

HUMAN NERVOUS SYSTEM-I

Spinal Cord

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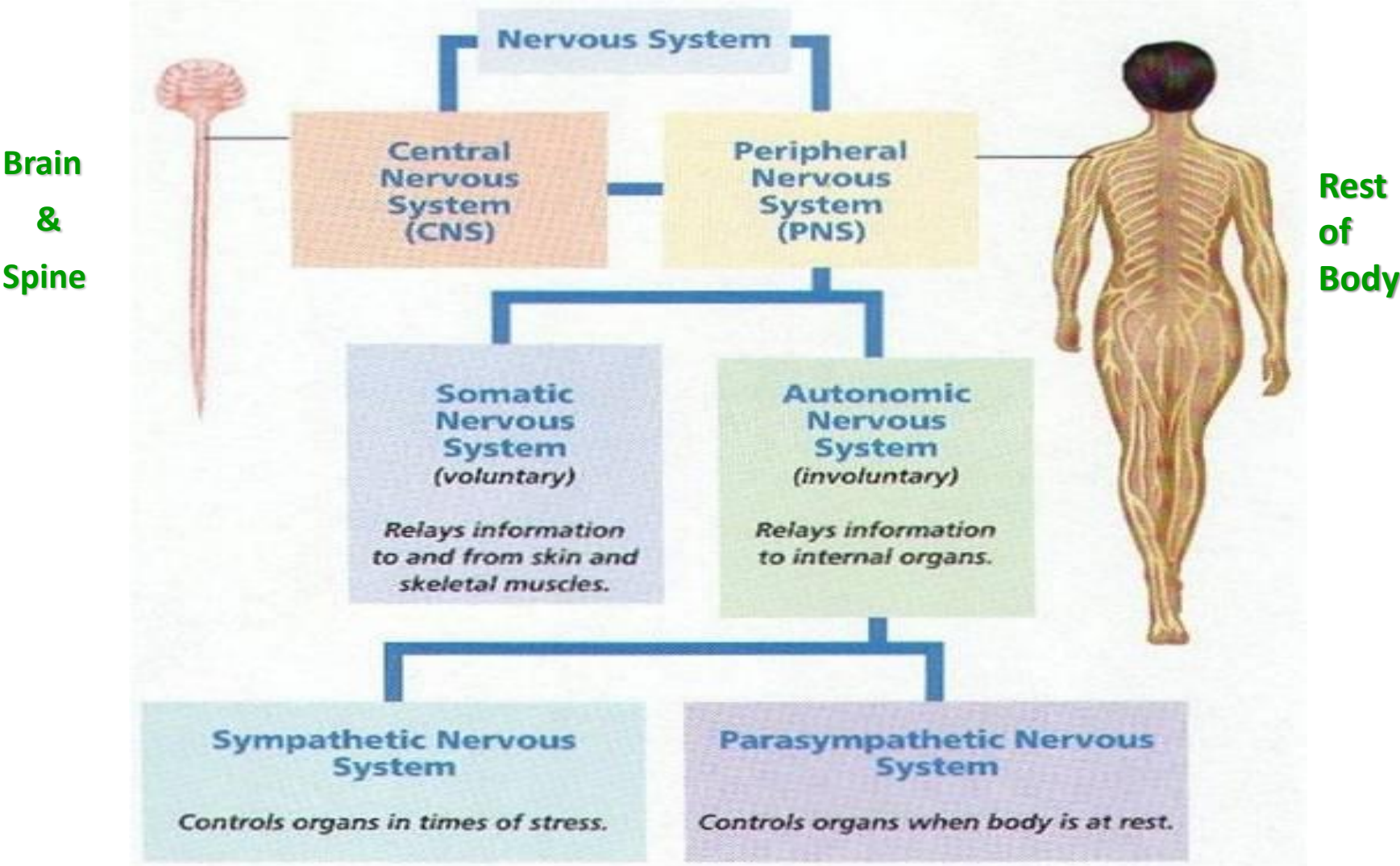
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Functions of the Nervous System

- Gathers information from both inside and outside the body - Sensory Function
- Transmits information to the processing areas of the brain and spine
Processes the information in the brain and spine – Integration Function
- Sends information to the muscles, glands, and organs so they can respond appropriately – Motor Function
- It controls and coordinates all essential functions of the body including all other body systems allowing the body to maintain homeostasis or its delicate balance.

Divisions of the Nervous System



Parts of the Nervous System

- Central Nervous System

- Brain

- Cerebrum
 - Cerebellum
 - Brain Stem and Pons
 - Lobes (4)

- Spinal Cord

- “information superhighway”

- Peripheral

- Autonomic

- Sympathetic
 - Fight or Flight
 - Parasympathetic
 - Relaxation

- Somatic

- Sensory and Motor Nerves
 - Reflex Arc

Spinal Cord:-

- The spinal cord is part of the central nervous system (CNS). It is situated inside the vertebral canal of the vertebral column.

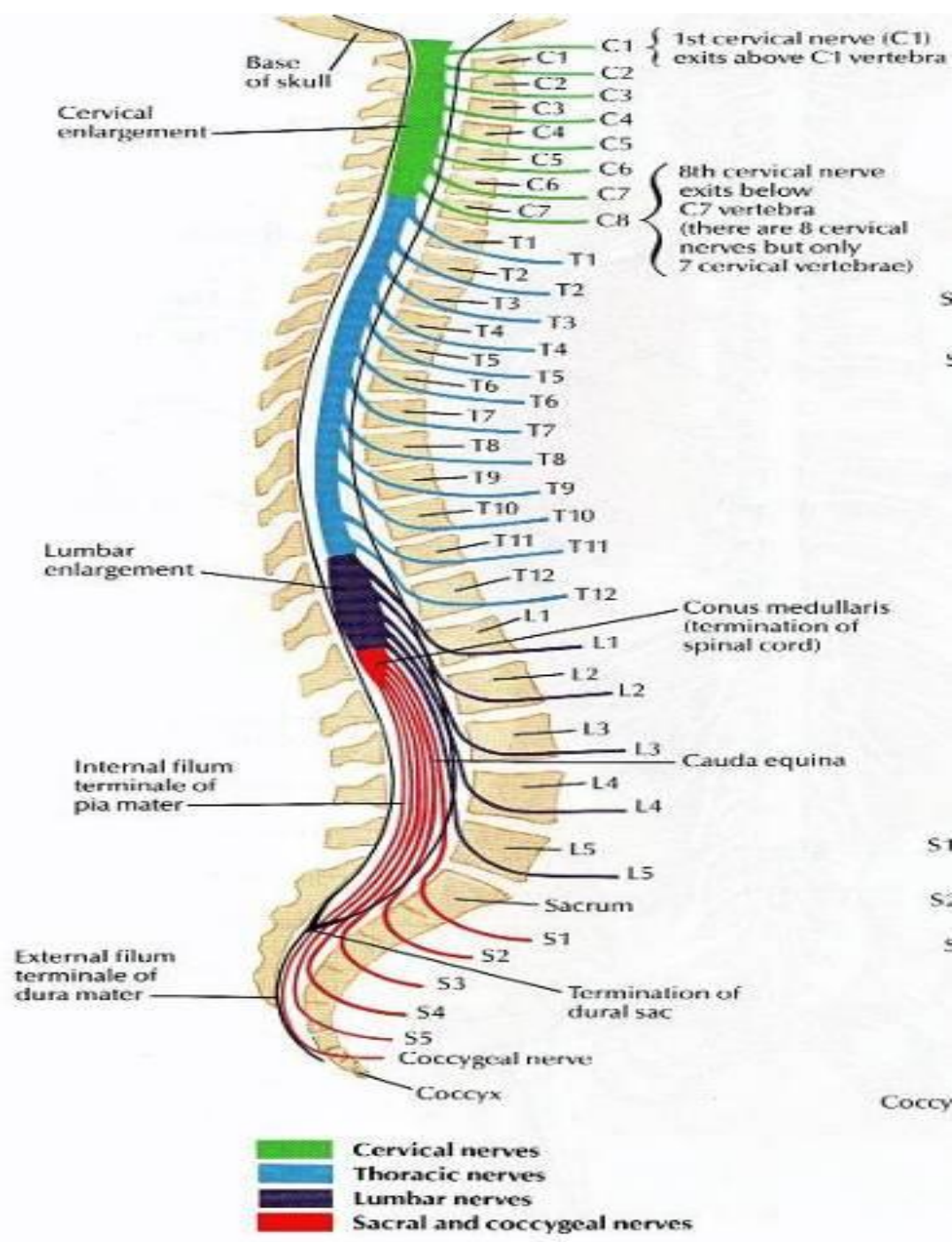
The Major Functions of The Spinal Cord

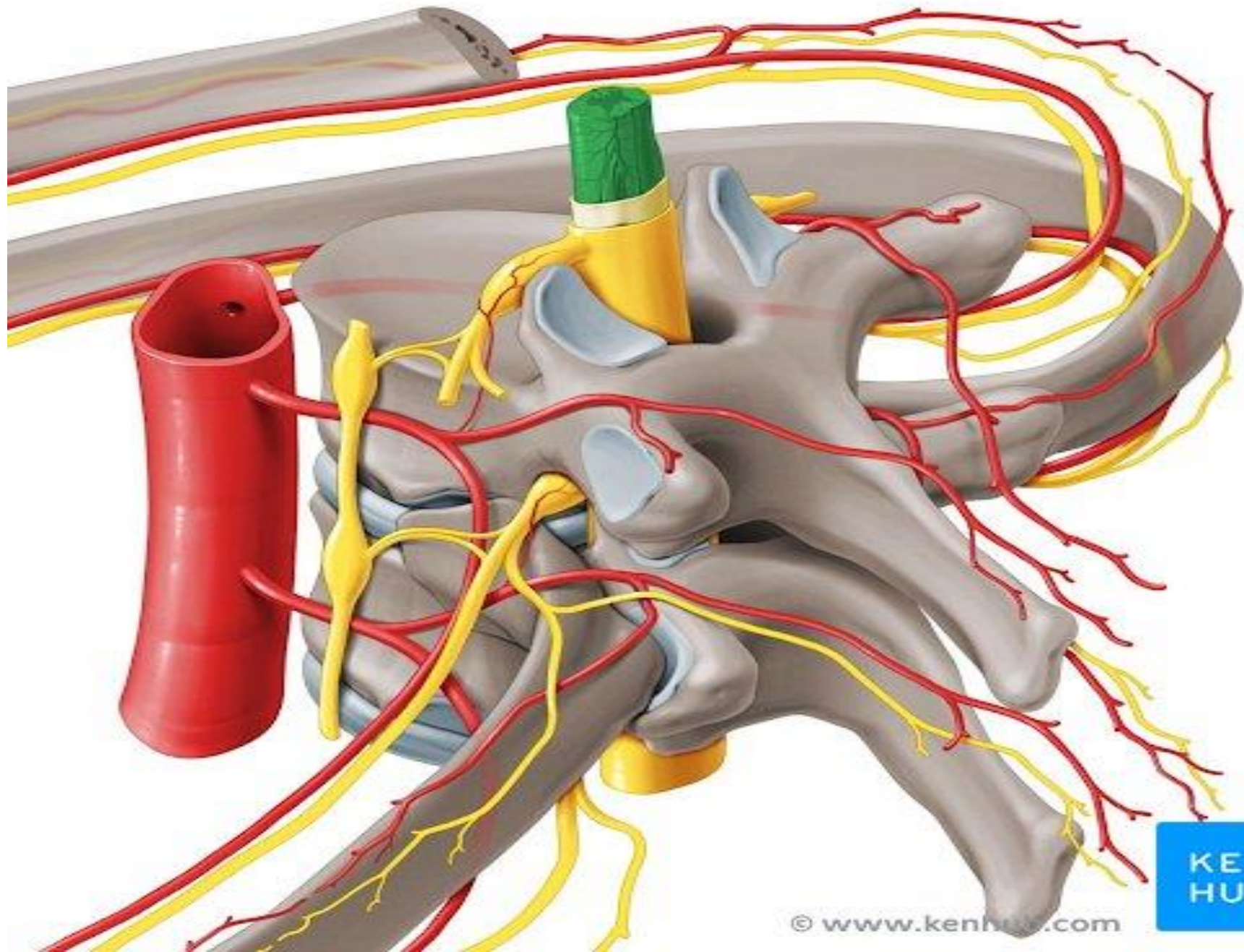
- **Electrical communication.** Electrical currents travel up and down the spinal cord, sending signals which allow different segments of the body to communicate with the brain.
- **Walking.** While a person walks, a collection of muscle groups in the legs are constantly contracting. The action of taking step after step may seem incredibly simple to us since we have been doing it all of our lives, but there are actually a lot of factors that have to be coordinated properly to allow this motion to occur. This central pattern generators in the spinal cord are made up of neurons which send signals to the muscles in the legs, making them extend or contract, and produce the alternating movements which occur when a person walks.
- **Reflexes.** Reflexes are involuntary responses resulting from stimuli involving the brain, spinal cord, and nerves of the peripheral nervous system.

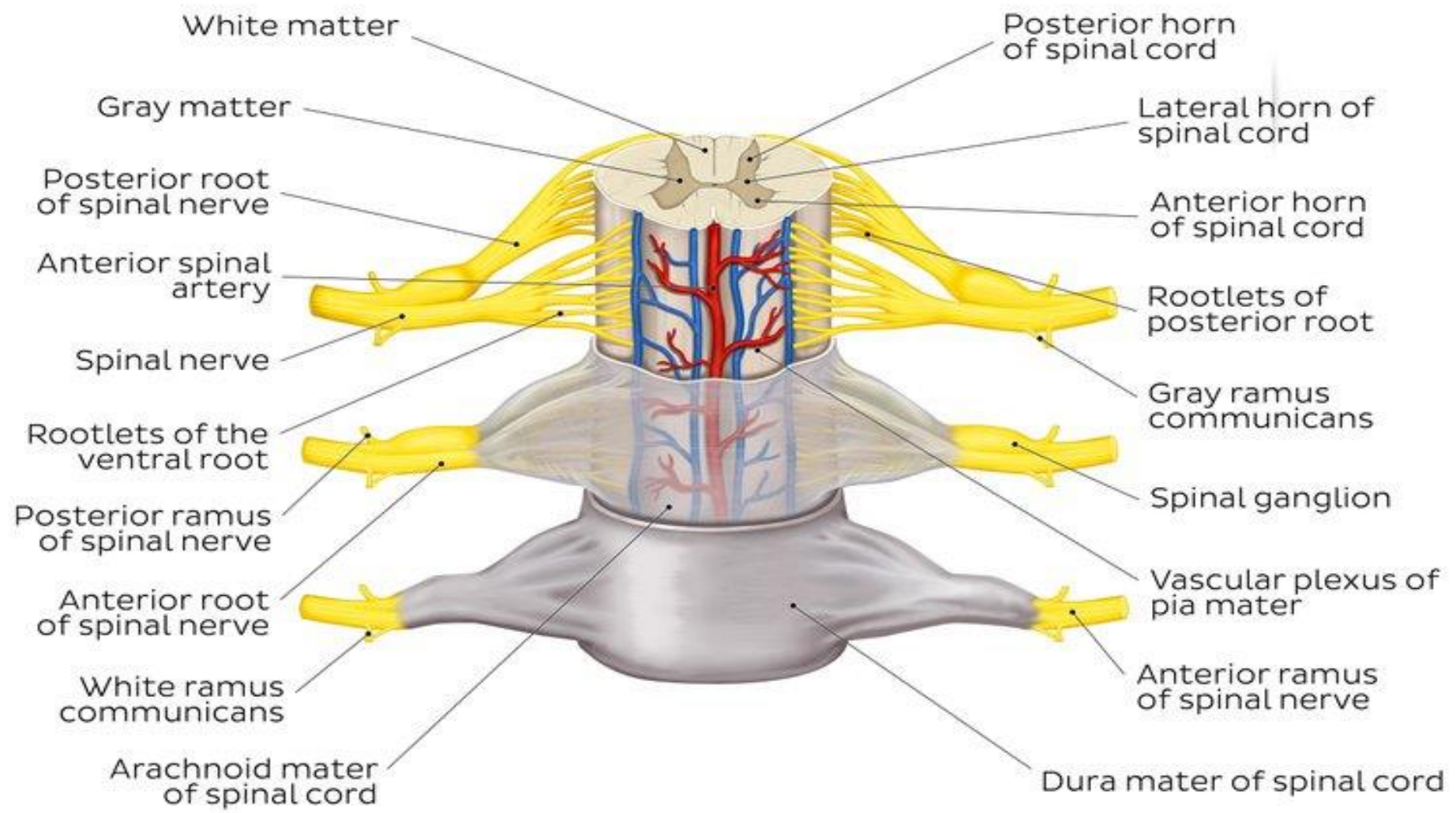
Structure of Spinal Cord

- The overall structure of the spinal cord is enclosed by the protection of the vertebral column. The spinal nerves are located in the spaces between the arches of the vertebrae. Spinal nerves are divided into these separate regions:
 - Cervical (neck)
 - Thoracic (chest)
 - Lumbar (abdominal)
 - Sacral (pelvic)
 - Coccygeal (tailbone)

- Spinal Nerves
- [Spinal nerves](#) are what allow the spinal cord and the rest of the body to communicate. A nerve is an organ shaped like a small cord that is made up of several axons that are bound together. There are 31 pairs of spinal nerves:
 - 8 are cervical nerves located in the neck
 - 12 are thoracic nerves located in the chest
 - 5 are lumbar nerves located in the abdomen
 - 5 are sacral nerves located in the pelvis
 - 1 is the coccygeal nerve located in the tailbone







White matter

Posterior horn of spinal cord

Gray matter

Lateral horn of spinal cord

Posterior root of spinal nerve

Anterior horn of spinal cord

Anterior spinal artery

Rootlets of posterior root

Spinal nerve

Gray ramus communicans

Rootlets of the ventral root

Spinal ganglion

Posterior ramus of spinal nerve

Vascular plexus of pia mater

Anterior root of spinal nerve

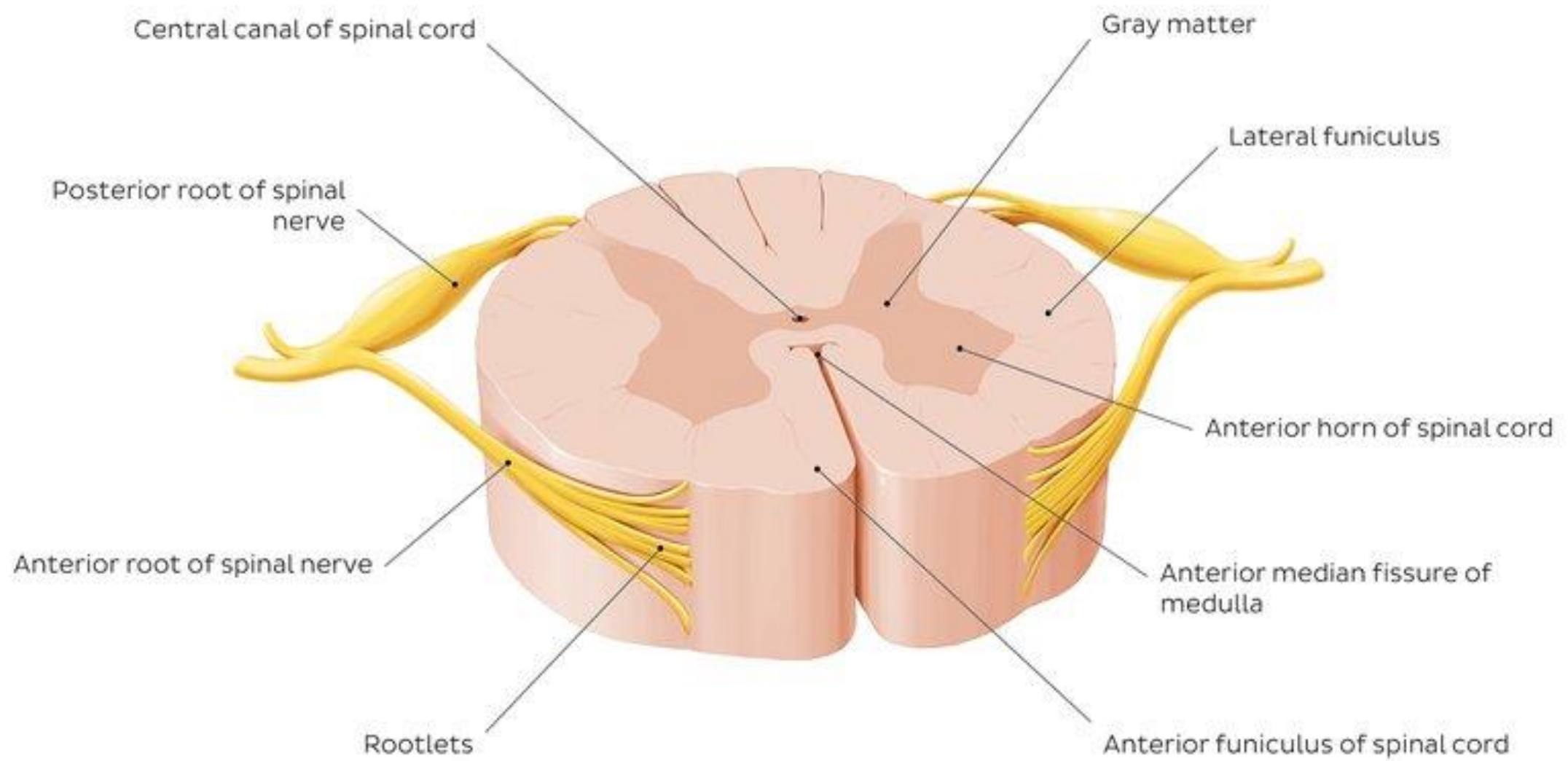
Anterior ramus of spinal nerve

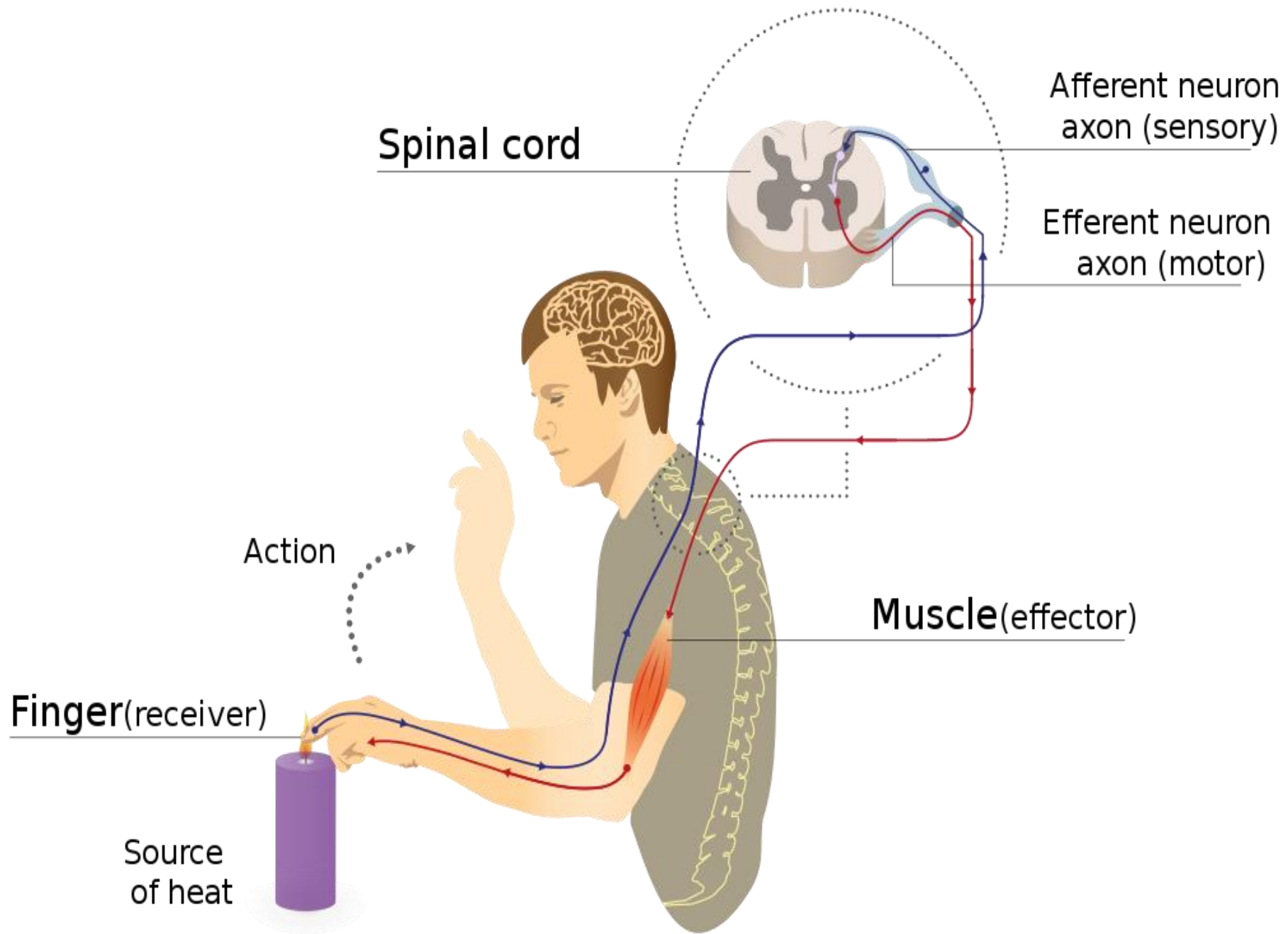
White ramus communicans

Arachnoid mater of spinal cord

Dura mater of spinal cord







- A reflex can be a simple and uncontrolled response or a learned response.
- The simple ones are built into our nervous system, such as pulling your hand away from something hot.
- A reflex that is acquired comes from practice, such as playing the piano.

A reflex is made up of 5 components:

- **Receptor:** the receptor responds to an electrical signal.
- **Afferent pathway:** this pathway sends the action onto the integrating centre.
- **Integrating centre:** this is typically the nervous system and is where all of the action potentials are processed. Once the information is processed the integrating centre determines how the body should respond.
- **Efferent pathway:** the response then travels through this pathway to the effector organ.
- **Effector organ:** this organ carries out the response to all of the above. The organ responding is usually a muscle or gland in the body.