

Autonomic Nervous System

By

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The Parasympathetic nervous System

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- It is the part of the autonomic nervous system, which deals with the **anabolic activities** and lead to **conservation of body energy**. It is also called the **Cranio-sacral outflow** secondary to its origin.

- **Parasympathetic is divided into:**

Parasympathetic cranial outflow

- Parasympathetic fibers are found in the cranial nerves III «**oculomotor**», VII «**facial**», IX «**glossopharyngeal**» and X «**vagus**»

Parasympathetic Sacral outflow

- Parasympathetic fibers arise from **LHCs** of sacral **2,3 &4** segments of the spinal cord

Oculomotor nerve (III)

■ These fibers produce:

a) **Contraction** of the constrictor pupillae

→ narrowing of the pupil. (**miosis**).

b) **Contraction** of the ciliary muscle

→ **relaxation** of suspensory ligaments, causing increased power of the lens which is very useful in **near vision** accommodation.

facial nerve (VII)

- **Supply** : the **lacrimal , nasal , sublingual and Submandibular** salivary glands

Functions:

- These fibers supply the salivary glands and produce **True secretion** (Large in volume, less in enzymes and watery) also produce **vasodilatation** of the glands blood vessels

The glosso-pharyngeal (IX)

- Supply the **parotid salivary gland** (largest) salivary gland.

Functions:

- a) True secretion (Large in volume, less in enzymes and watery)
- b) Vasodilatation of the gland blood vessels

N.B Nerve supply to salivary glands arise from **facial nerve**
(to Submandibular and sublingual glands) and from **glosso-pharyngeal nerve**
(to parotid gland)

The vagus nerve (X)

The vagus nerve have the following functions:

1-Inhibition of all properties of **atrial cardiac muscle.**

N.B Ventricles receive very few vagal parasympathetic efferent fibers.
(this is called *the ventricular vagal escape phenomenon*)

2- Decrease of the coronary blood flow and O₂ consumption of the heart

(indirect v.c in coronary due to the increased O₂ concentration & decreased metabolic activity.

- **Constriction** of the bronchi and bronchioles (**Bronchoconstriction**)
 - **Increased secretion** from bronchial glands.
 - **VD** of blood vessel. This leads to **narrowing of air passages**.
- **Motor** to **GIT wall** (contraction).

oesophagus, stomach, small intestine and proximal part of large intestine.

but **inhibitory** to sphincters leading to rapid evacuation of food.

- (↑) Secretory to **digestive glands** of stomach, pancreas and liver enhancing (↑) **insulin** hormone release.
- **Motor** (↑) to gall bladder and **inhibitory** to sphincter of Oddi
- **Vasodilatation** to the **splanchnic** vessels.

Parasympathetic sacral outflow

- The sacral parasympathetic fibers **arise from L.H.C of 2, 3, and 4th sacral** segments of the spinal cord
- The sacral parasympathetic fibers supply :
 - * The rest of the digestive tract that is **the descending colon, the rectum the anal canal.**
 - * The urinary bladder
 - * the **blood vessels** of the external genitals.

This Sacral flow have the following functions:-

■ **Defecation**

contraction of the wall of the rectum and relaxation of internal rectal sphincter.

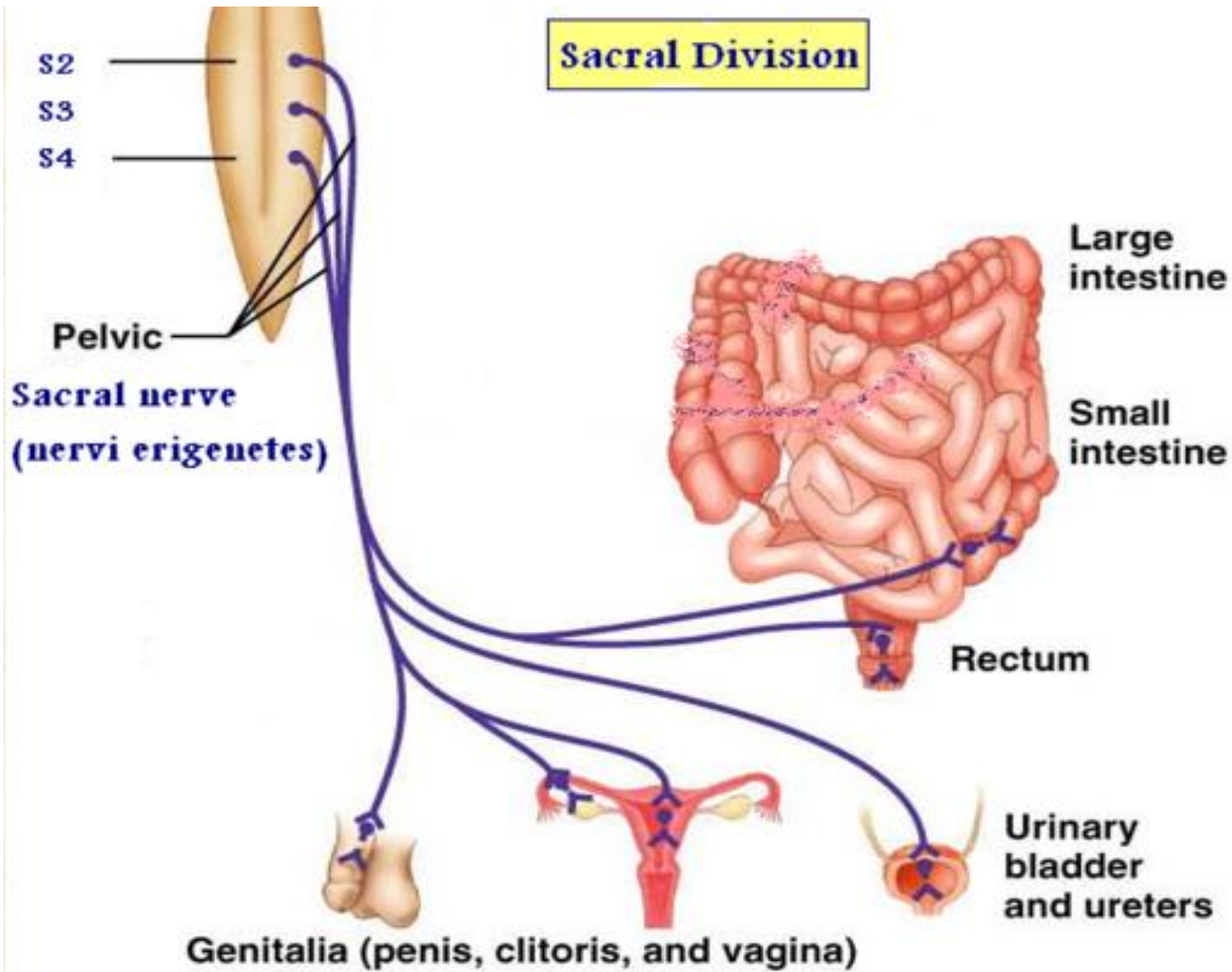
■ **Micturition**

contraction of the wall of the bladder and relaxation of the internal urethral sphincter.

■ **Erection**

vasodilatation of the blood vessels of the erectile tissue of the penis in the male and clitoris in the female

Sacral Division



Parasympathetic tone

a) Vagal tone to the heart

- Decreases the rhythm of the SAN from **110** to only **70** beats / minute.
- This greatly spares excess energy & effort in the heart.

b) Vagal tone to the gastrointestinal tract

- Prevents GIT distention and maintain basal amount of secretion.
- This is very important to complete the digestive process.

c) Vagal tone to the bronchi

- Maintains constant distribution of air during ventilation.
- Protects the bronchial wall during cough.

*N.B. Many structures are supplied by **one system** only:*

- ***Sympathetic:*** Skin, Suprarenal medulla, Sweat glands, Skeletal muscle blood vessels, Spleen, ventricles, **dilator** pupillae muscle.
- ***Parasympathetic:*** constrictor pupillae muscle.

