

HUMAN ANATOMY AND PHYSIOLOGY-I, BP-101(T)

UNIT-IV (Peripheral nervous system:)

CLASS:6

TOPIC – Structure And Functions Of Sympathetic and Parasympathetic Nervous System



The ANS is responsible for providing sensory and motor innervation to smooth muscles, blood vessels, glands, and internal organs. As such, it provides a coordinated regulation of visceral and glandular functions, playing a role in maintaining homeostasis. _____

The autonomic nerves are also peripheral in nature. Autonomic nerves synapse with a sympathetic or parasympathetic ganglion. The portion of the nerve before the ganglion is referred to as preganglionic and carries the impulse towards the cluster of cell bodies. The portion located from the ganglion onwards is called postganglionic and carries the impulse away from the cell bodies.

The ANS has three major branches: sympathetic, parasympathetic and enteric. The sympathetic division prepares the body for dealing with periods of increased physical activity through actions such as regulating blood vessels (often, but not always, vasoconstriction), dilating pupils, increasing heart rate and blood pressure, and decreasing peristalsis. The parasympathetic division helps the body to conserve energy, it has 'rest and digest', feeding, and breeding functions. This is carried out by actions that slow the cardiovascular system, stimulates gland secretion and increases peristalsis. The PNS is also involved in sexual arousal and lacrimation (crying). The enteric nervous system (ENS) lies within the walls of the gastrointestinal tract and consists of the myenteric (Auerbach) and submucosal (Meissner) plexuses. They work together to control peristalsis within the digestive system. This system is often described as the second brain because it acts independently while only being influenced by impulses from the ANS.

Sympathetic division

The **preganglionic fibers** of the sympathetic nerves leave the spinal cord through the **T1 to L2 anterior roots**, entering the corresponding spinal nerve. The fibers then travel through the **white rami communicantes** to paravertebral ganglia of the **sympathetic trunks**, located on either side of the vertebral column.

Some fibers synapse here, while others travel through it without synapsing, exiting the sympathetic trunks as the splanchnic nerves (greater, lesser, least, lumbar, sacral). These splanchnic nerves synapse closer to their target organs in prevertebral ganglia called celiac, aorticorenal, and mesenteric (superior and inferior). The postganglionic fibers then project onto their target structures either directly, or by returning through the grey ramus communicantes and following the path of spinal nerves throughout the body. Target organs include blood vessels, sweat glands, arrector pili, the iris, and internal organs. One example target organ of the sympathetic nervous system is the adrenal gland. Sympathetic nervous system activity stimulates the release of epinephrine/adrenaline via the sympathetic-adrenal medullary system.

Parasympathetic division

The parasympathetic nervous system is divided into cranial and sacral outflows. The preganglionic fibers of the cranial outflow exit the brainstem within the oculomotor, facial, glossopharyngeal, and vagus cranial nerves. They synapse in the ciliary, pterygopalatine, otic, submandibular, and enteric ganglia. The postganglionic fibers ultimately innervate salivary glands of the head, iris and ciliary muscles of the eye and, in the case of the vagus nerve, thoracic and abdominal viscera.

The preganglionic fibers of the sacral outflow are much more restricted, only exiting the spinal cord through the anterior roots of the S2-S4 spinal nerves. They travel with the pelvic splanchnic nerves, ultimately innervating the pelvic viscera (descending colon, sigmoid colon, rectum, bladder, penis/clitoris).

IMPORTANT QUESTIONS:**2M QUESTIONS:**

- 1) Differentiate sympathetic and parasympathetic nervous system.
- 2) Differentiate spinal nerves and cranial nerves.
- 3) What is Astigmatism.

5M QUESTIONS:

- 1) Different between sympathetic and parasympathetic nervous system.
- 2) Write a note sympathetic and parasympathetic nervous system.
- 3) Explain cranial nerves along with their functions.
- 4) Explain spinal nerves along with their functions.

10 M QUESTIONS:

- 1) Different between sympathetic and parasympathetic nervous system.
- 2) Write a note sympathetic and parasympathetic nervous system.
- 3) Explain cranial nerves along with their functions.
- 4) Explain spinal nerves along with their functions.