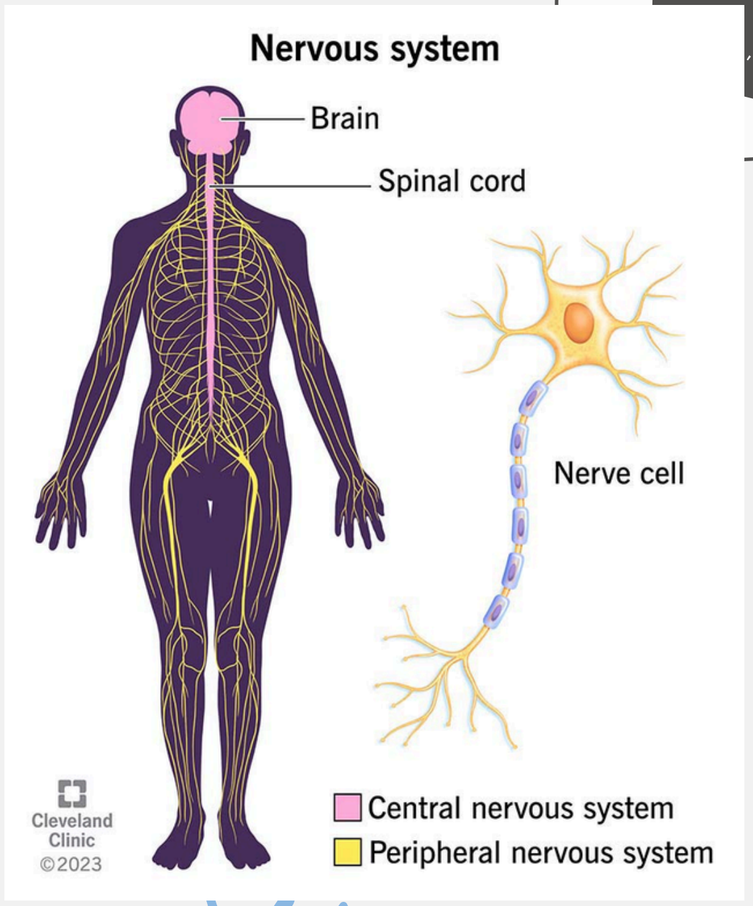
The Role of the Nervous System

Biology 12 – Chapter 11.1

The purpose of Nervous System

The nervous system helps all the parts of the body to communicate with each other. It also reacts to changes both outside and inside the body. The nervous system uses both electrical and chemical means to send and receive messages. Sends messages through **neurons**.

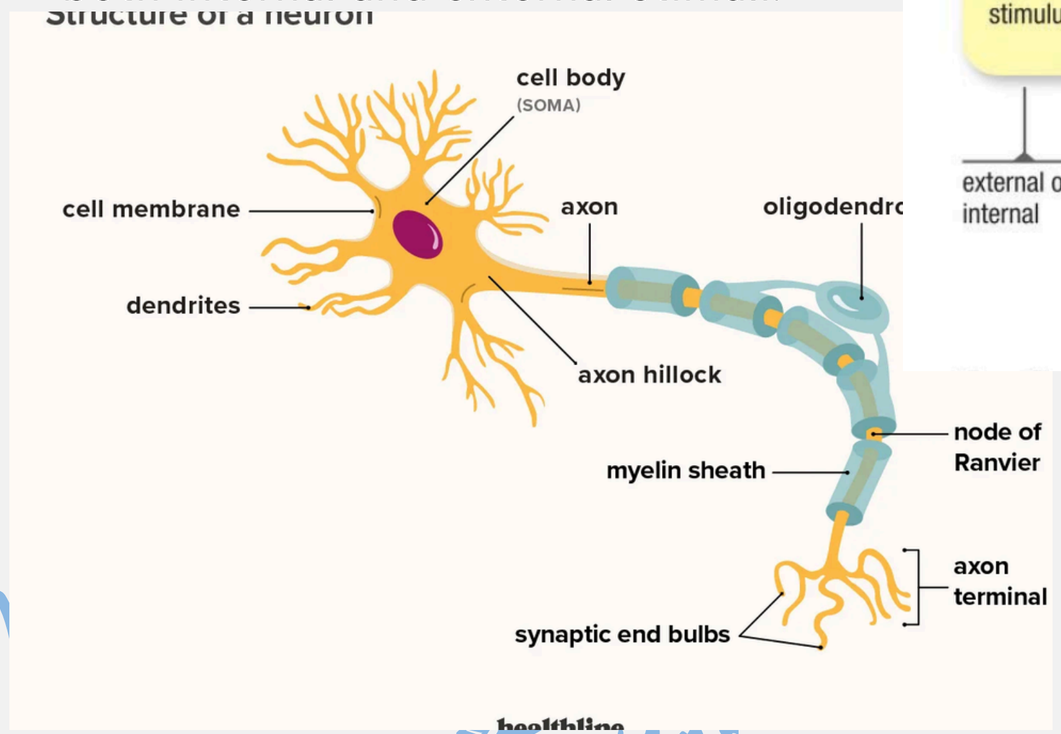


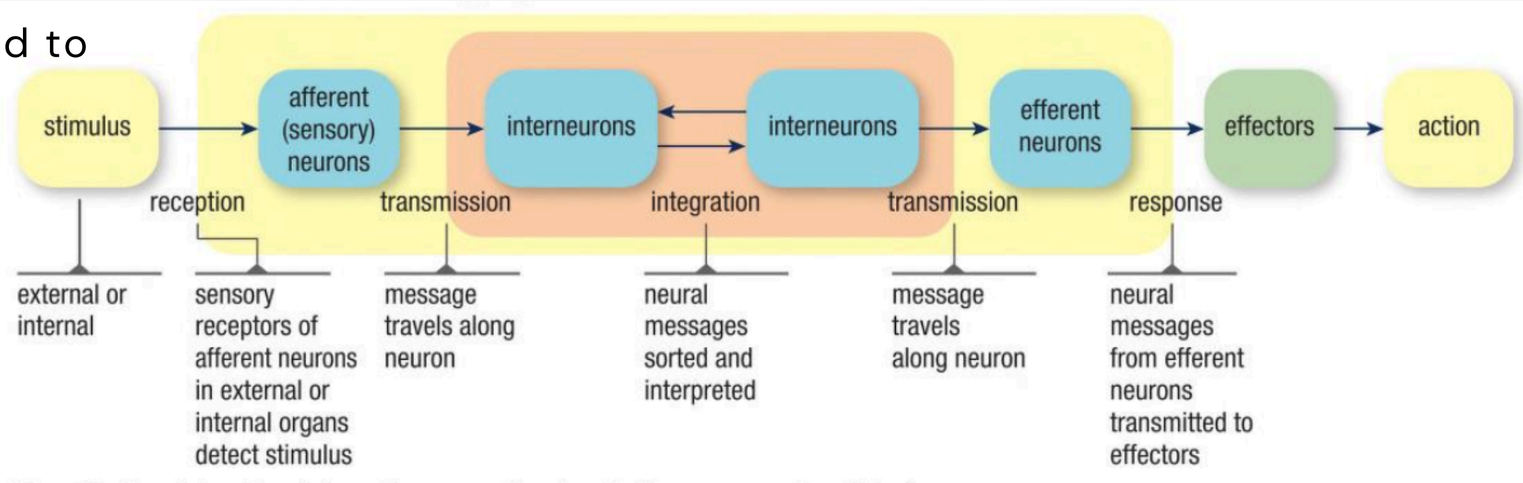
Neurons and Neural Signalling

A neuron is a specialized nerve cell that is the functional unit of the nervous system. It allows an organism to receive and respond to both internal and external stimuli.

Steps of neural signalling:

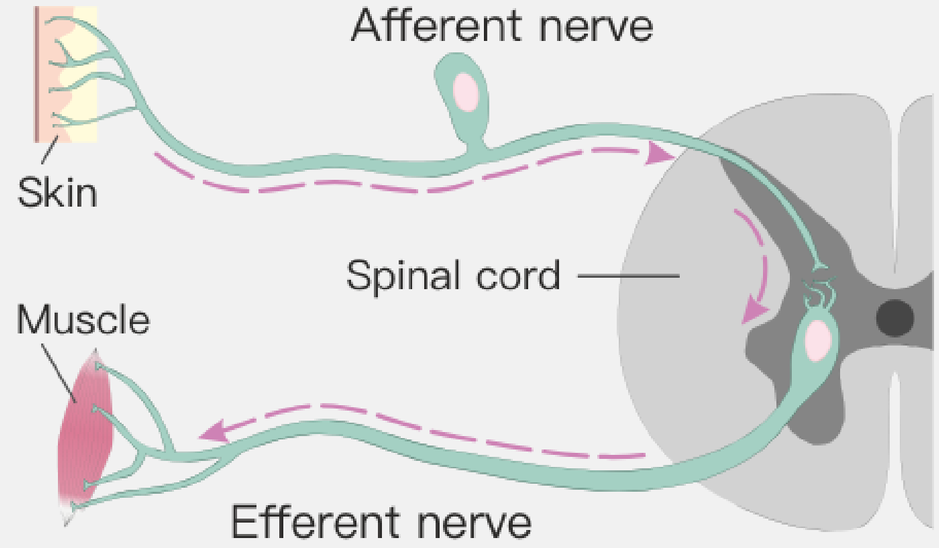
1. Reception – detect a stimulus
2. Transmission – send the message
3. Integration – process the message
4. Response – take action





Types of Neurons

- Afferent neurons: carry information to CNS
- Interneurons: process information inside CNS
- Efferent neurons: send signals out to muscles and glands



Supporting Cells

01

Glial cells: support and protect neurons

02

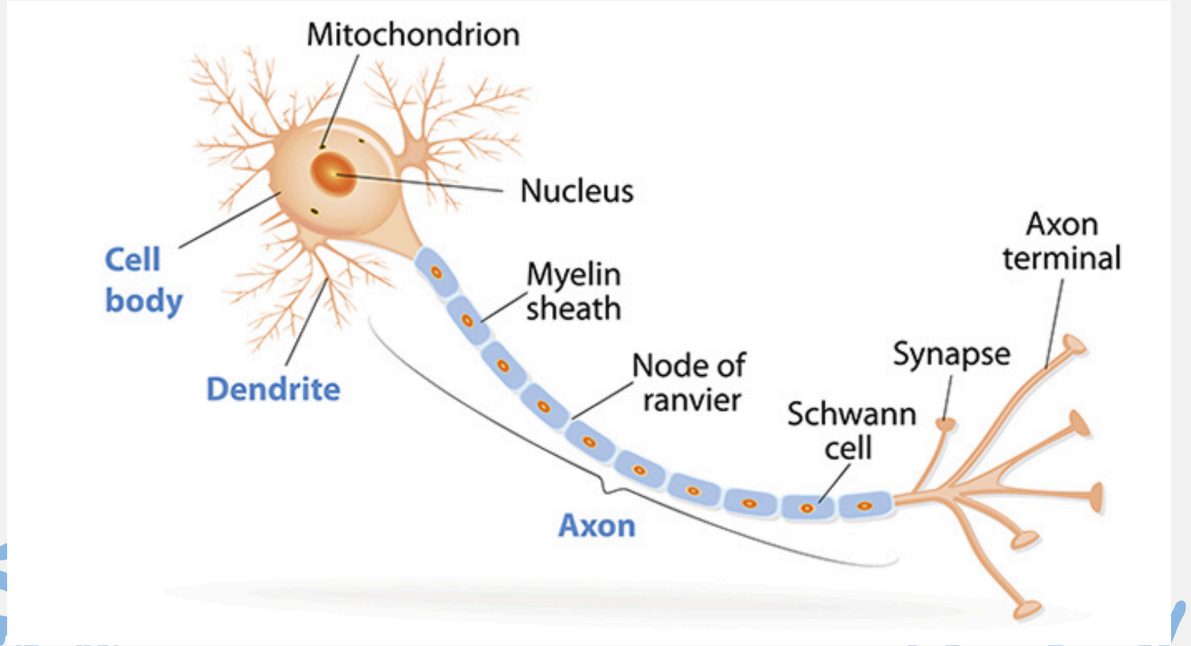
Schwann cells: wrap axons with myelin sheath

03

Myelin sheath: speeds up nerve signals

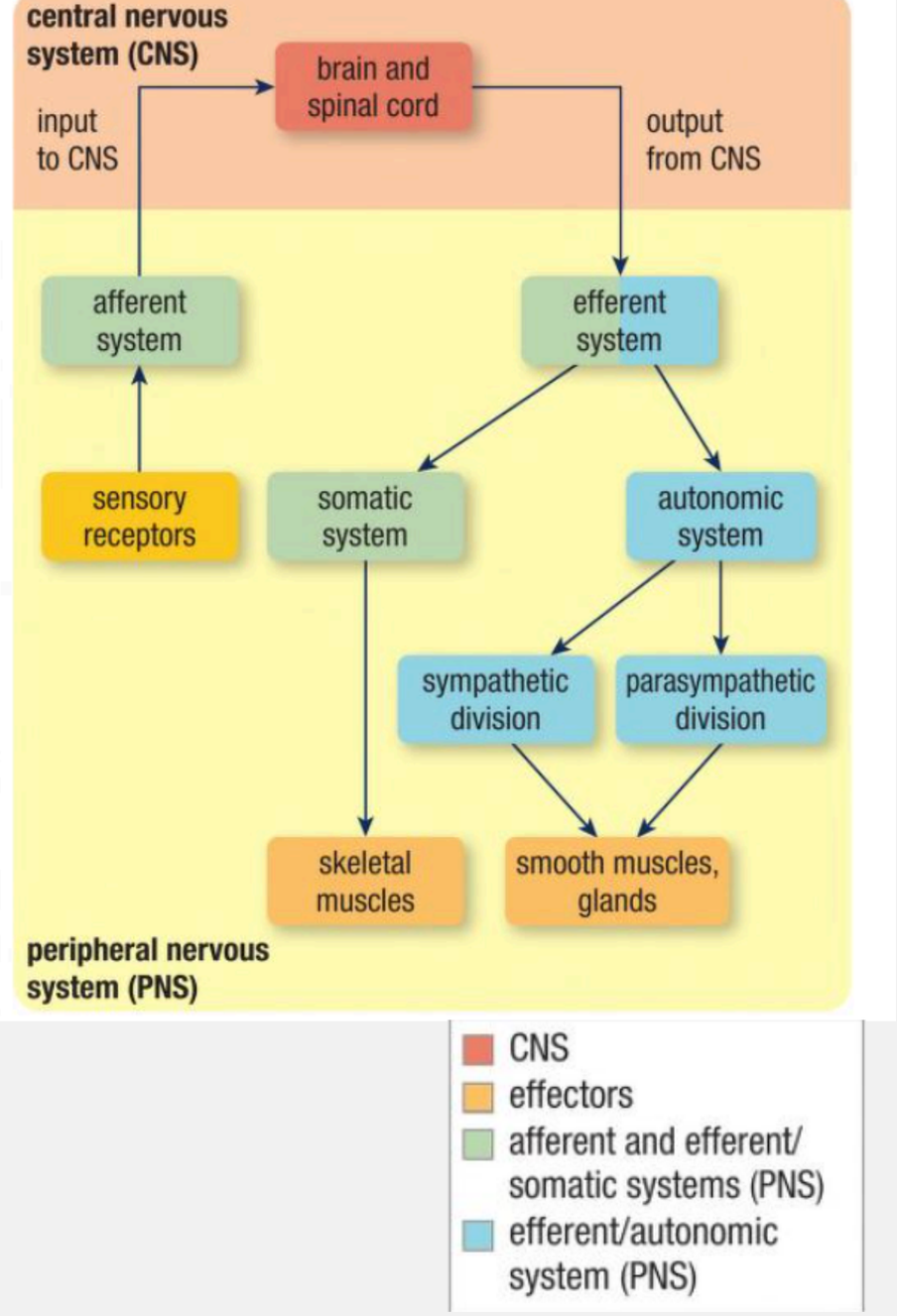
04

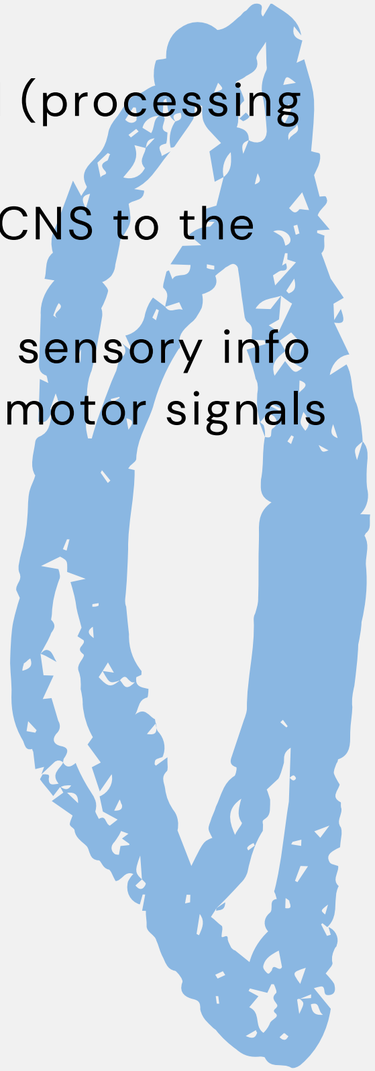
Nodes of Ranvier: gaps that help the signal jump faster



Organization of the Nervous System

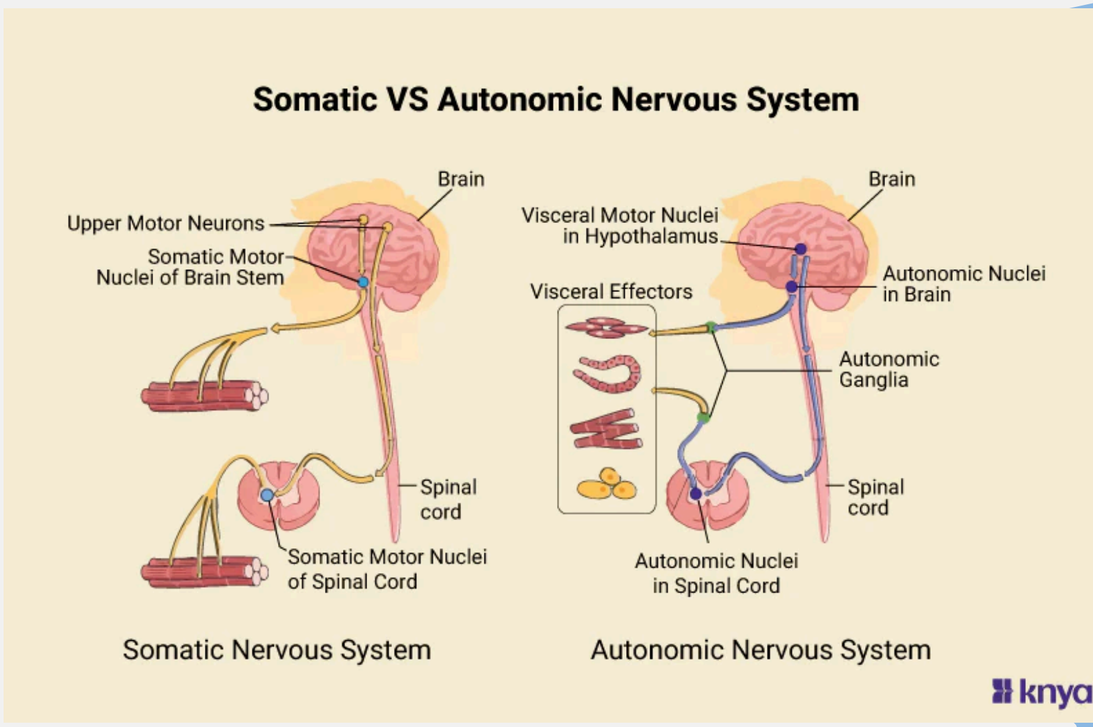
- CNS: Brain and spinal cord (processing center)
- PNS: Nerves that connect CNS to the body
- Afferent system: incoming sensory info
- Efferent system: outgoing motor signals





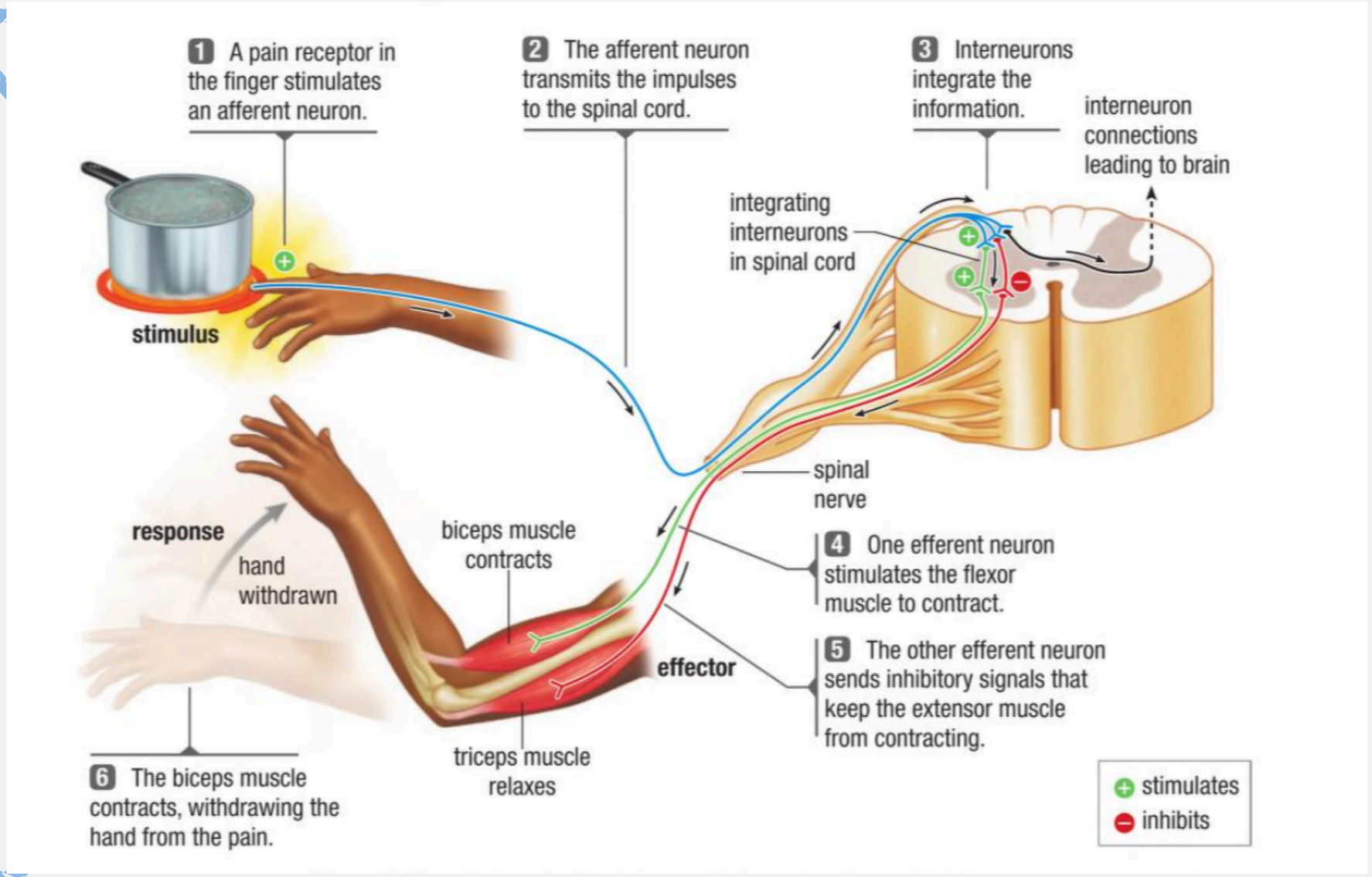
Somatic vs Autonomic Systems

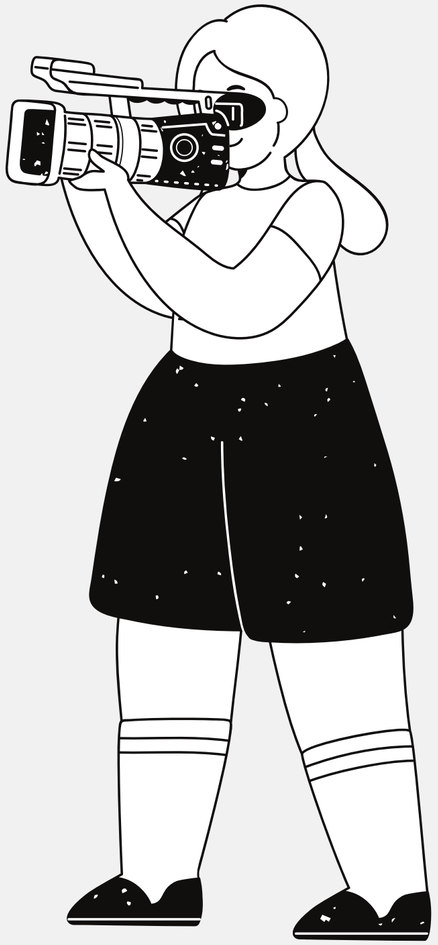
- Somatic system: voluntary control (moving muscles)
- Autonomic system: automatic control (organs, glands)
- Sympathetic: prepares for stress ("Fight or Flight")
- Parasympathetic: promotes relaxation ("Rest and Digest")



Neural Circuits and Reflex Arcs

- Neural circuit:
- Receptor -> Afferent neuron -> Interneuron -> Efferent neuron -> Effector
- Reflex arc:
- Quick, automatic response
- Example: Pulling hand away from hot stove


1 A pain receptor in the finger stimulates an afferent neuron.
2 The afferent neuron transmits the impulses to the spinal cord.
3 Interneurons integrate the information.
interneuron connections leading to brain
integrating interneurons in spinal cord
stimulus
spinal nerve
response
hand withdrawn
biceps muscle contracts
4 One efferent neuron stimulates the flexor muscle to contract.
effector
5 The other efferent neuron sends inhibitory signals that keep the extensor muscle from contracting.
triceps muscle relaxes
6 The biceps muscle contracts, withdrawing the hand from the pain.
stimulates
inhibits



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Thank you very much!