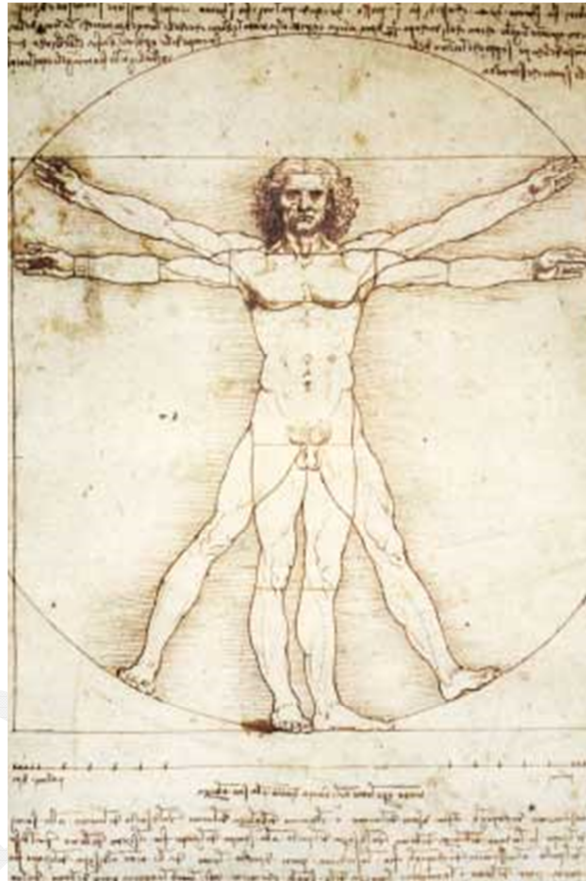




**RTD EXAM PREP**

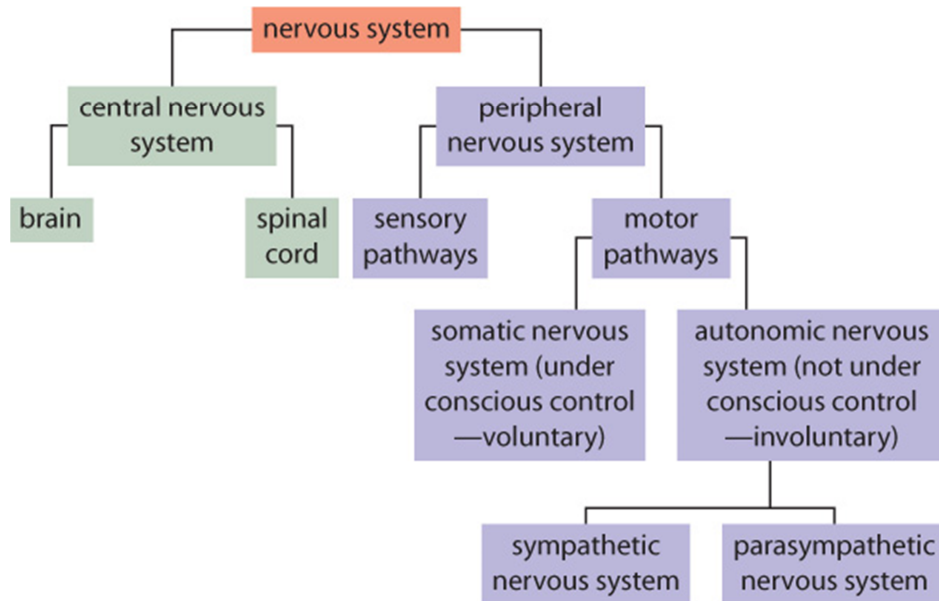


# **Booklet A**

**Nervous & Endocrine Systems**

**(General Outcomes A1 & A2)**

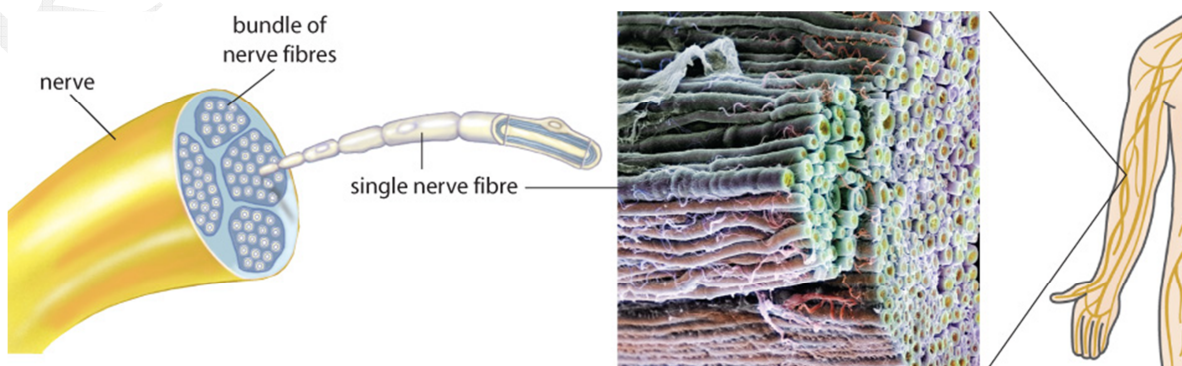
## THE NERVOUS SYSTEM



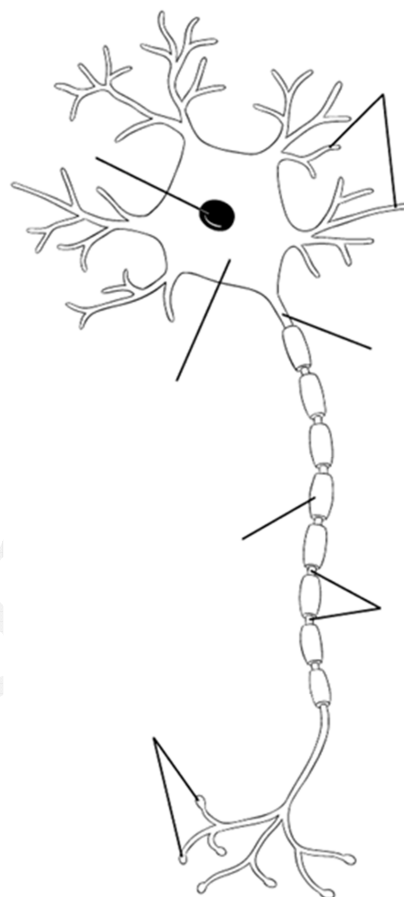
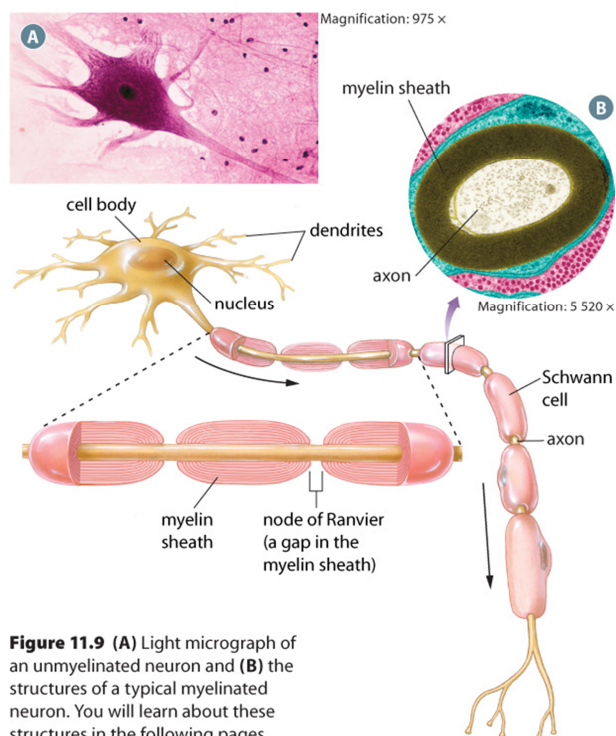
Through specialized cells called **neurons**, the nervous system receives and interprets information from the internal and external environments and produces a response that allows the organism to maintain **homeostasis**.

Neurons produces an electrochemical signal called an impulse or **action potential** that travels in one direction.

A nerve is a bundle of neurons:



## Neuron Anatomy



**Dendrites:** receiving information

**Cell Body (Soma):** contains the major cell organelles and cytoplasm

**Axon:** conduct nerve impulses away from the cell body to the target cells. Axons of larger diameter, conduct impulses faster.

**Myelin Sheath:** insulates the axon, thereby speeding up transmission and saving the neuron energy. Myelinated nerves are referred to as **white matter** (unmyelinated = **gray matter**).

The myelin sheath in the peripheral nervous system is composed of **Schwann cells** that form the **neurilemma** (a delicate membrane that promotes the regeneration of damaged axons).

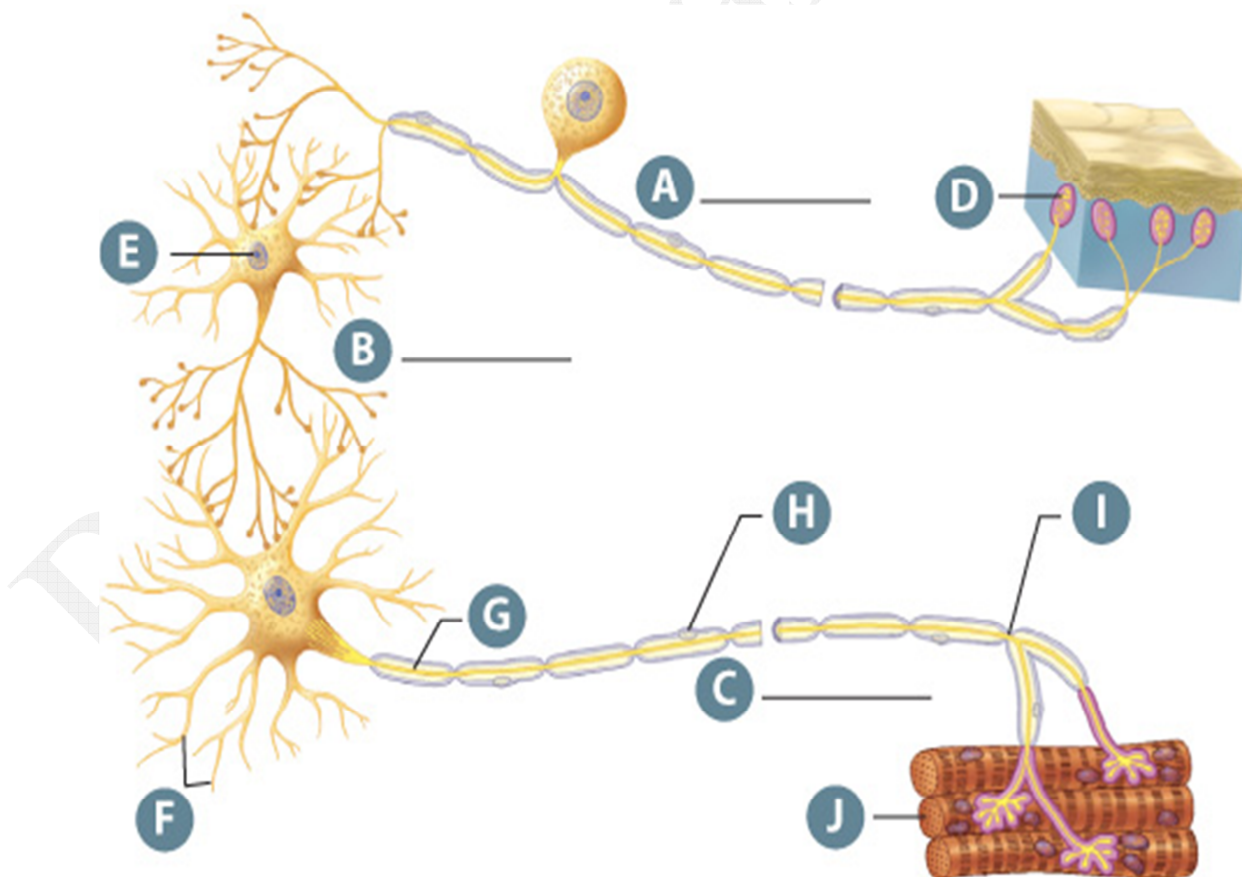
**Nodes of Ranvier:** spaces located between the myelin sheath where impulses “jump” from node to node (**saltatory conduction**).

**Terminal branches:** end with **axon bulbs (synaptic knobs or end plates)** that contain vesicles that secrete neurotransmitters need to bridge the **synapse** (region between neurons).

Note: the point where a neuron comes in contact with a muscle is called a neuromuscular junction.

## Types of Neurons & Neural Pathways

1. **Receptors:** modified dendrites of a sensory neuron that are activated by environmental stimuli and generate action potentials
2. **Sensory neurons:** carry action potentials to the CNS
3. **Interneurons:** interpret or integrate the information
4. **Motor neurons:** carry action potentials to the effectors
5. **Effectors:** muscles, glands, organs etc. that help the organism respond to the stimulus



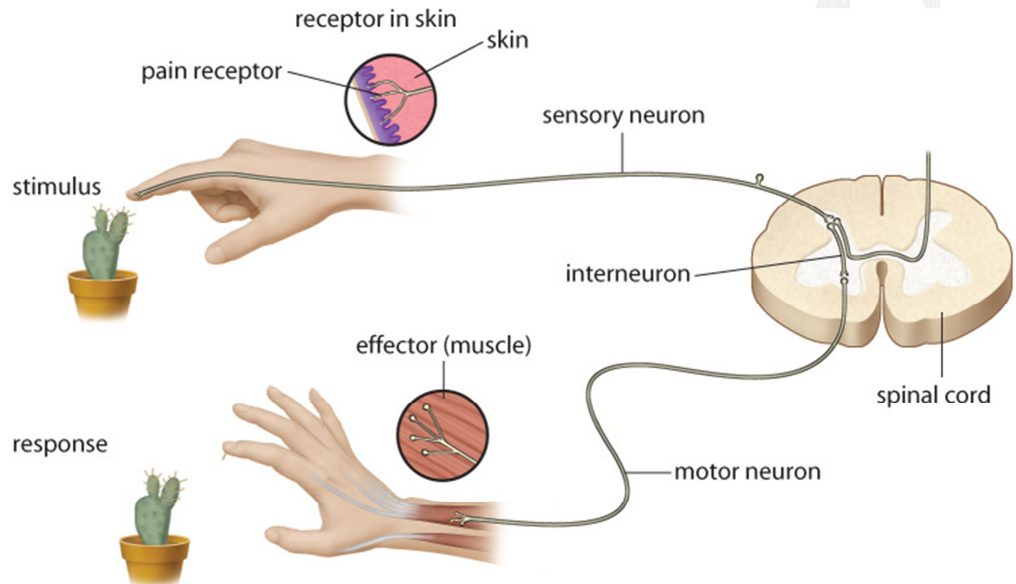


## Reflexes

Motor neurons are activated by conscious control from the brain or by an involuntary response called a **reflex**. Reflexes bypass interpretation by the brain (**reflex arc**) and allow your body to quickly and involuntarily respond to the stimuli. Interpretation by interneurons requires time and this can be detrimental in times of an emergency like when you accidentally touch a cactus needle.

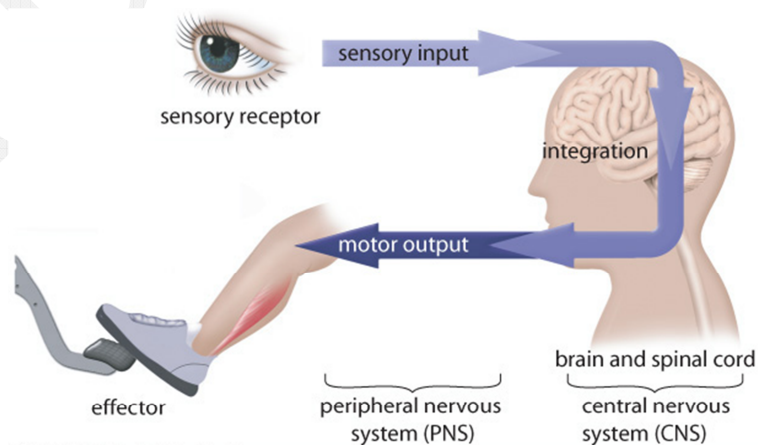
The arc contains five essential parts:

1. Receptor
2. sensory neuron
3. interneuron of spinal cord
4. motor neuron
5. effector



By the time your brain interprets the information, the effector has already responded.

Note: reflexes differ from learned responses:



**Figure 11.7** An overview of the neurons in a nerve impulse pathway