

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Autonomic Nervous system

Lectures

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▶ Objectives :

- ▶ Students should know the functional structure of the nervous system .
 - ▶ Students should know the functional structure of autonomic nervous system .
 - ▶ Students should know types and characters of functional divisions of autonomic nervous system .
- 

Body organs

are

Somatic structure
eg;

and

Viscera
eg;

Skeletal muscles

Cardiovascular system
Respiratory system
Digestive system
Urinary system
others

*The main regulatory systems
for the body organs are

Nervous system

Endocrine system

is responsible for rapid regulation

is responsible for slow ,and fine regulation
by its hormones.

Body systems



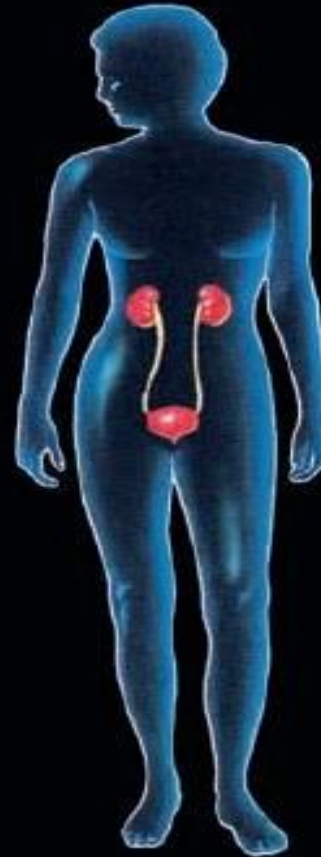
Circulatory system
heart, blood vessels,
blood



Digestive system
mouth, pharynx,
esophagus, stomach,
small intestine, large
intestine, salivary
glands, exocrine
pancreas, liver,
gallbladder



Respiratory system
nose, pharynx, larynx,
trachea, bronchi, lungs



Urinary system
kidneys, ureters,
urinary bladder,
urethra



Skeletal system
bones, cartilage,
joints



Muscular system
skeletal muscles



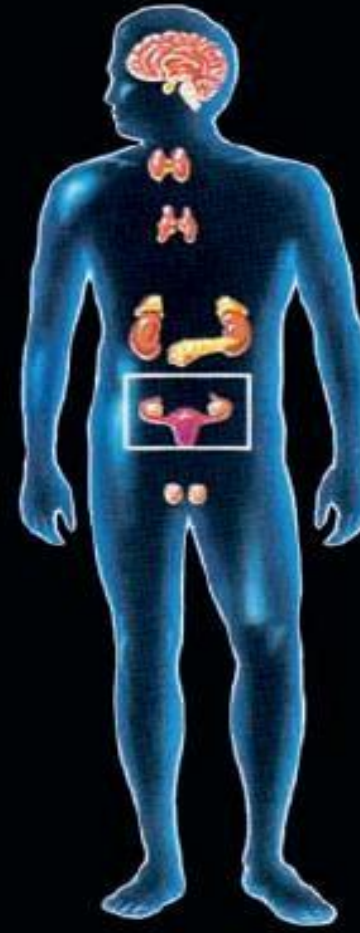
Integumentary system
skin, hair, nails



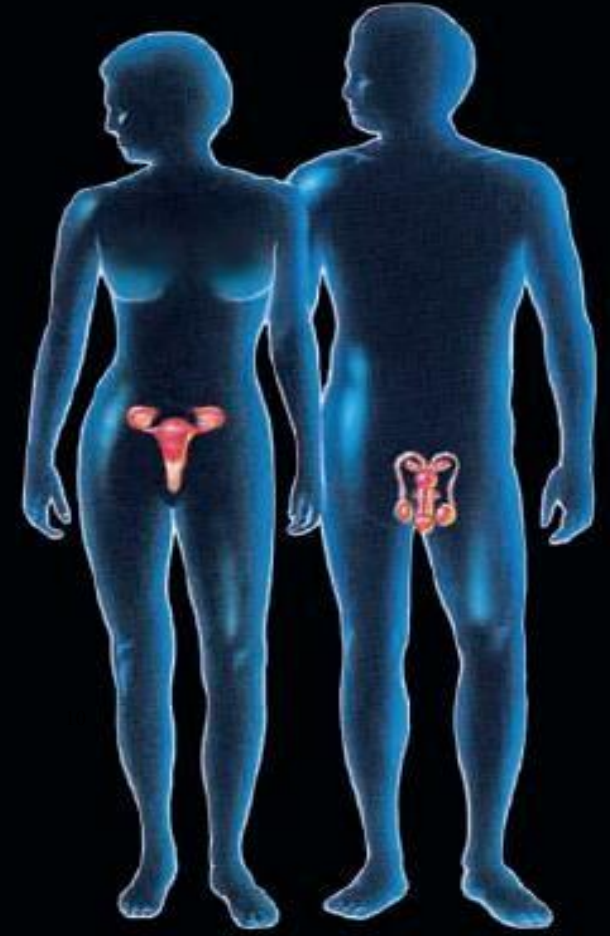
Immune system
lymph nodes, thymus, bone marrow, tonsils, adenoids, spleen, appendix, and, not shown, white blood cells, gut-associated lymphoid tissue, skin-associated



Nervous system
brain, spinal cord, peripheral nerves, and, not shown, special sense organs



Endocrine system
all hormone-secreting tissues, including hypothalamus, pituitary, thyroid, adrenals, endocrine pancreas, gonads, kidneys, pineal, thymus, and, not shown, parathyroids, intestine, heart, skin, adipose tissue



Reproductive system
Male: testes, penis, prostate gland, seminal vesicles, bulbourethral glands, associated ducts

Female: ovaries, oviducts, uterus, vagina, breasts

Functional organization of the nervous system

*Central nervous system

*Peripheral nervous system

CENTRAL NERVOUS SYSTEM

Brain

Spinal cord

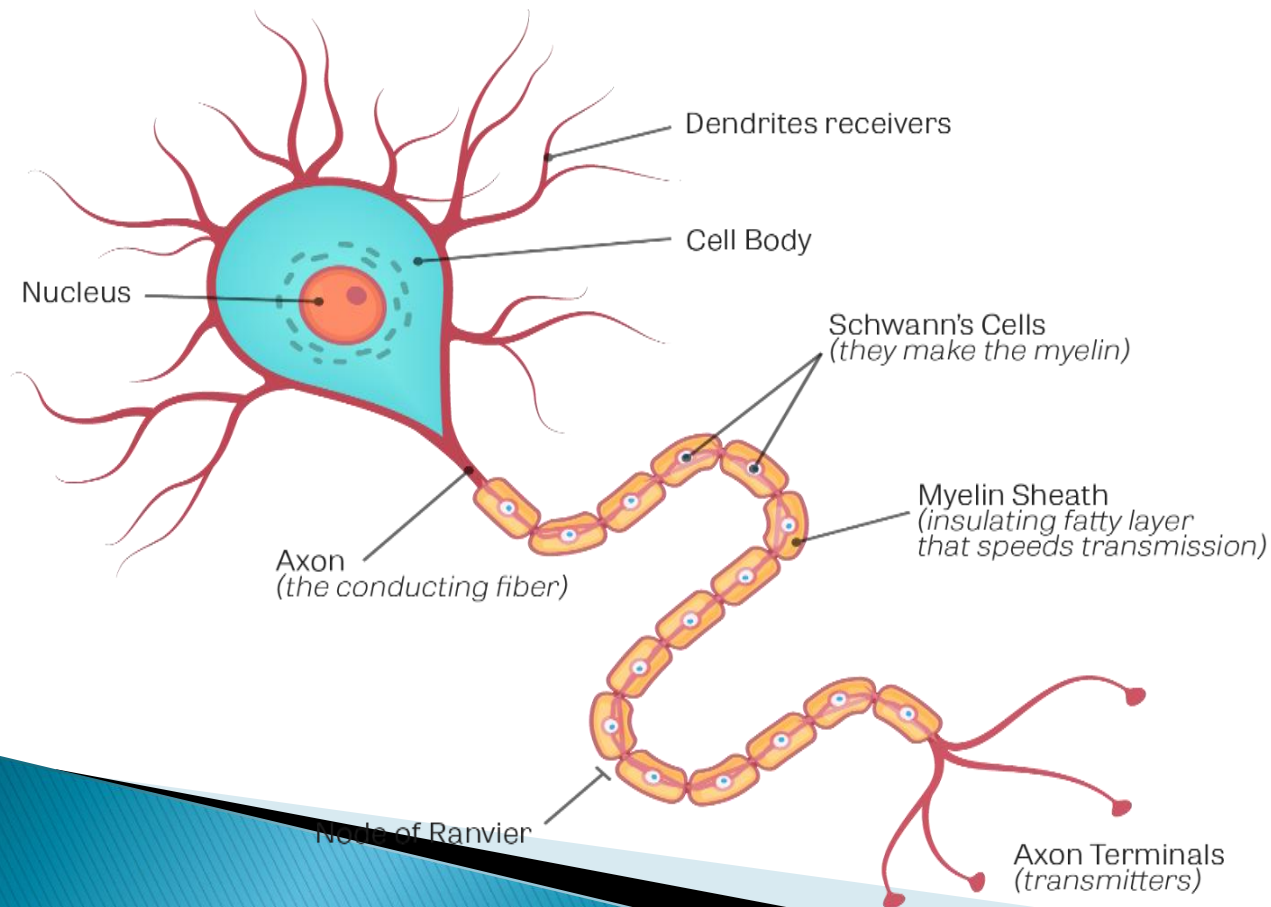
PERIPHERAL NERVOUS SYSTEM

Peripheral nerve

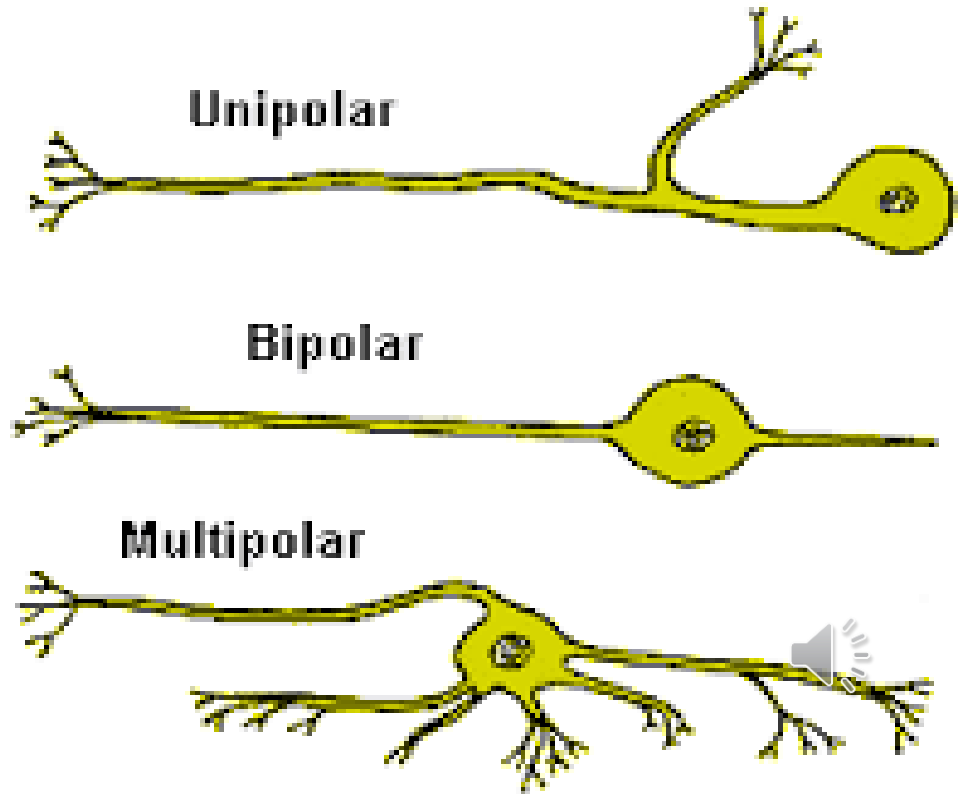


HISTO-PHYSIOLOGY OF THE NERVE CELLS

- The neuron is the structural unit of the nervous system
- It is formed of
 - cell body which has
 - short cytoplasmic extension (dendrites)
 - long cytoplasmic extension (axon) .



Types of Neurons



Nervous System Components

Central Nervous System

1-Brain is formed of

a-Cerebrum (two cerebral hemi-spheres) .

-Cerebral cortex =outer layer=gray matter = cell bodies .

-Subcortical nuclei =basal ganglia .

-Diencephalon: -thalamus .
 -hypothalamus.

b-Cerebellum .

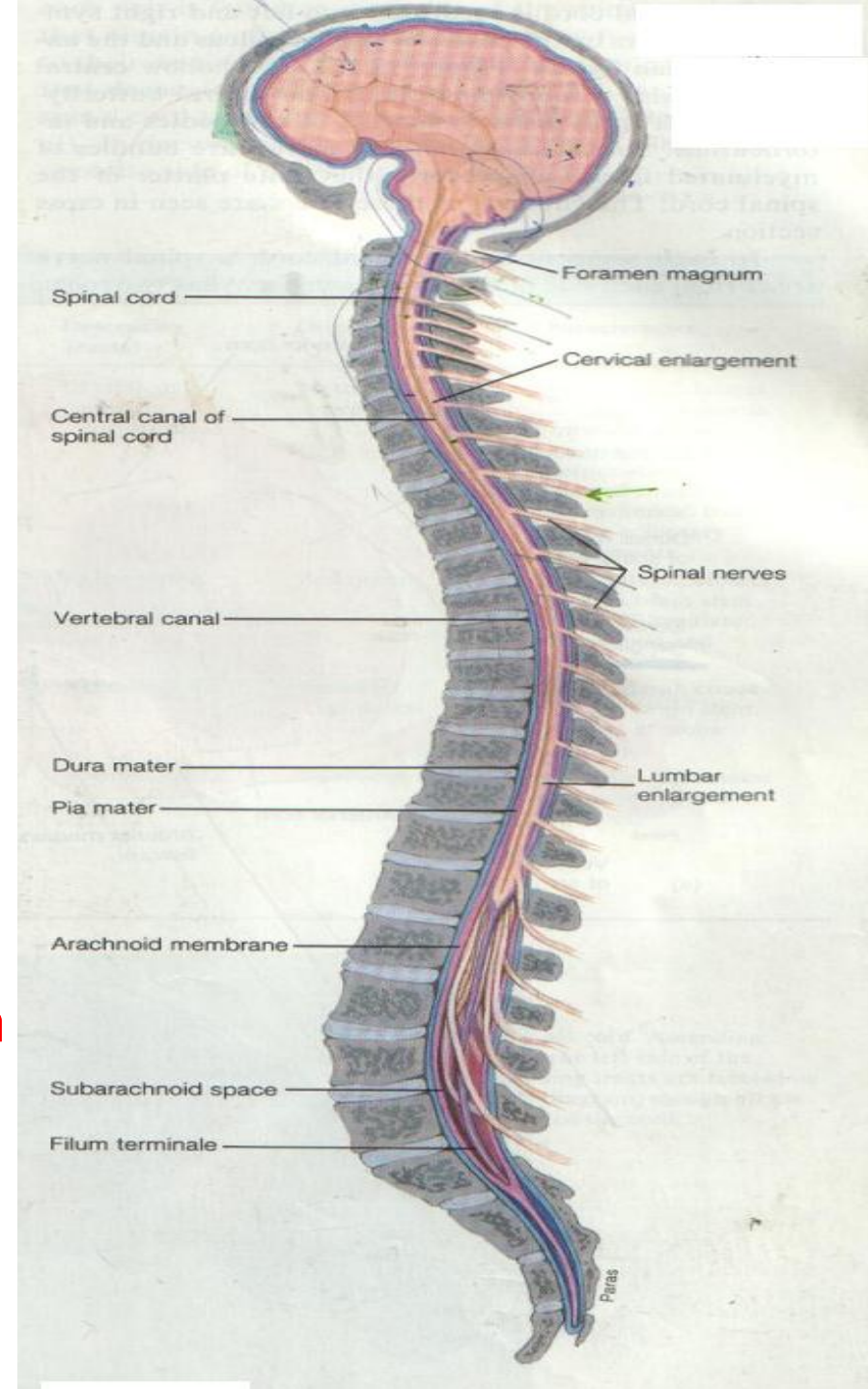
c-Brain stem-Midbrain (-cr.nerves ...3 ,4)
 -Pons (-cr.nerves 5,6,7,8)
 -Medulla oblongata (-cr.nerves 9,10,11,12)

2-Spinal cord

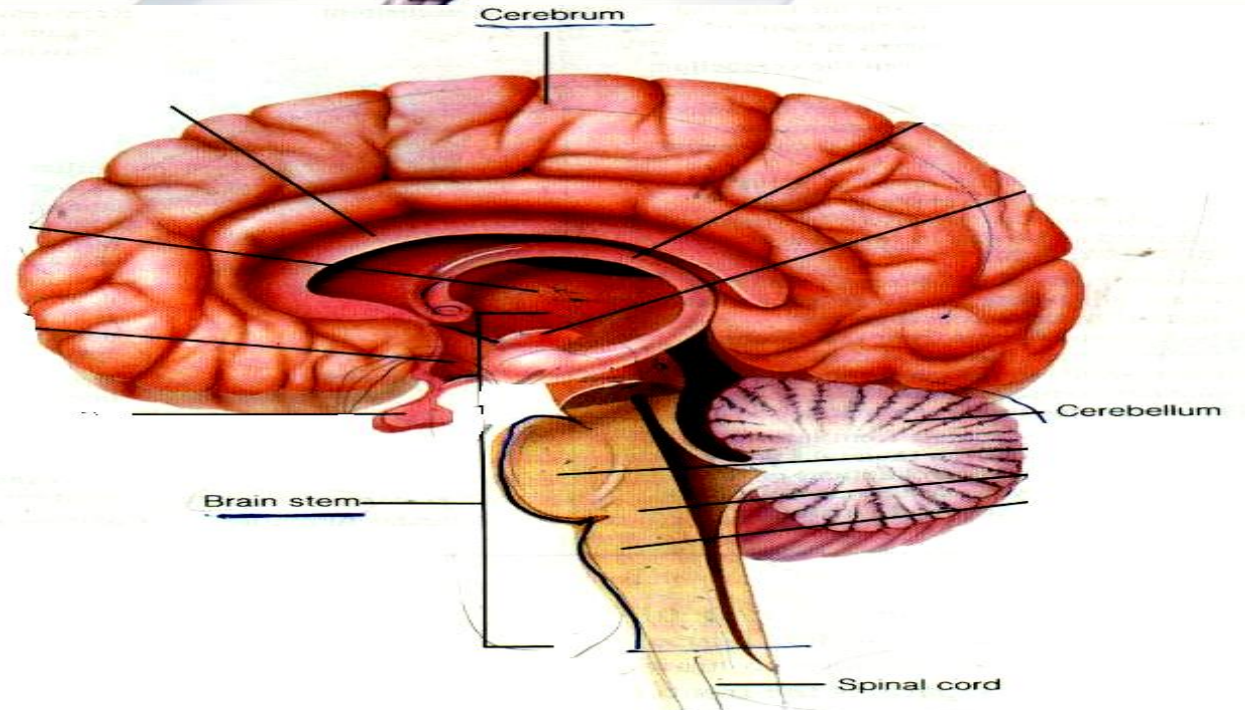
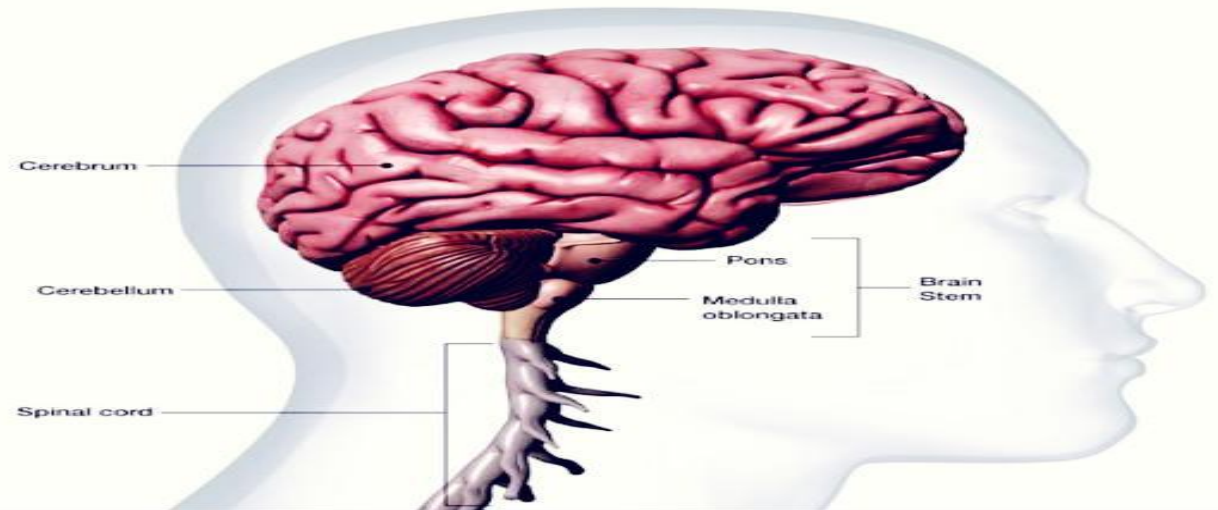
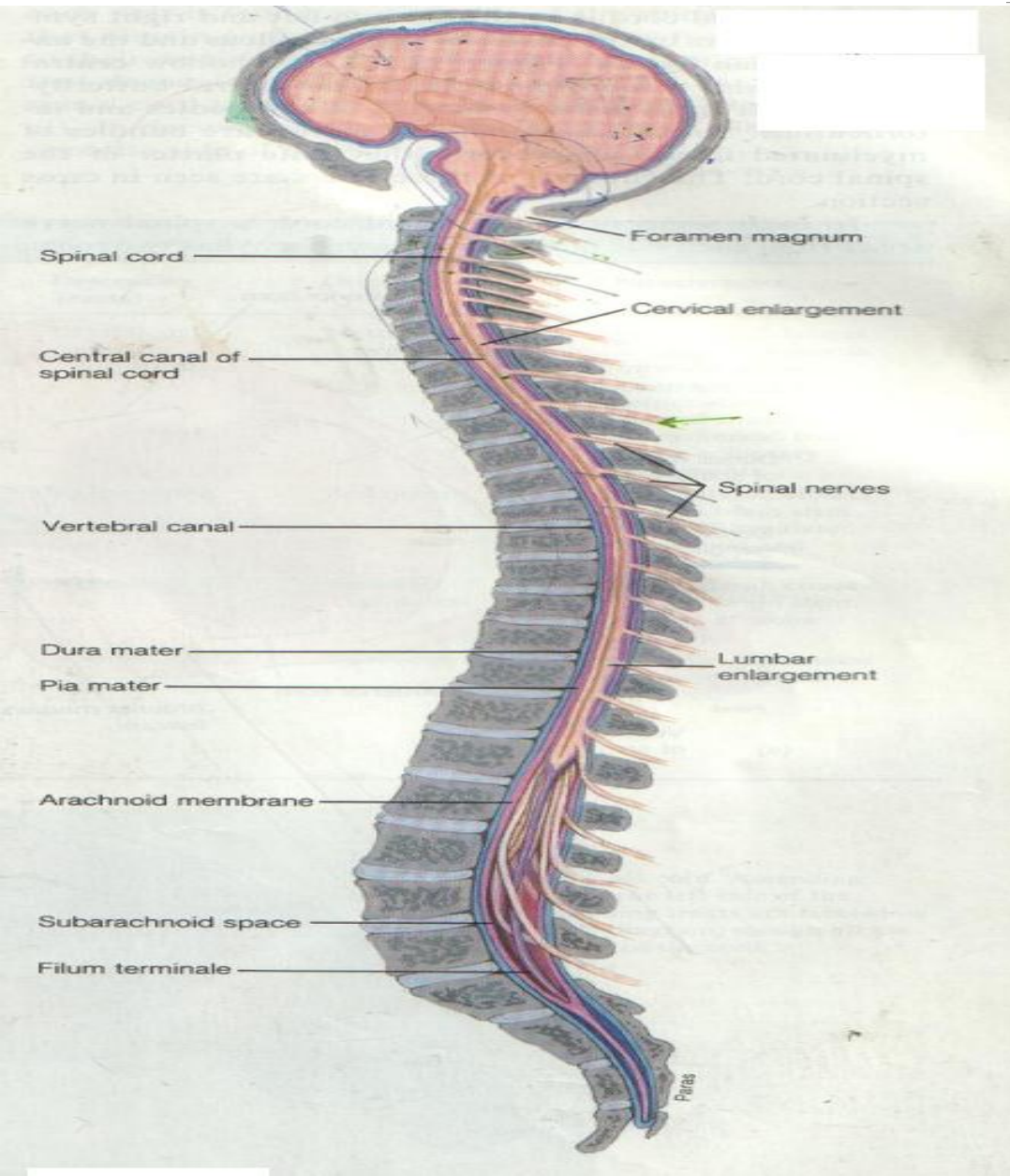
-Cranial nerves (12)pair

-Spinal nerves (31) pair

Peripheral Nervous System



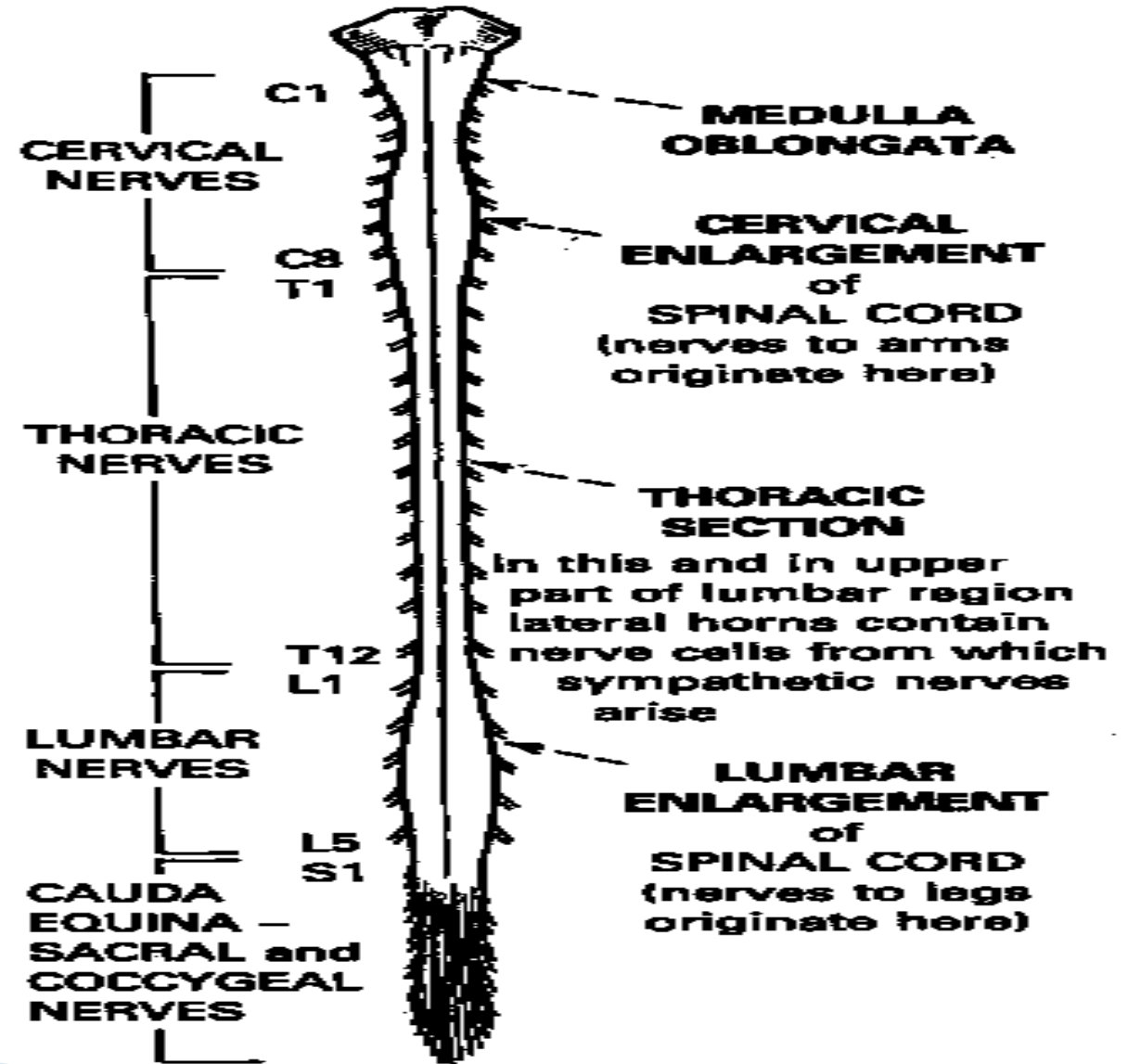
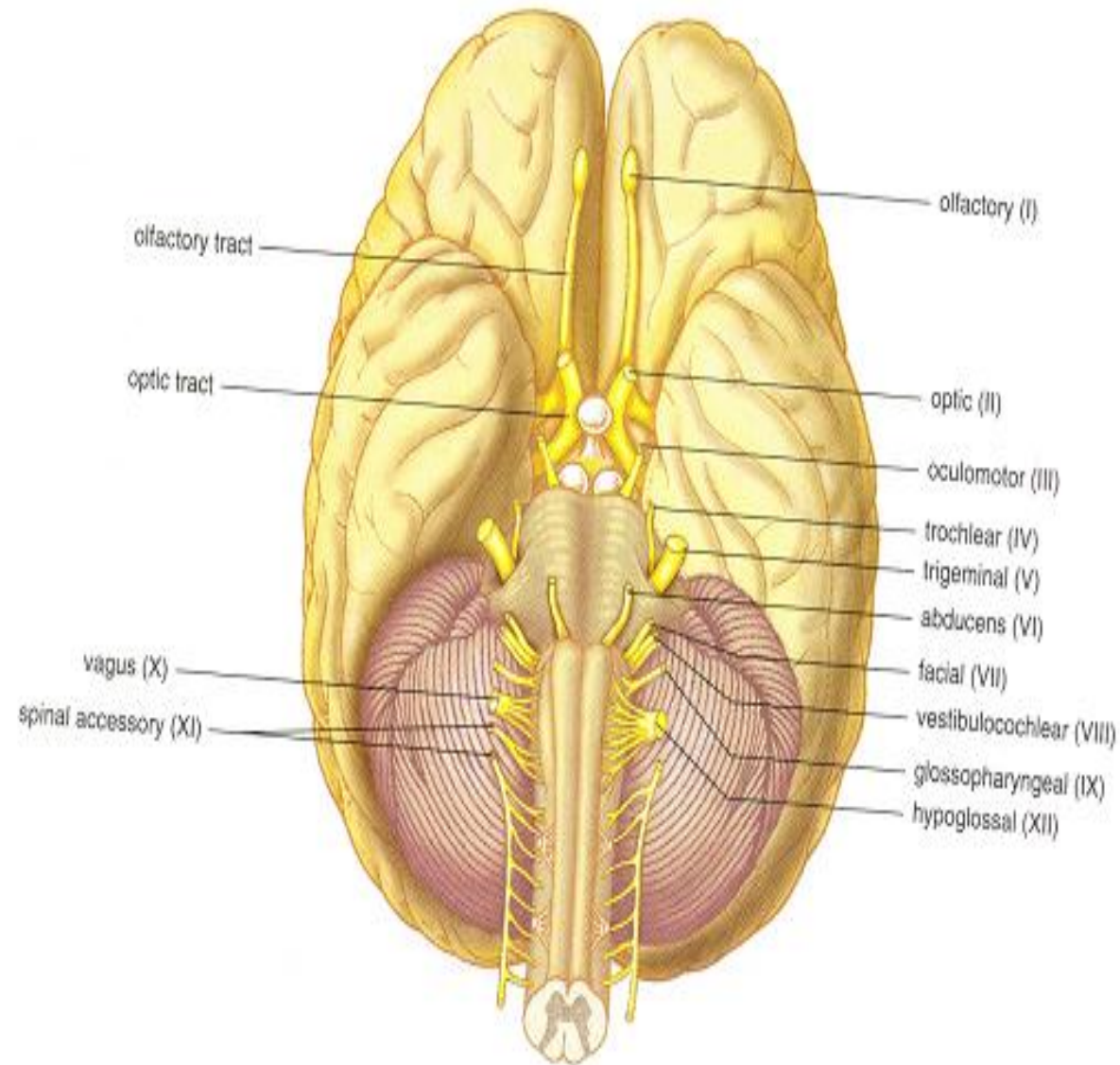
Central Nervous System



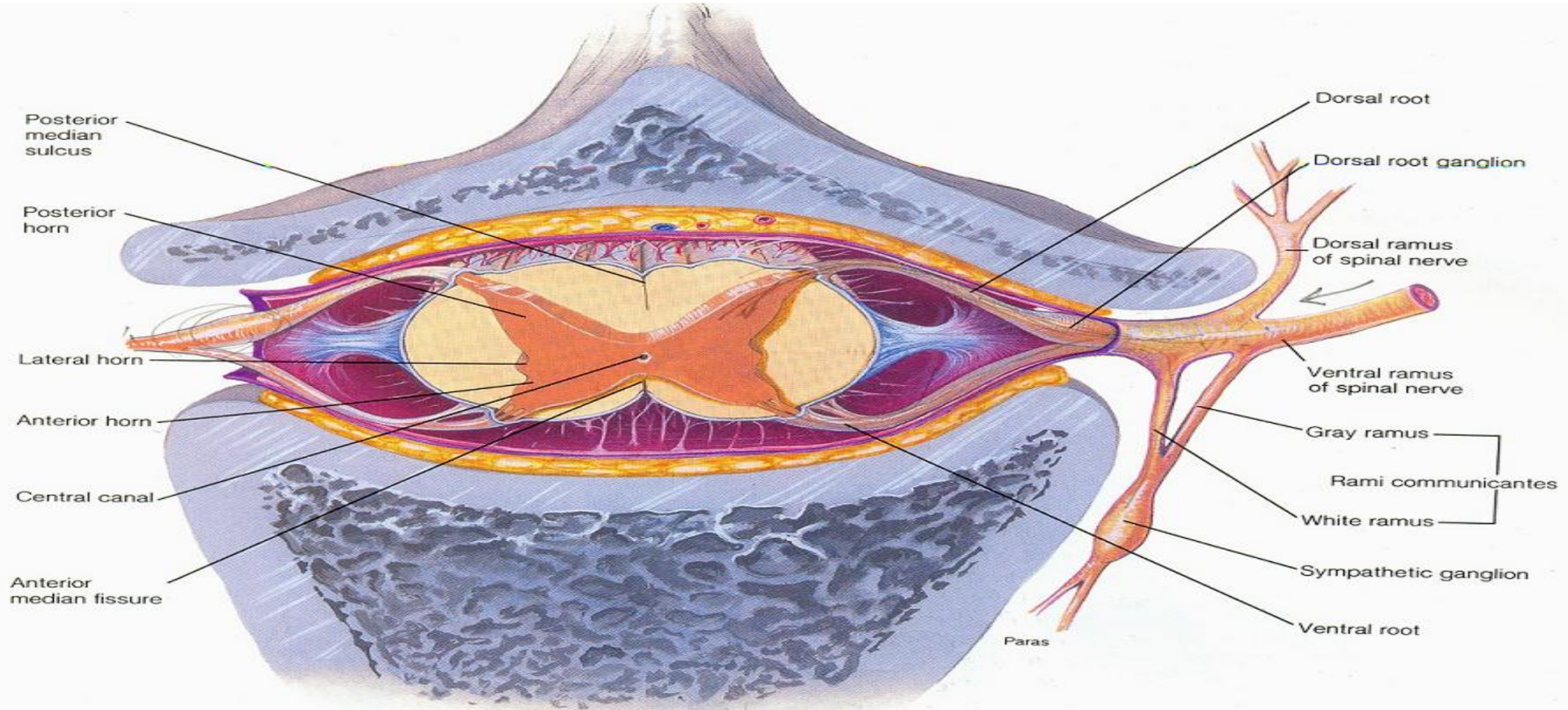
Peripheral NS

Cranial Ns

Spinal Ns



Transverse section of spinal cord



Functional unit of nervous system

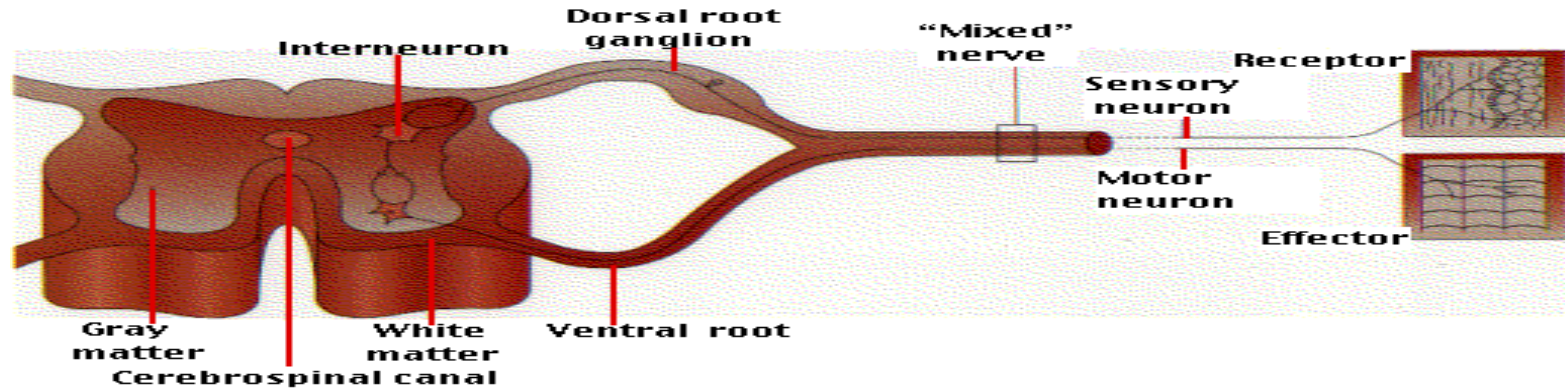
is the reflex arc

is the functional unit of the nervous system

Components:

- **Receptors (Rs):** detectors for the surrounding changes and transduce different forms of stimuli into electric impulses
- **Afferent (sensory) nerve fibers:** transmit electric impulses from RS → C.N.S.
- **Centre :** control and regulates the organs functions.
- **Efferent (motor) nerve fibers :** transmit commands from C.N.S. → effectors .

N.B: Effectors : are the target organs e.g: skeletal muscle and viscera .



Functional divisions of peripheral nervous system

Somatic nervous system

and

Autonomic N.S.

Function:-

control skeletal muscles activities (contraction)

–control the visceral functions

Action:

involuntary and voluntary(Rapid action(response)

–Involuntary slower action(response)

Reflex arc: characterized by

1–Afferent :

enter the spinal cord through the posterior (dorsal)root.
sensory nerve fibers.

sensory nerve fibers

2–Efferent :

leave the spinal cord through the anterior(ventral) root.

origin :

anterior(ventral)horn cells

lateral horn cells(preganglionic)

number :

one cell

two cells –preganglionic cell and postganglionic cell

3–Chemical Transmitter

is acetylcholine

acetylcholine or norepinephrine.

4– Effector:is

skeletal muscles

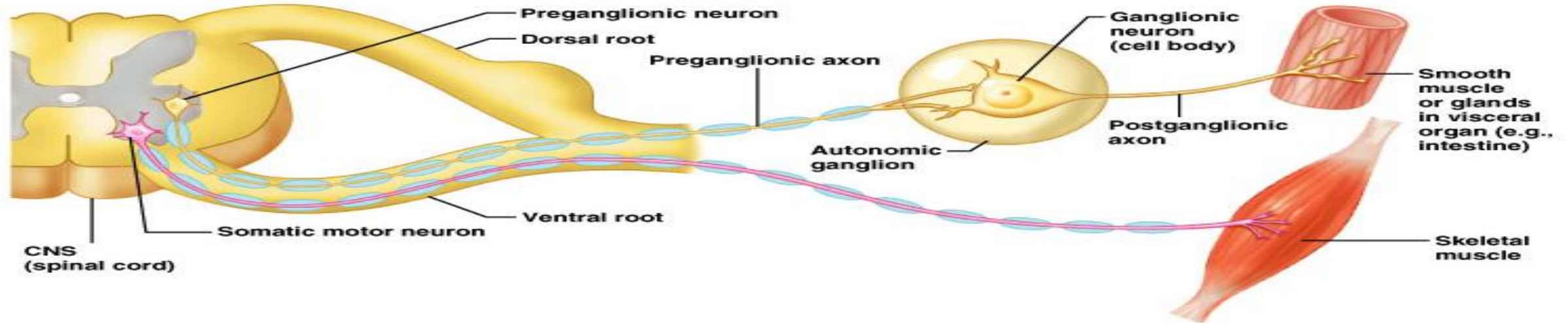
viscera

5–Response :is

always excitatory
(→skeletal muscles contraction)

is to modulate the function
(→excitation or inhibition)

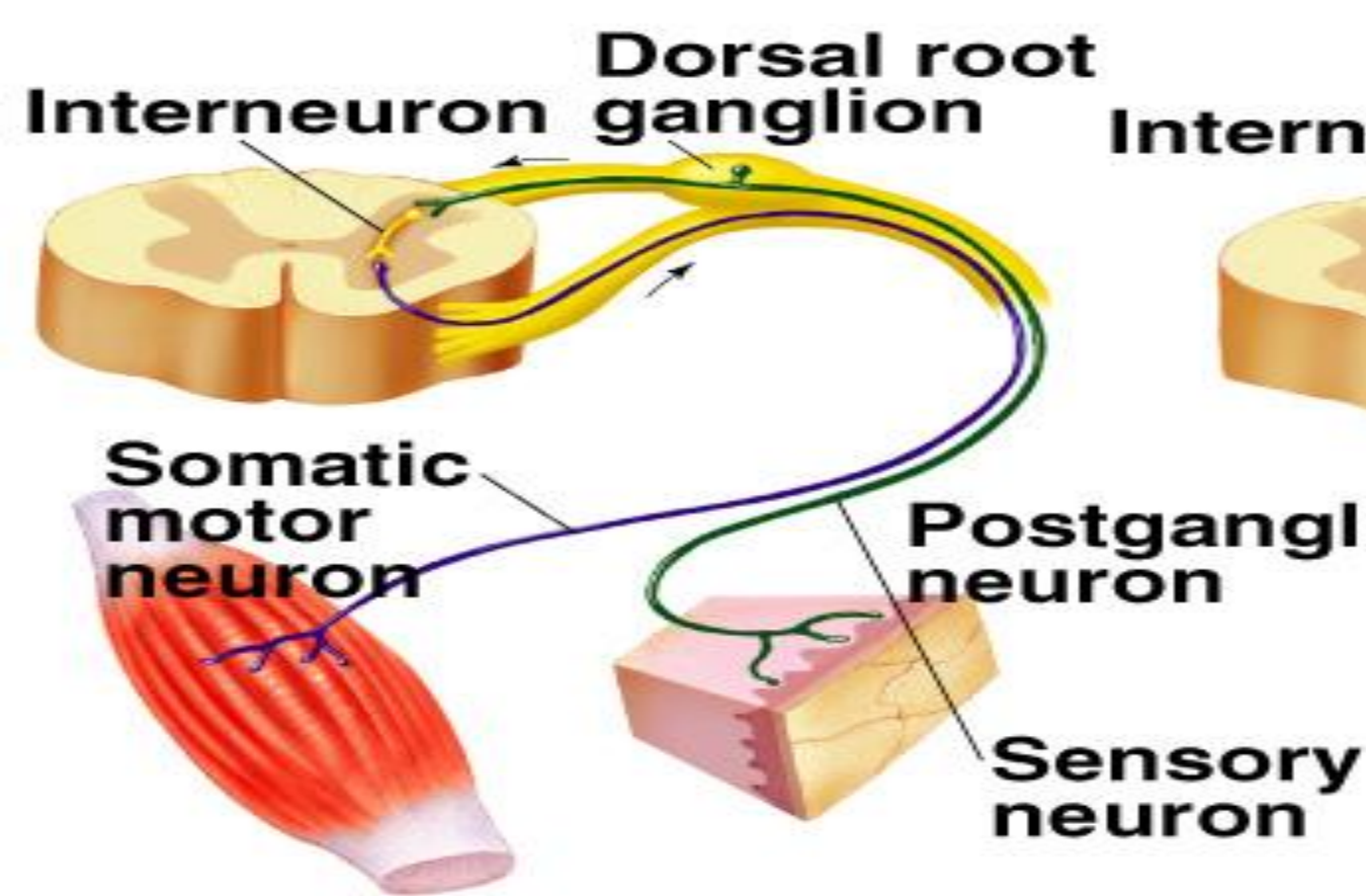
Comparison



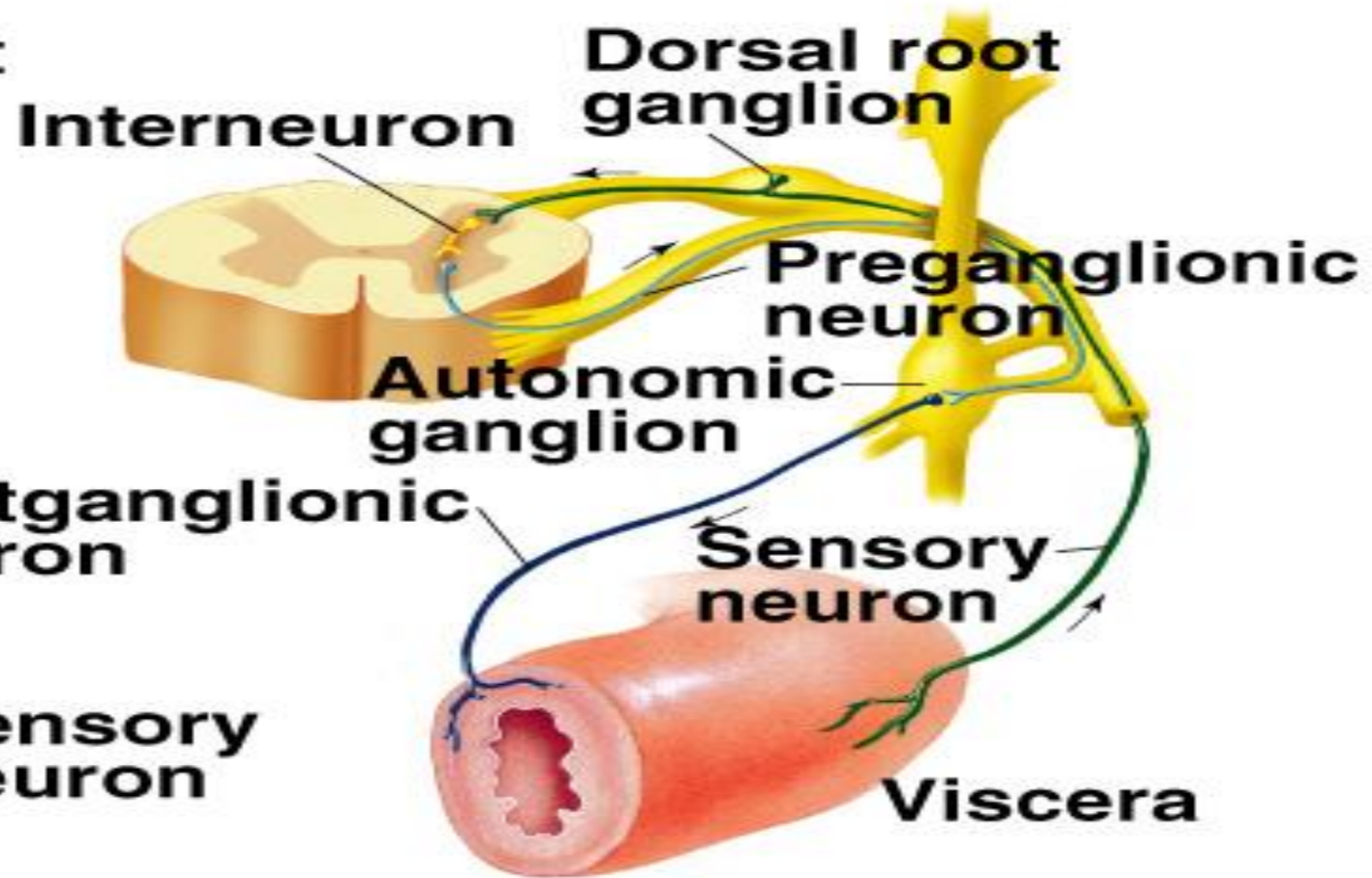
A Comparison of Somatic and Autonomic Function

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Somatic motor reflex



Autonomic motor reflex



الحمد لله

THANK YOU

