THE NERVOUS SYSTEM

OBJECTIVES

At the end of this lectutre (1)the student should be able to:-

- **-appreciate the anatomy of symathetic& parasympathetic nervous system.**
- **-explain physiological functions of Symathetic &parasympathetic nerves in head&neck,chest,abdomen and pelvis**

* This note isn't include all points in the lecture , it's a summarization of the important point !

*

RED = very Important

Blue = Sections or new Terminology you should know .

Other color just to disperse .

- **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)

cranial nerves & spinal nerves

***Formed by neurons & their process present in all the regions of the body.**

Autonomic nervous system

(involuntary)

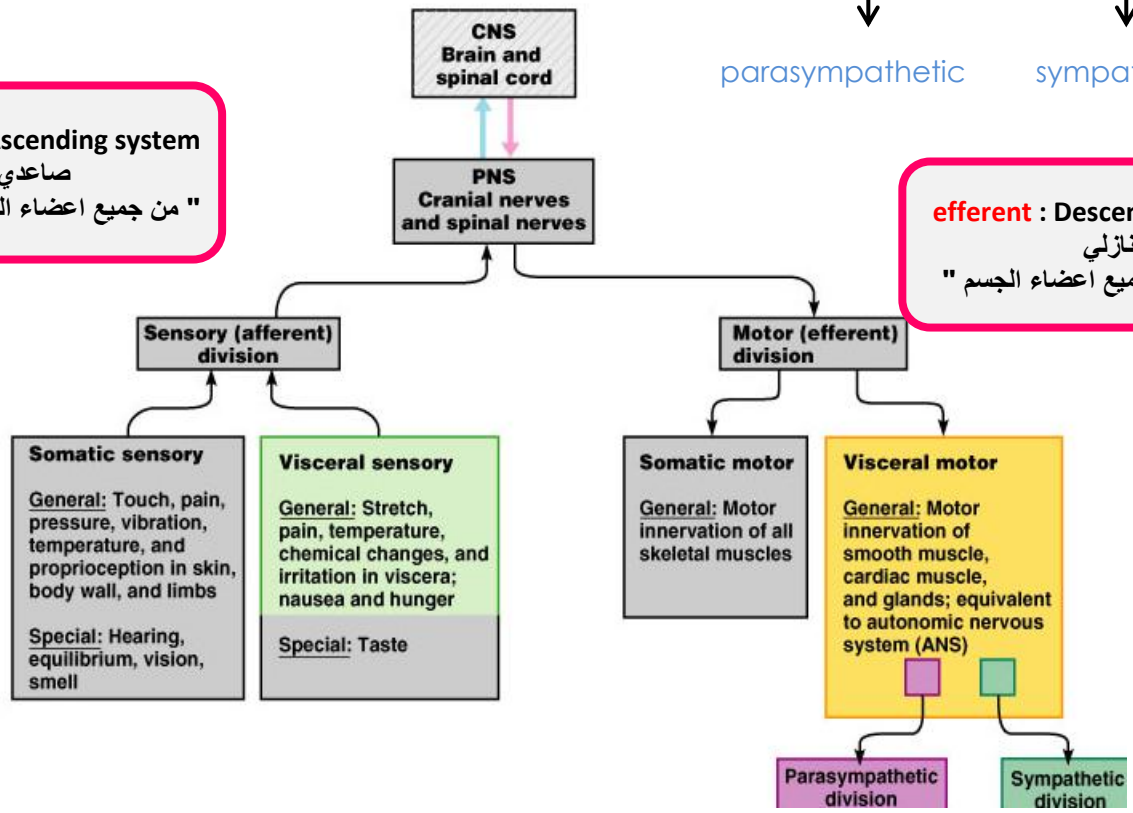
Somatic Nervous system

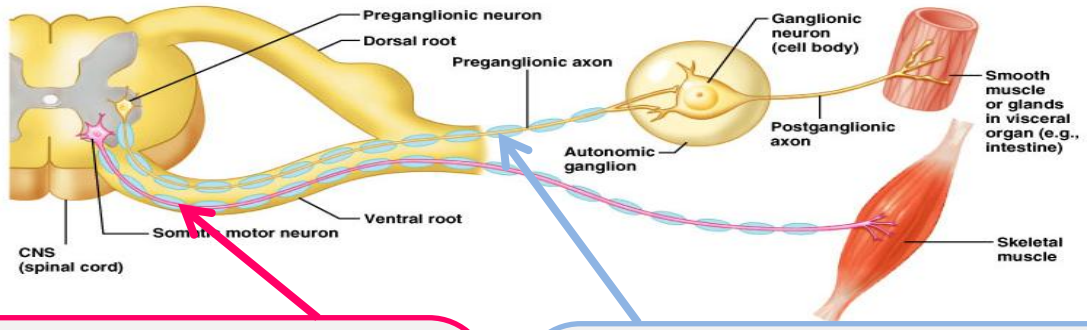
(Voluntary)

parasympathetic sympathetic

Afferent : Ascending system
صاعدي
" من جميع اعضاء الجسم للدماغ "

efferent : Descending system
تنازلي
" من الدماغ لجميع اعضاء الجسم "





Somatic nerve

* it supply **Skeletal muscle**
* Cell bodies of motor neurons reside in **CNS** (brain or spinal cord) " **ventral hole** of the spinal cord .
* It has **one** ganglionic axon :
" extend all the way to their skeletal muscles "
myelinated
" مباشرة

Autonomic nerve

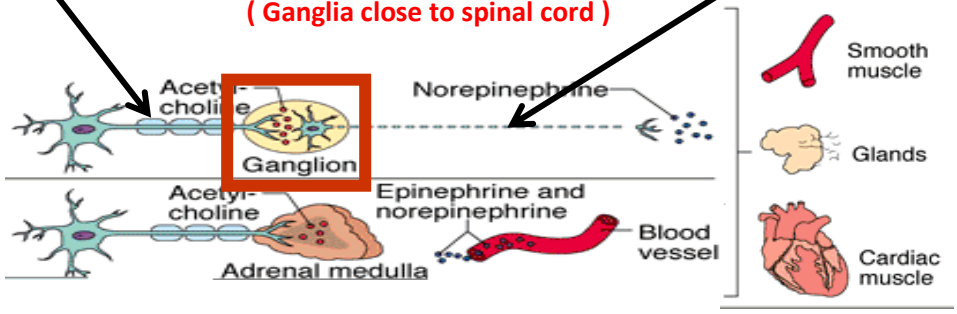
* 1st = preganglionic neuron (in brain or cord)
2nd = ganglionic neuron (cell body in ganglion outside CNS)
" lateral hole " .
* It has **Two** ganglionic axons :
Preganglionic – Postganglionic
* **Slower** because lightly or unmyelinated
" غير مباشر فيكون ابطأ "

Sympathetic

Short , lightly myelinated
Preganglionic neuron

Long , unmyelinated
Postganglionic neuron

(Ganglia close to spinal cord)

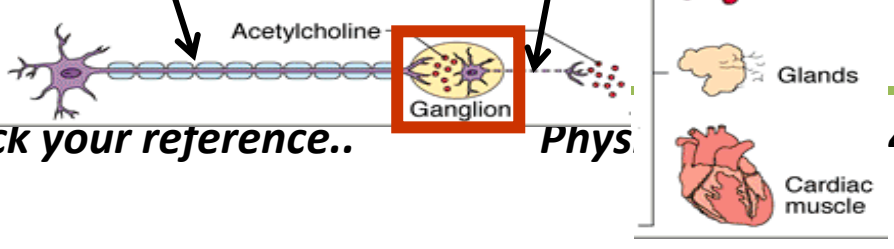


Parasympathetic

preganglionic neuron - Long

postganglionic neuron - Short

(Ganglia close to target organs)



Sympathetic – Origin → Thoracolumbar lateral horns of the spinal segments T1-L2.

Parasympathetic – Origin → Craniosacral Cell bodies of the motor nuclei of the cranial nerves

the cranial nerves III, VII, IX and X in the brain stem

The cranial nerves III, VII and IX affect the pupil and salivary gland secretion

Second, third and fourth [S2-S4] sacral segments of the spinal cord

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.

SYMPATHETIC NERVOUS SYSTEM FUNCTIONS

* **The sympathetic system enables the body to be prepared for fear, flight or fight**

1-Sympathetic responses include an increase in heart rate, blood pressure and cardiac output

2-Diversion of blood flow from the skin and splanchnic vessels to those supplying skeletal muscle .

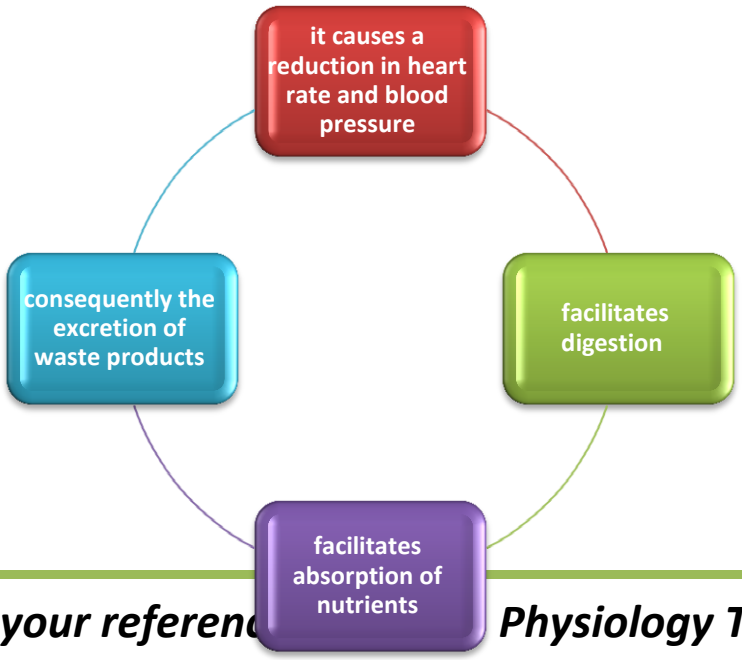
3-Increased pupil size, bronchiolar dilation(which allows for greater alveolar oxygen exchange) contraction of sphincters and metabolic changes .

It increases heart rate and the contractility of cardiac cells

thereby providing a mechanism for the enhanced blood flow to skeletal muscles.

* **The parasympathetic nervous system has "rest and digest" activity**

In physiological terms, the parasympathetic system is concerned with conservation and restoration of energy **:**



* PHYSIOLOGICAL FUNCTIONS OF THE AUTONOMIC NERVOUS SYSTEM

Structure	Sympathetic Stimulation	Parasympathetic Stimulation
Iris (eye muscle)	Pupil dilation	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	Heart rate and force decreased
Lung	Bronchial muscle relaxed	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 and epinephrine secreted	-
Bladder	Wall relaxed Sphincter closed	Wall contracted Sphincter relaxed

Subdivision	Nerves Employed	Location of Ganglia	Chemical Messenger	General Function
Sympathetic	Thoracolumbar	Alongside vertebral column	Norepinephrine	Fight or flight
Parasympathetic	Craniosacral	On or near an effector organ	Acetylcholine	Conservation of body energy

Good luck =) !

By :

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