinct function in vision.

The ear

Pinna, auditory canal, tympanum, ossicles, cochlea, organ of Corti, auditory nerve, semicircular canals, and Eustachian tube support hearing and balance.

Other senses

Olfactory receptors, proprioceptors, taste receptors, and skin receptors provide additional information about the environment and spatial orientation.

Nervous and Endocrine Systems Working Together

The stress response and the adrenal gland

The nervous and endocrine systems act together to maintain homeostasis. A stressful stimulus is detected and processed rapidly by the nervous system, which then signals the adrenal gland to release hormones that sustain the body's response over a longer period. Comparing the two control systems highlights differences in speed, duration, and mechanism of action, while showing how they complement each other in coordinating a whole-body response.

Bringing It Together

This unit examined how the nervous system detects stimuli and coordinates rapid responses through neurons, action potentials, and synaptic transmission, how the CNS and PNS organize these responses, how reflex arcs, the eye, the ear, and other receptors sense the environment, and how the nervous system interacts with the endocrine system to maintain homeostasis.

If the myelin sheath along a neuron were damaged, as occurs in some neurological disorders, how would this affect the speed and reliability of nerve impulse transmission?