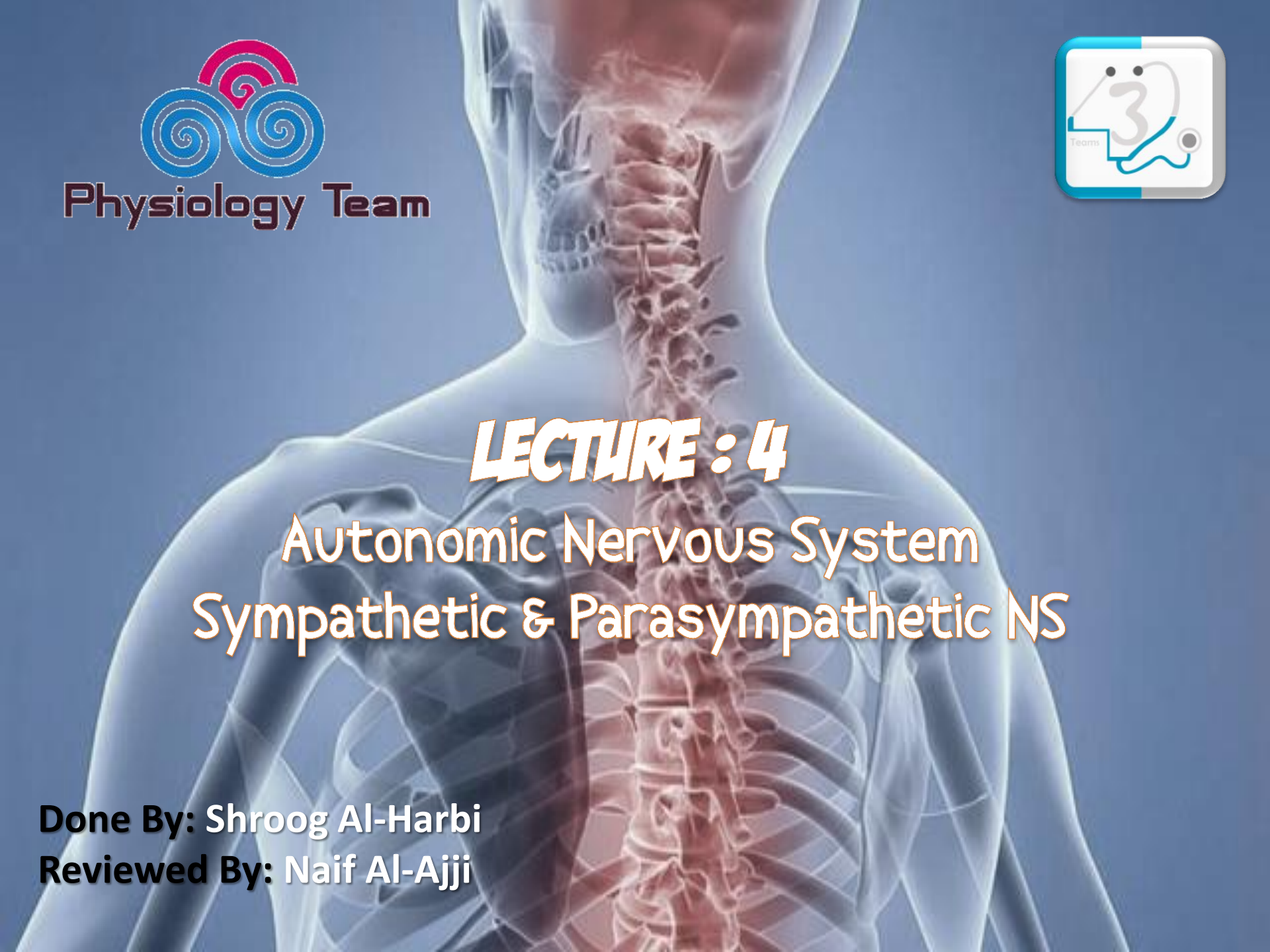

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LECTURE : 4

Autonomic Nervous System
Sympathetic & Parasympathetic NS

Done By: Shroog Al-Harbi
Reviewed By: Naif Al-Ajji

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OBJECTIVES

At the end of this lecture, student should be able to describe:

- Appreciate the anatomy of sympathetic & parasympathetic nervous system.

- Explain physiological functions of Sympathetic & parasympathetic nerves in head & neck, chest, abdomen and pelvis.

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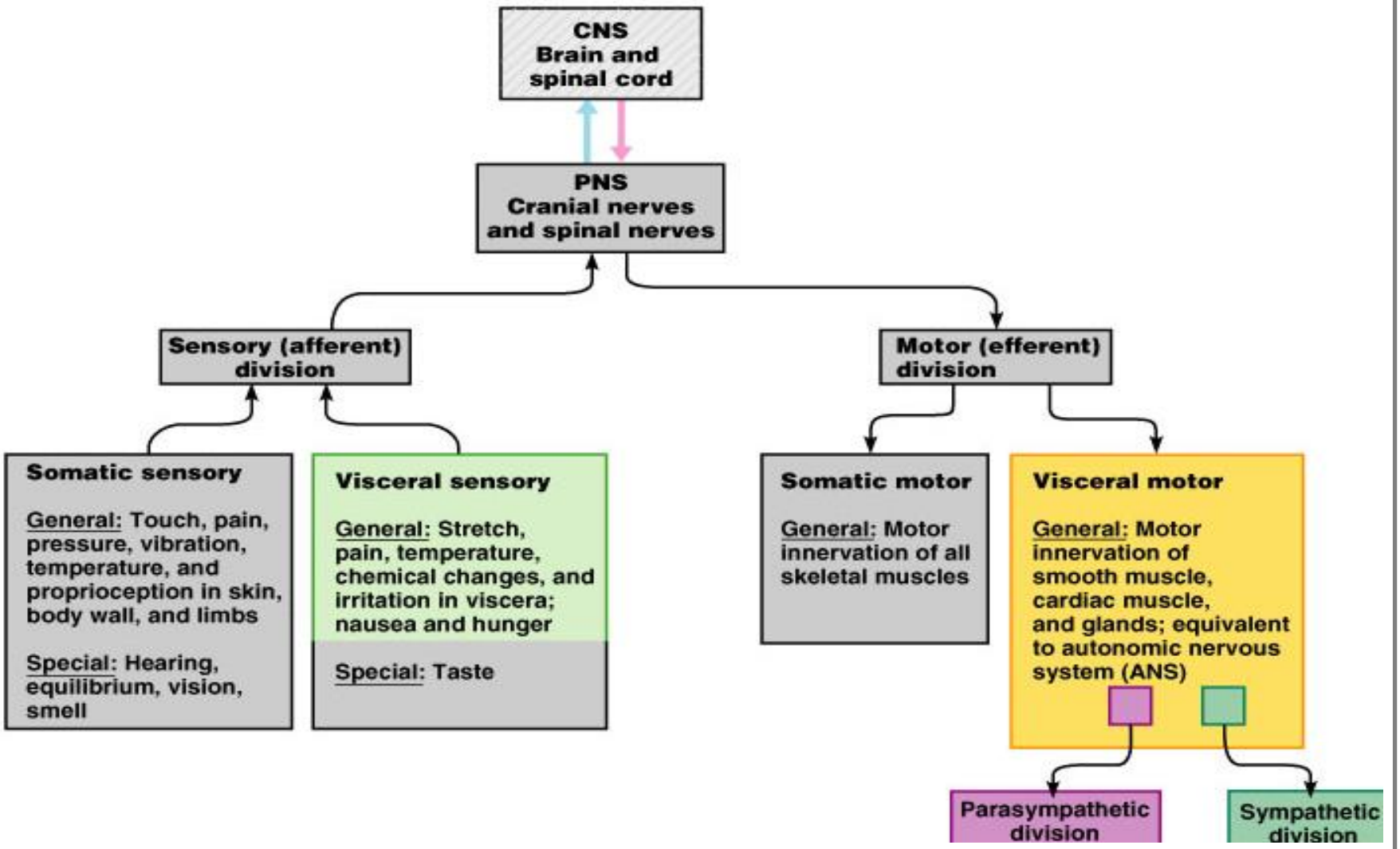
MIND MAP



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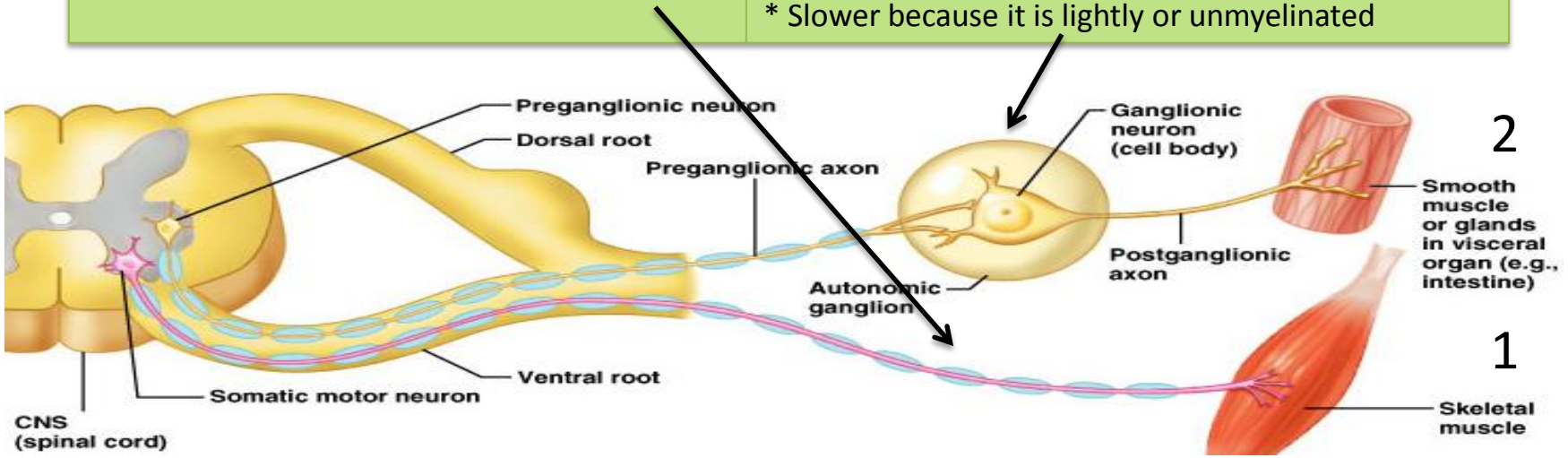
Basic anatomical difference between the motor pathways of the voluntary somatic nervous system(to skeletal muscles) and those of the autonomic nervous system:

1) Somatic division:	2) Autonomic system: chains of two motor neurons:
*Cell bodies of motor neurons reside in CNS (brain or ventral horn of the spinal cord) *Their axons (sheathed in spinal nerves) *it supply Skeletal muscle It has one ganglionic axon *faster Because it is myelinated	*1st = preganglionic neuron (in brain or lateral horn of spinal cord) *2nd = ganglionic neuron (outside CNS) * It has Two ganglionic axons : Axon of 1st (preganglionic) neuron leaves CNS to synapse with the 2nd (ganglionic) neuron Axon of 2nd (ganglionic) neuron extends to the organ it serves * Slower because it is lightly or unmyelinated



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Autonomic Nervous System

*ANS is the subdivision of the peripheral nervous system that regulates body activities that are generally not under conscious control.

*Visceral motor innervates non-skeletal (non-somatic) muscles Composed of a special group of neurons serving:

-Cardiac muscle (the heart)

-Smooth muscle (walls of viscera and blood vessels)

-Internal organs

-Skin

Autonomic Nervous System

Sub.	Nerves Employed	Location of Ganglia	Chemical Messenger	General Function	Pre-ganglionic neurons	Post-ganglionic neurons
Sympathetic next slide 2	(Thoracolumbar) lateral horns of the spinal segments T1-L2(Nerve fibers originate between T1 & L2)	paravertiebralTrunk ganglia near vertebral bodies Prevertebral ganglia near large blood vessel in gut: celiac, superior mesenteric &inferior mesenteric next slide 1	Norepinephrine	fear, flight or fight	Short, lightly myelinated	Long, unmyelinated
Parasympathetic next slide 3	(Craniosacral) Craniosacral Cell bodies of the motor nuclei of the cranial nerves III, VII, IX and X in the brain stem [S2-S4] sacral segments of the spinal cord (Nerve fibers emerge from brain & sacrum cranio-sacral outflow)	On or near an effector organ	at both pre and postganglionic synapses is Acetylcholine	Conservation of body energy(rest and digest" activity)	Long, myelinated	Short, unmyelinated

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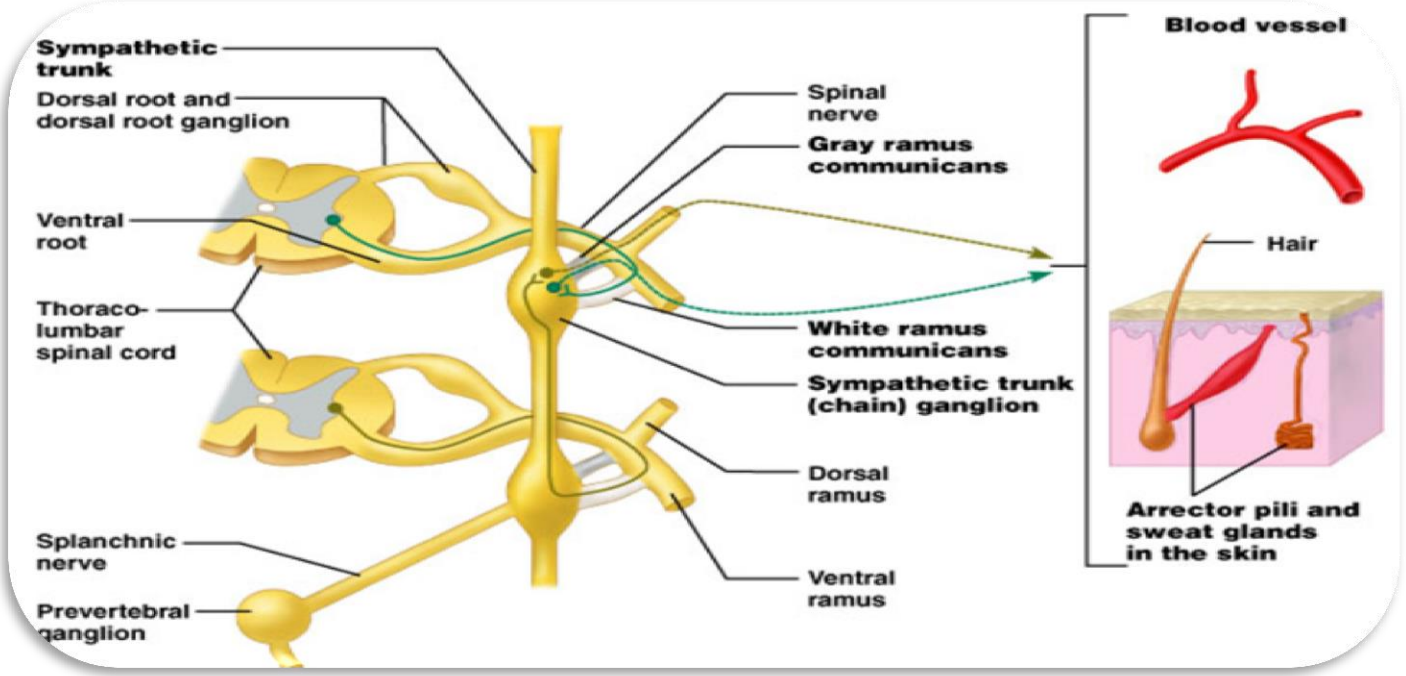
1



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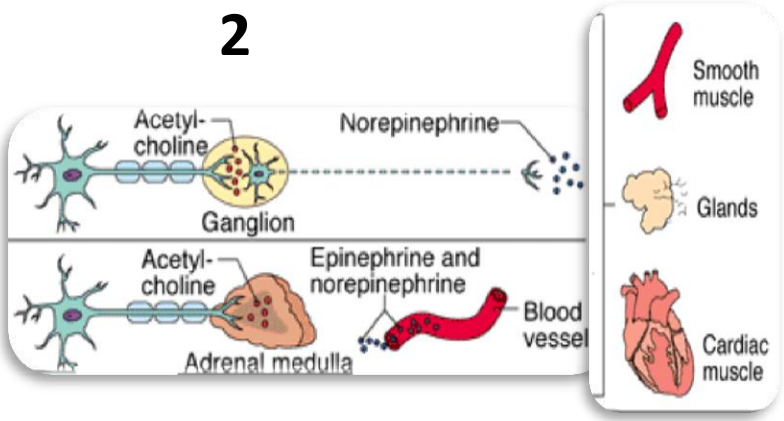

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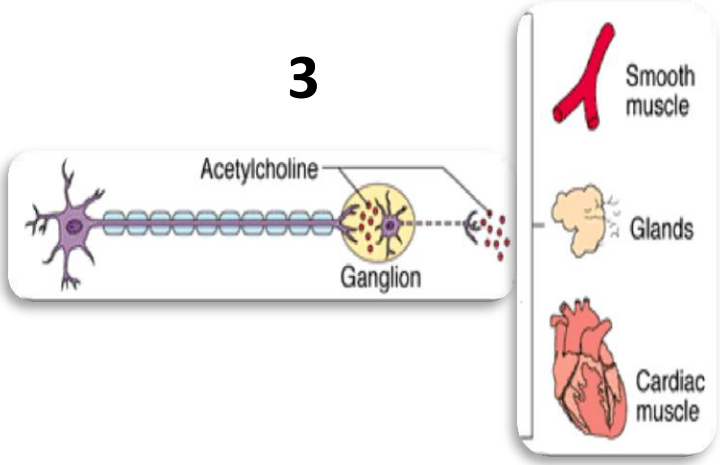

■ Slides ■ Important ■ Doctor's Notes ■ Explanation ■ Boy's Slides

Parasympathetic Nervous System

- The cranial nerves III, VII and IX affect the pupil and salivary gland secretion.
- Vagus nerve (X) carries fibres to the heart, lungs, stomach, upper intestine and ureter.
- The sacral fibres form pelvic plexuses which innervate the distal colon, rectum, bladder and reproductive organs.

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Autonomic Nervous System

Structure	Sympathetic Stimulation	Parasympathetic Stimulation
Iris (eye muscle)	Pupil dilation Sympathetic nerves dilate the pupil and relax the lens, allowing more light to enter the eye.	Pupil constriction
Salivary Glands	Saliva production reduced	Saliva production increased
Oral/Nasal Mucosa	Mucus production reduced	Mucus production increased
Heart	Heart rate and force increased It increases heart rate and the contractility of cardiac cells (myocytes), thereby providing a mechanism for the enhanced blood flow to skeletal muscles.	Heart rate and force decreased
Lung	Bronchial muscle relaxed which allows for greater alveolar oxygen exchange.	Bronchial muscle contracted
Stomach	Peristalsis reduced	Gastric juice secreted; motility increased
Small Intes	Motility reduced	Digestion increased
Large Intes	Motility reduced	Secretions and motility increased
Liver	Increased conversion of glycogen to glucose	
Kidney	Decreased urine secretion	Increased urine secretion
Adrenal medulla	Norepinephrine & epinephrine secreted	
Bladder	Wall relaxed Sphincter closed	Wall contracted Sphincter relaxed

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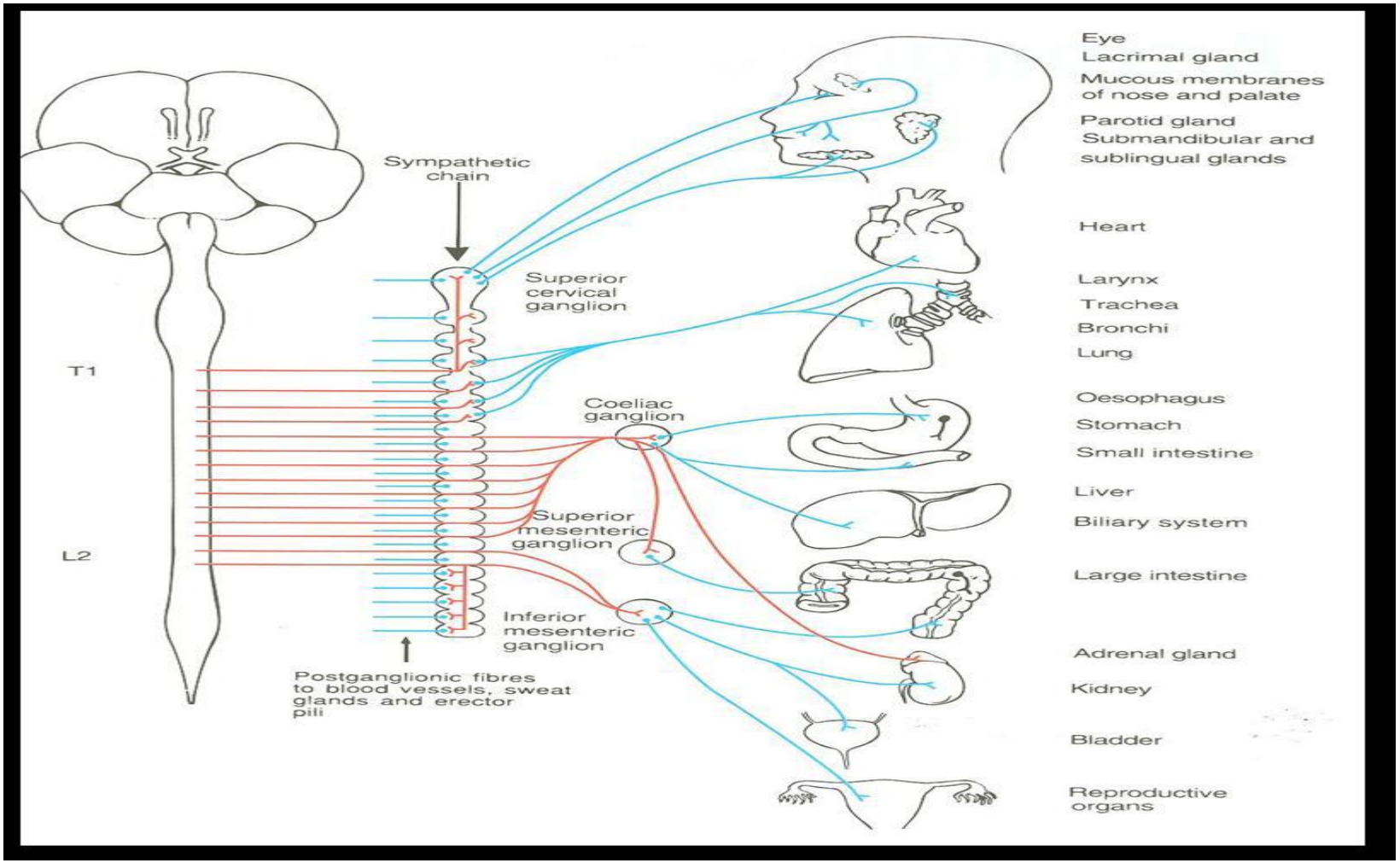
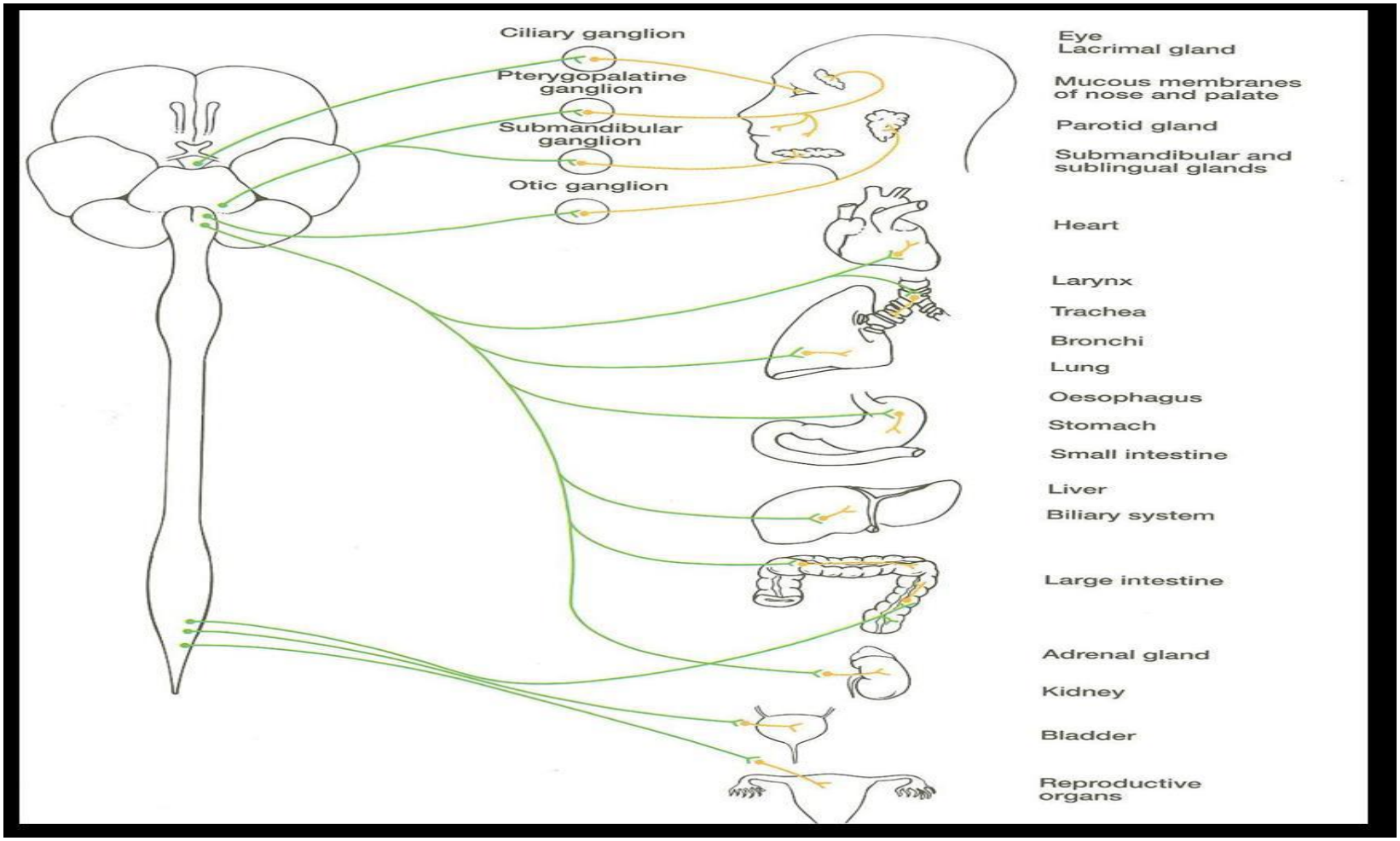
SYMPATHETIC NERVOUS SYSTEM



PARASYMPATHETIC NERVOUS SYSTEM



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SUMMARY

*The nervous system monitors and controls almost every organ / system through a series of positive and negative feedback loops.
*The Central Nervous System (CNS): Includes the brain and spinal cord.
*The Peripheral Nervous System (PNS): Formed by neurons & their process present in all the regions of the body.
*It consists of cranial nerves arises from the brain & spinal nerves arising from the spinal cord.
*The peripheral NS is divided into:Somatic Nervous system &Autonomic nervous system
*The autonomic nervous system consist of sympathetic and parasympathetic nervous system
*The sympathetic system enables the body to be prepared for fear, flight or fight
* The parasympathetic nervous system has "rest and digest" activity.

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QUESTIONS

1=D, 2=A, 3=C

1- Regarding the sympathetic nervous system, which one of the following statements is Correct?

A. Its preganglionic axons are long.
B. It supplies pelvic viscera.
C. Its preganglionic neurons are located in the sacral segments of spinal cord.
D. Its postganglionic neurons are located in the coeliac & mesenteric plexuses.

2- Which one of these functions would not be controlled by they autonomic nervous system:

A. Swallowing.
B. Contraction of the stomach muscles.
C. Beating of the heart.
D. Body temperature.

3- Which definition is correct for Ganglion:

a. group of nerve fibers (axons) outside the CNS
b. A group of nerve fibers (axons) within the CNS
c. A group of neurons outside the CNS
d. A group of neurons within the CNS

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THE END

If there are any Problems or Suggestions,
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THANK YOU