



B.Pharm Semester 1

Human Anatomy, Physiology and Pathophysiology I

Unit 04

Peripheral Nervous System and Special Senses

PPT Notes

Nerves Connect Life



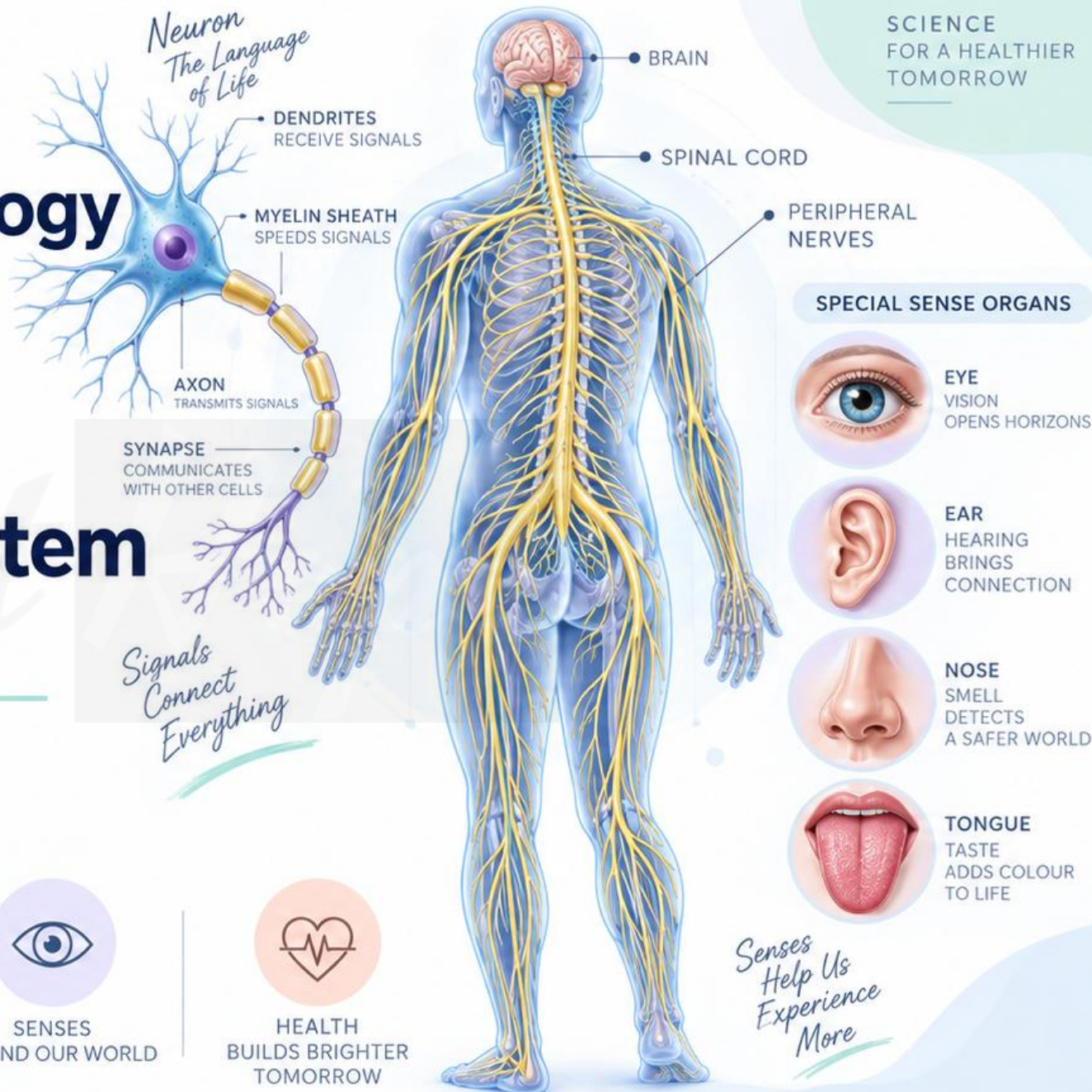
NERVES
TRANSMIT LIFE



SENSES
EXPAND OUR WORLD



HEALTH
BUILDS BRIGHTER
TOMORROW



SCIENCE
FOR A HEALTHIER
TOMORROW

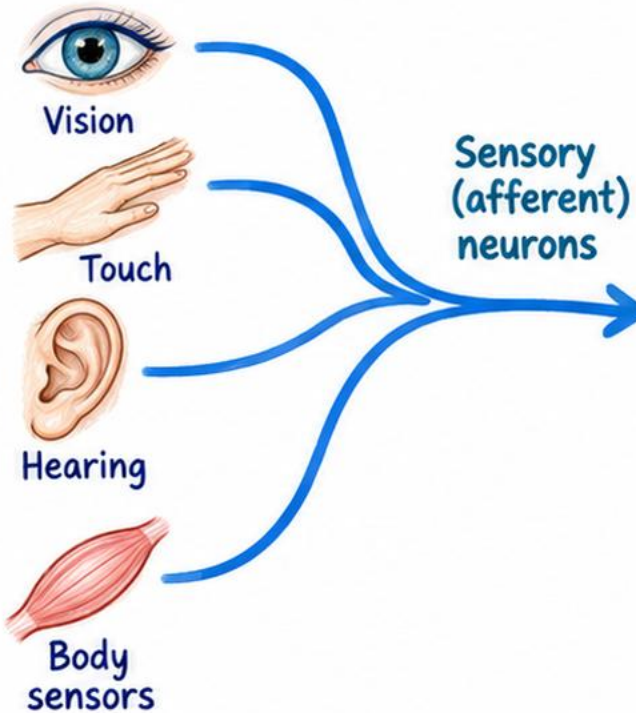


STUDY | UNDERSTAND | APPLY | GROW

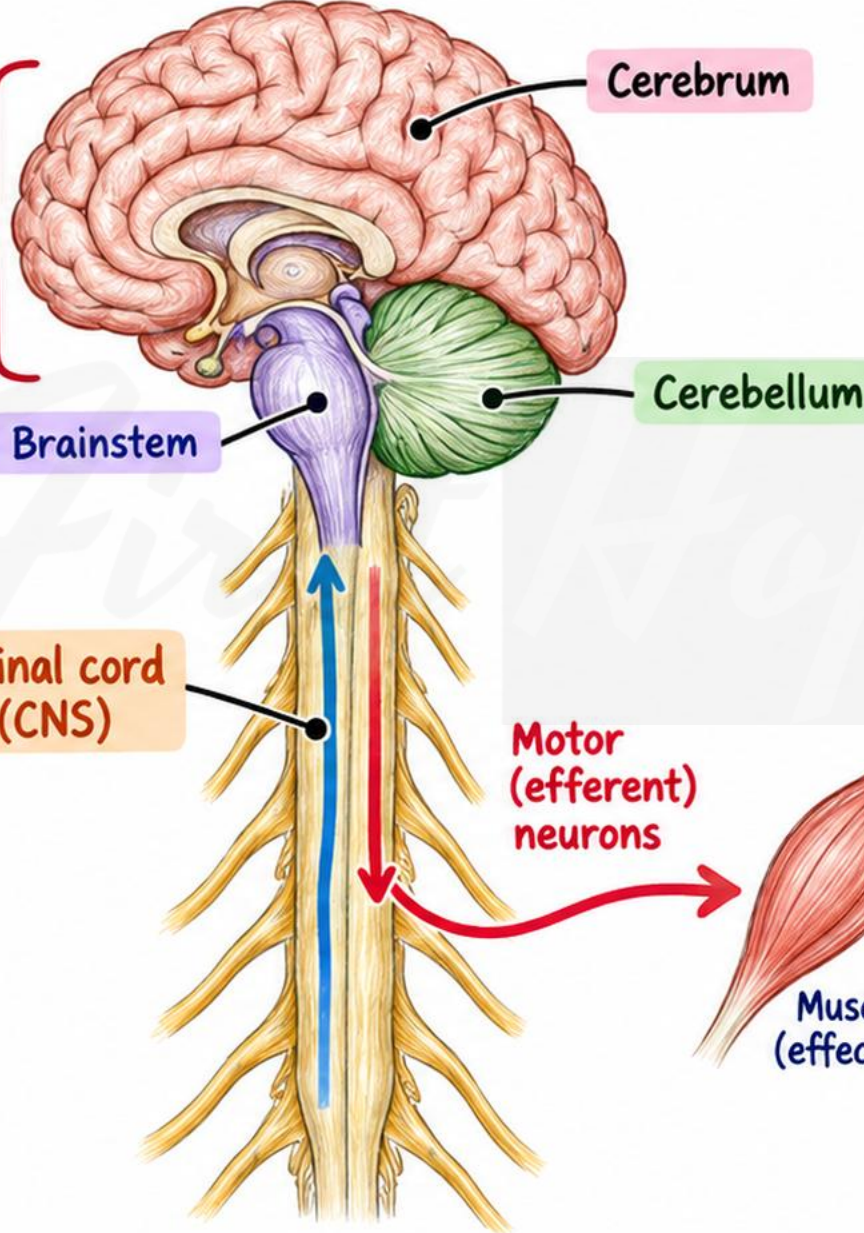
NERVOUS SYSTEM OVERVIEW

1 Sensory Input

Receptors detect internal and external stimuli and send signals to the CNS via sensory (afferent) neurons.



Brain (CNS)



Cerebrum

Cerebellum

Brainstem

Spinal cord (CNS)

Motor (efferent) neurons

Muscle (effector)

2 Central Nervous System (CNS)

- Consists of the brain and spinal cord.
- Acts as the body's control center, processing, integrating and coordinating information.

3 Peripheral Nervous System (PNS)

- All nerves and neurons outside the CNS.
- Connects the body to the CNS.

4 Motor Output

- CNS sends signals to muscles and glands via motor (efferent) neurons, producing a response.

5 Function

- Enables the body to sense and respond to stimuli, interact with the environment and maintain homeostasis.



Remember

- The CNS and PNS work together — sensory input → integration → motor output.

DIVISIONS OF THE PERIPHERAL NERVOUS SYSTEM

1. WHAT IS PNS?

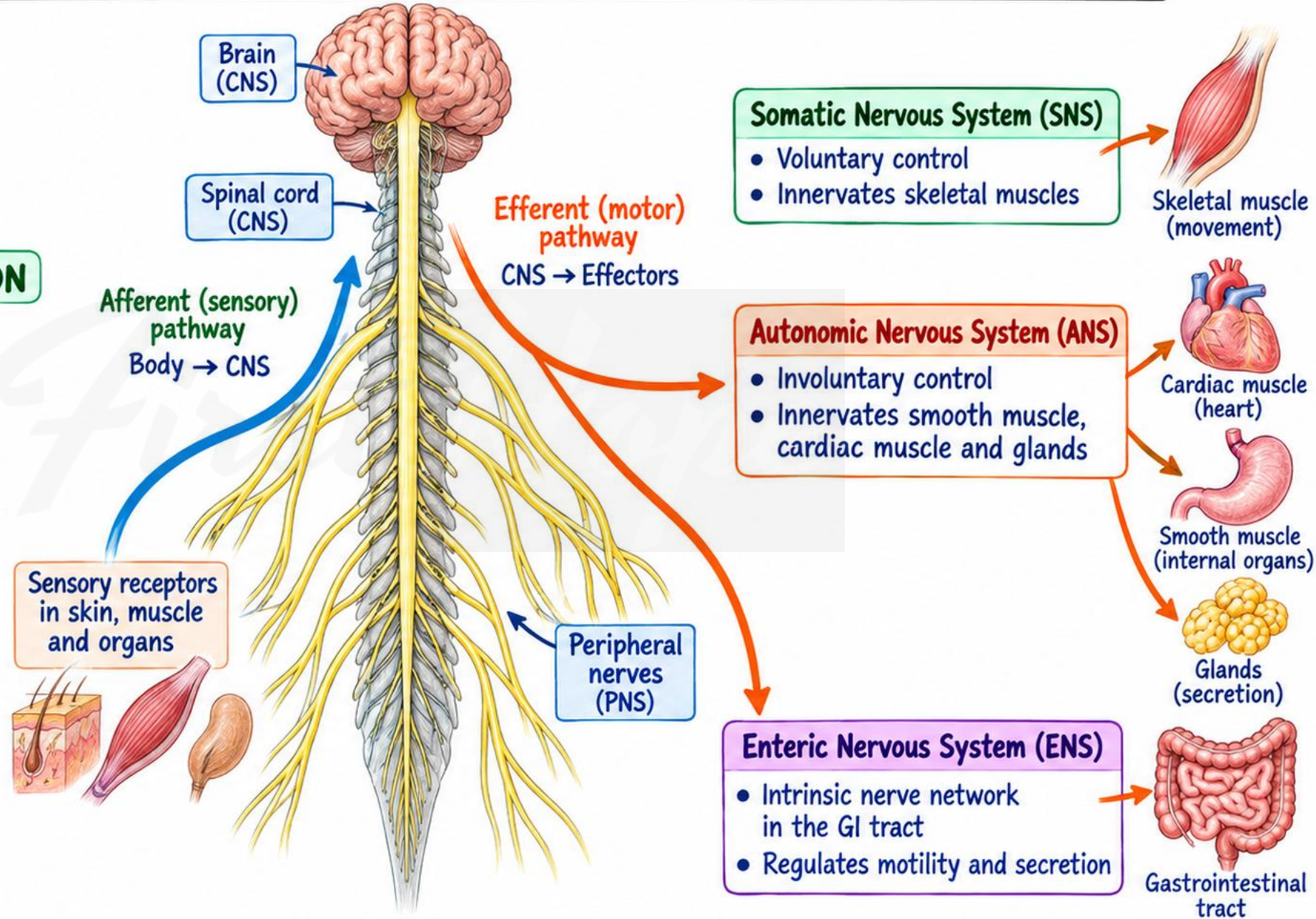
- All nerves and ganglia outside the CNS (brain and spinal cord).
- Connects the CNS with the rest of the body.

2. TWO-WAY COMMUNICATION

- **Afferent (sensory):** carry sensory information from the body to the CNS.
- **Efferent (motor):** carry motor commands from the CNS to muscles, glands and organs.

3. SUBDIVISIONS OF PNS

- **Somatic nervous system (SNS):** voluntary control of skeletal muscles.
- **Autonomic nervous system (ANS):** involuntary control of smooth muscle, cardiac muscle and glands.
- **Enteric nervous system (ENS):** controls gastrointestinal (GI) tract functions.



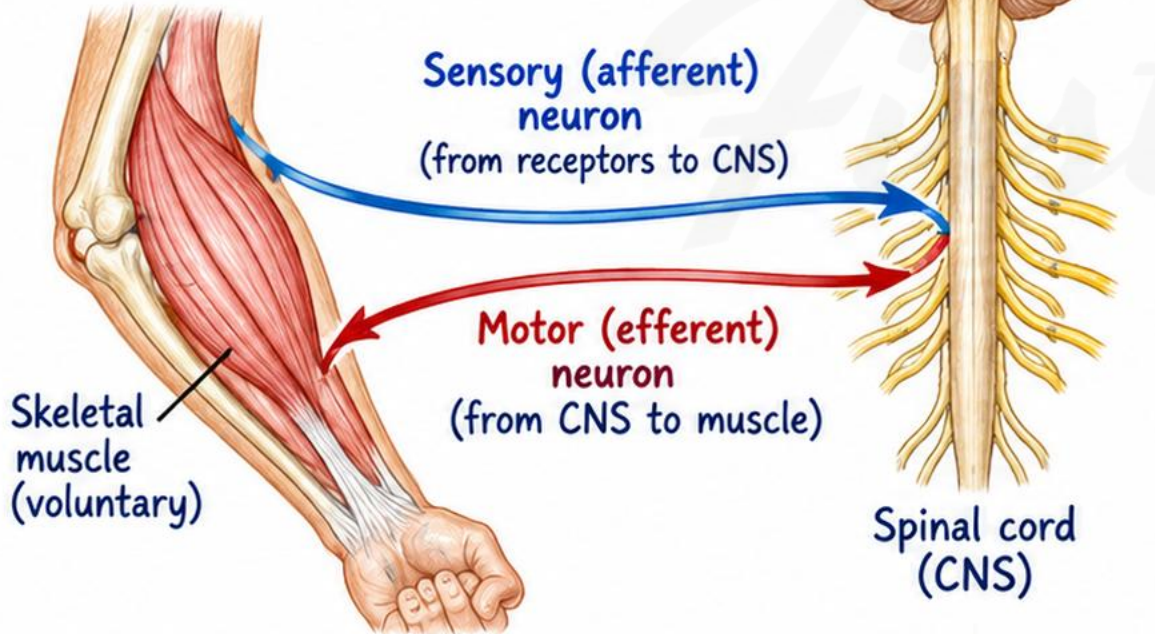
SOMATIC AND AUTONOMIC SYSTEMS

Peripheral Nervous System (PNS)

(functional classification)

Somatic Nervous System (SNS)

- Controls voluntary movements of skeletal muscles.
- Carries sensory information to the CNS.

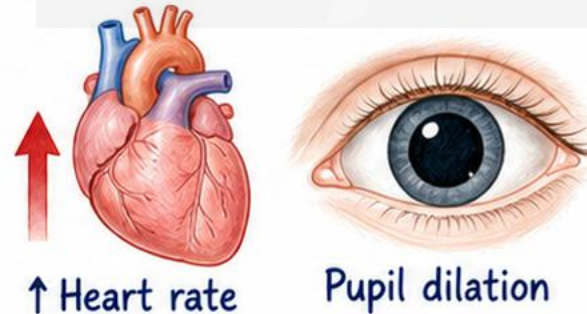


Autonomic Nervous System (ANS)

- Regulates involuntary functions (heart rate, digestion, respiration, glandular activities).
- Uses a two-neuron chain (preganglionic → ganglion → postganglionic).

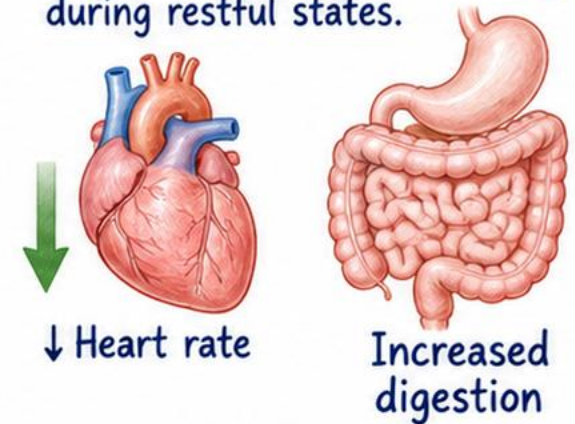
Sympathetic Nervous System

- “Fight or flight” response.
- Increases heart rate, dilates pupils and redirects blood to skeletal muscles.



Parasympathetic Nervous System

- “Rest and digest” state.
- Slows heart rate, increases digestion and conserves energy during restful states.



Key difference: Somatic system uses a single motor neuron to skeletal muscle (voluntary); Autonomic system uses a two-neuron chain to smooth muscle, cardiac muscle and glands (involuntary).

SYMPATHETIC NERVOUS SYSTEM: ORGANIZATION

① Thoracolumbar origin

Preganglionic neurons arise from T1 to L2 segments (lateral horn – intermediolateral cell column).

② Preganglionic fibers (short)

- Exit via ventral root
- Enter spinal nerve
- Travel through white rami communicantes to sympathetic chain.

③ Postganglionic fibers (long)

- Originate from sympathetic ganglia.
- Travel to target organs.
- Longer than preganglionic fibers.

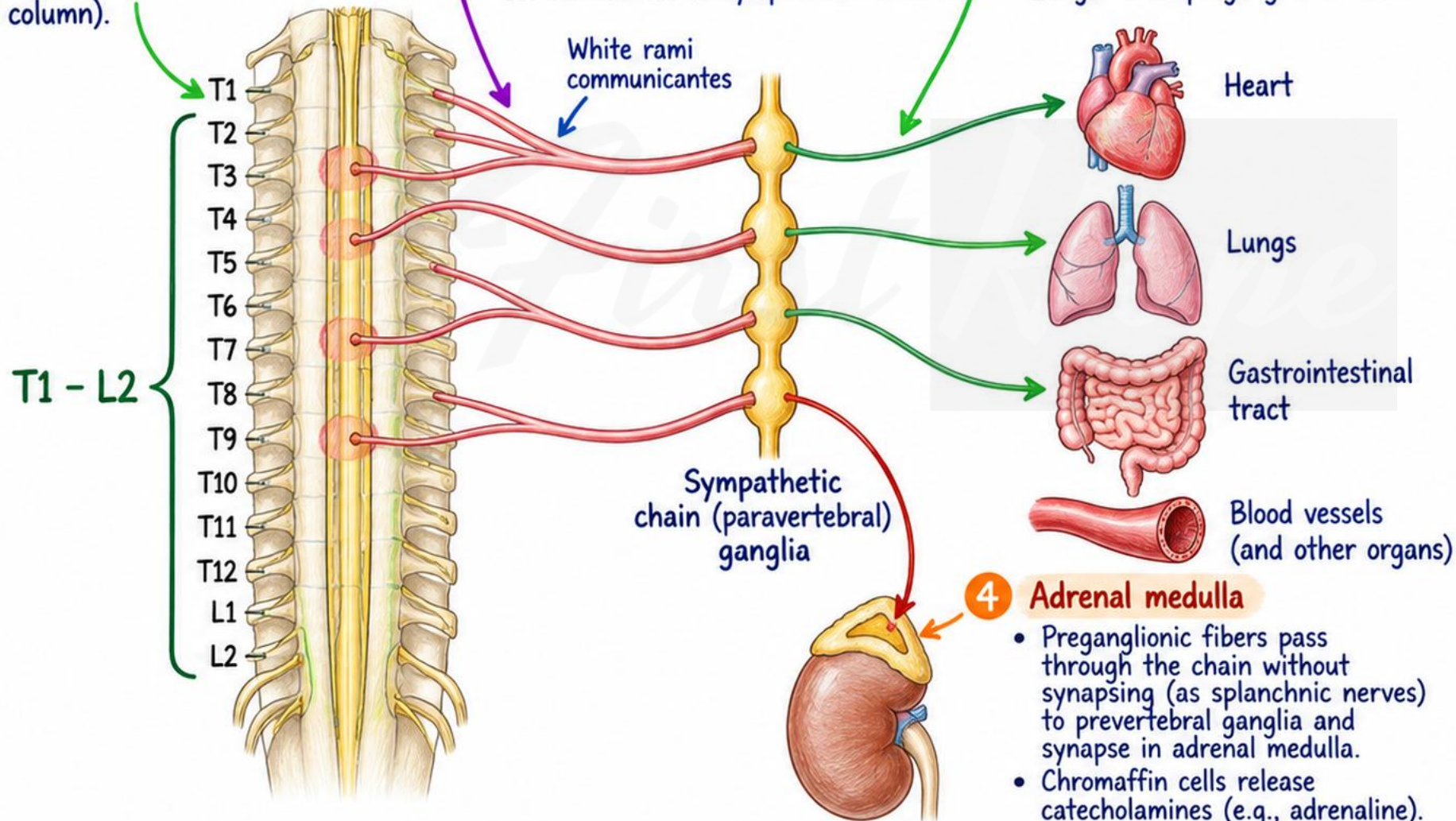
⑤ Routes of preganglionic fibers

- Synapse at same level → postganglionic fiber exits via gray ramus.
- Ascend or descend in chain to synapse at a different level.
- Pass through without synapsing as splanchnic nerves to prevertebral ganglia (e.g., celiac, superior/inferior mesenteric) or adrenal medulla.

⑥ Target organs

Postganglionic fibers innervate:

- Heart
- Lungs
- Gastrointestinal tract
- Blood vessels
- Sweat glands
- Other visceral organs



④ Adrenal medulla

- Preganglionic fibers pass through the chain without synapsing (as splanchnic nerves) to prevertebral ganglia and synapse in adrenal medulla.
- Chromaffin cells release catecholamines (e.g., adrenaline).



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