

Which part of the neuron sends electrical impulses away from the cell body?

- A. Dendrite
- B. Soma
- C. Axon
- D. Synapse

Answer: C

What structure speeds up the transmission of nerve impulses along the axon?

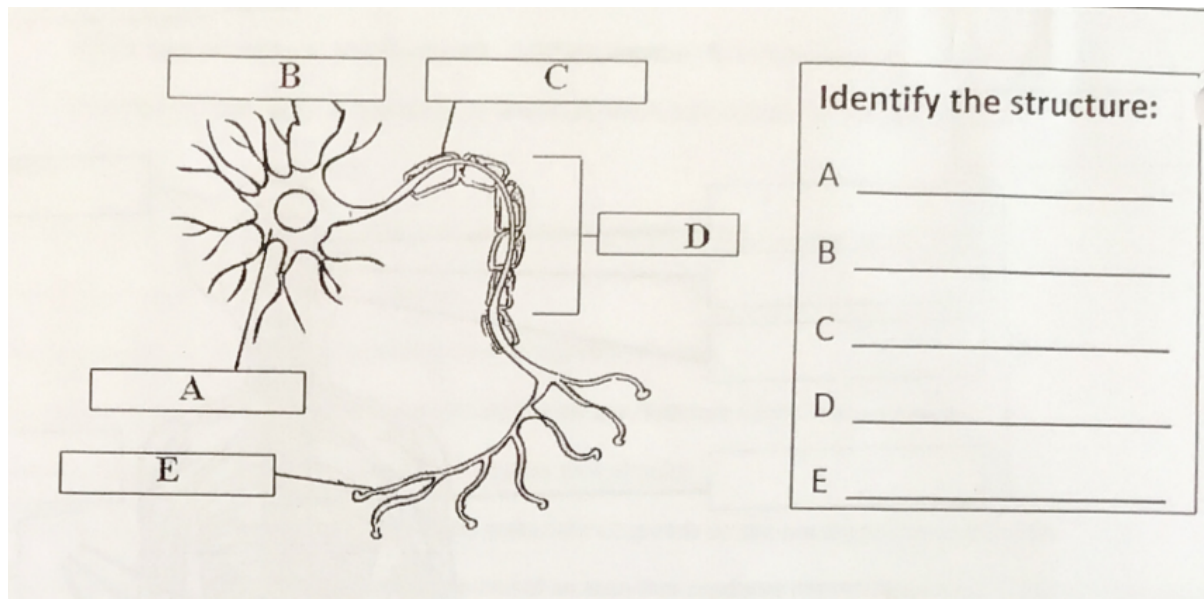
- A. Cell body
- B. Myelin sheath
- C. Nodes of Ranvier
- D. Axon terminals

Answer: B

Which division of the autonomic system is responsible for “rest and digest” activities?

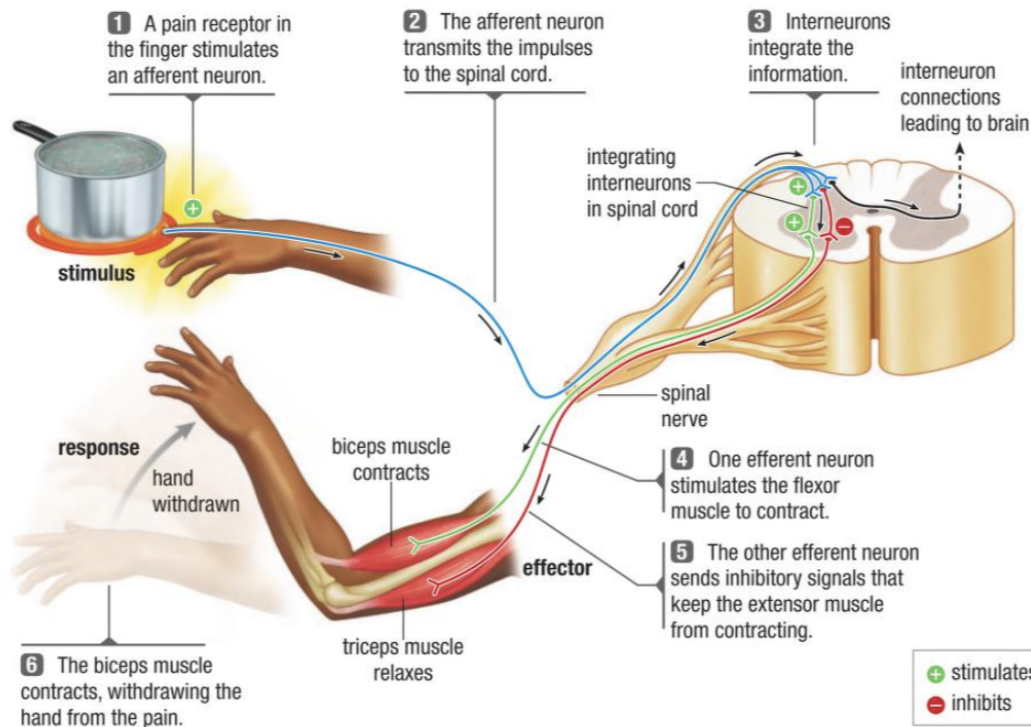
- A. Somatic
- B. Sympathetic
- C. Afferent
- D. Parasympathetic

Answer: D



A(cell body) B(dendrites) C(Myelin Sheath)D(axon)E(axon terminal)

Using the diagram provided, explain the neural pathway involved in the withdrawal reflex when a person touches a hot object. In your response, describe the roles of the afferent neuron, interneurons, and efferent neurons. Be sure to include the effects of both stimulation (positive signals) and inhibition (negative signals) on the muscles involved in the reflex response.



When a person touches a hot object, a pain receptor in the skin detects the harmful stimulus. This receptor activates an afferent neuron (Step 1), which transmits the signal to the spinal cord (Step 2). Once the signal reaches the spinal cord, it is processed by interneurons (Step 3), which integrate the information and coordinate a rapid response without needing to first consult the brain.

The interneurons then transfer the signal to efferent (motor) neurons (Steps 4 and 5). One efferent neuron sends a stimulatory (positive) signal to the biceps muscle, which is a flexor muscle, causing it to contract (Step 4). At the same time, another efferent neuron sends an inhibitory (negative) signal to the triceps muscle, which is an extensor muscle, preventing it from contracting (Step 5). This coordination ensures that the arm flexes effectively and the hand is quickly withdrawn from the source of pain (Step 6).

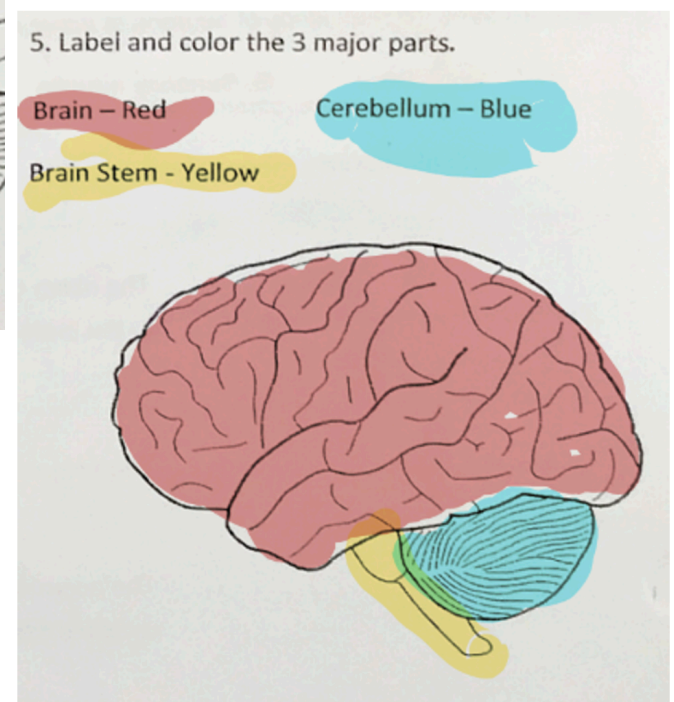
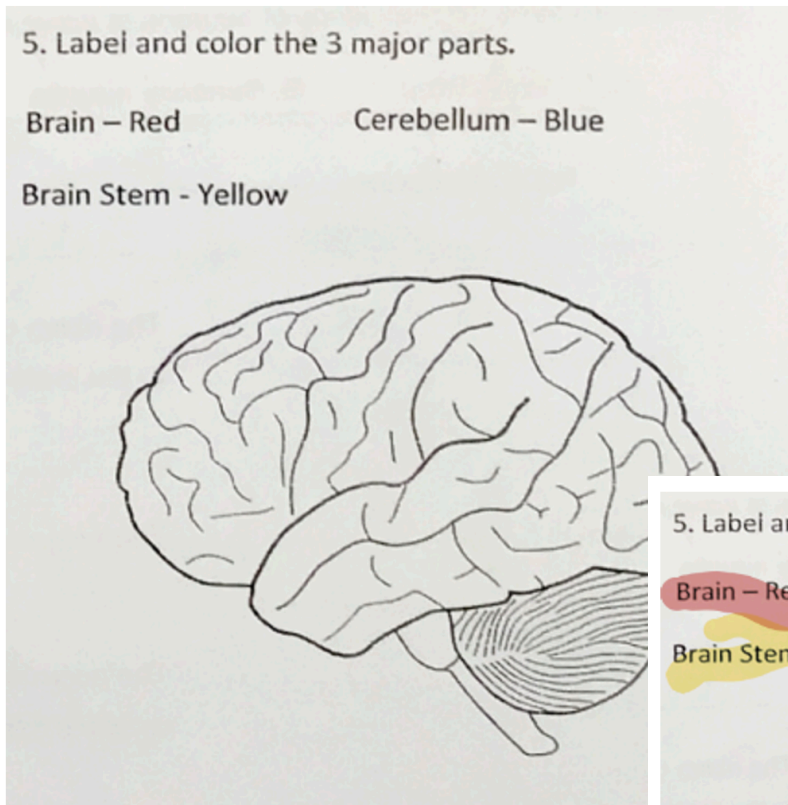
This rapid, automatic response is known as a reflex, and it protects the body from harm by minimizing the time it takes to react to a dangerous stimulus. The positive (stimulating) and negative (inhibitory) signals work together to control muscle actions and produce a quick and efficient movement.

1, A person was in an accident and can still talk, but they **cannot feel or move their legs**. Based on this information, **what part of the central nervous system is most likely damaged, and why?**

Answer (for teacher use):

The most likely damaged area is the **spinal cord**. This is because the spinal cord carries signals between the brain and the body. If the person can still talk, the **brain is still functioning**. However, the inability to feel or move the legs suggests that the part of the spinal cord that sends motor signals to and receives sensory signals from the **lower body** has been injured.

2,



3. What is the function of the spinal cord?

- A) To regulate breathing, heart rate, and blood pressure
- B) To control emotions and memory
- C) To carry messages between the brain and body, and manage reflexes (*right*)
- D) To produce hormones and regulate metabolism

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5. Which part of the brain controls balance and movement coordination?

- A) Brainstem
- B) Cerebellum (*right*)
- C) Cerebrum
- D) Corpus callosum

1. Explain how thermoregulation in humans uses both physiological and behavioural mechanisms when body temperature becomes too high or too low. Include the roles of thermoreceptors and the hypothalamus.

Answer:

Thermoreceptors detect changes in body temperature and send signals to the hypothalamus. The hypothalamus then activates responses. If too hot, vasodilation and sweating help release heat; if too cold, vasoconstriction and shivering conserve or produce heat. Behavioural actions like putting on clothes or moving to shade also help maintain temperature balance.

2. Which of the following animals is an example of a homeothermic endotherm?

- A. Lizard
- B. Arctic Fox
- C. Frog
- D. Salmon

Answer: B. Arctic Fo

3. Give two ways your body responds to cold weather to maintain a stable internal temperature. Explain how each response helps prevent heat loss.

Answer:

- Vasoconstriction: Blood vessels near the skin narrow to reduce heat loss through the skin.
- Shivering: Muscles contract rapidly to generate heat through increased metabolism.

4. List two differences between endotherms and ectotherms in how they regulate body temperature. Provide an example of each.

Answer:

- Endotherms generate their own heat using metabolism (e.g., humans).
- Ectotherms rely on environmental heat sources to regulate body temperature (e.g., snakes).

5. Torpor is a form of long-term dormancy used by animals in hot and dry environments. (True or False)

Answer: False

Torpor is short-term. Estivation is long-term dormancy in heat or drought.