Autonomic

Nervous System

Compiled by

Campbell M Gold

(2006)

CMG Archives
http://campbellmgold.com

--()--

IMPORTANT

The health information contained herein is not meant as a substitute for advice from your physician, or other health professional. The following material is intended for general interest only; and it should not be used to diagnose, treat, or cure any condition whatever. If you are concerned about any health issue, symptom, or other indication, you should consult your regular physician, or other health professional. Consequently, the Author cannot accept responsibility for any individual who misuses the information contained in this material. Thus, the reader is solely responsible for all of the health information contained herein. However, every effort is made to ensure that the information in this material is accurate; but, the Author is not liable for any errors in content or presentation, which may appear herein.

--()--

Introduction

The autonomic nervous system (parasympathetic nervous system, sympathetic nervous system, vegetative nervous system) is the part of the nervous system that regulates vital functions of the body that are not consciously controlled (involuntary).

It includes the activity of the heart, the smooth muscles (e.g. digestive muscles), and the glands.

It has two divisions:

1) The **Sympathetic Nervous System** which speeds up heart rate, narrows blood vessels, and raises blood pressure.
2) The **Parasympathetic Nervous System** which slows heart rate, increases intestinal and gland activity, and relaxes ring-like muscles that close passages (sphincters).

--()--

Sympathetic Nervous System

The general properties of the sympathetic nervous system includes:

- Mediates the body's response to activity, stress, danger, or environmental challenge.

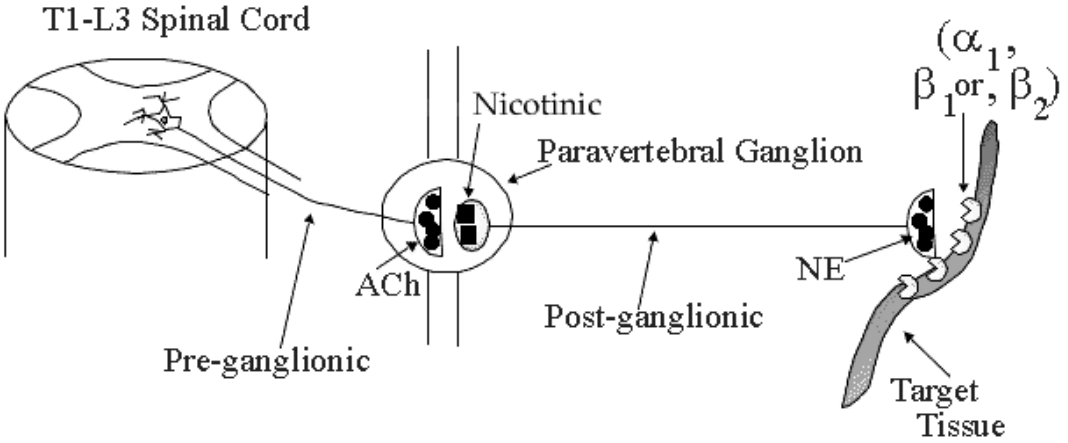
  The overall pattern of sympathetic activation is typified by the fright, fight or flight reaction to danger. Its responses include:

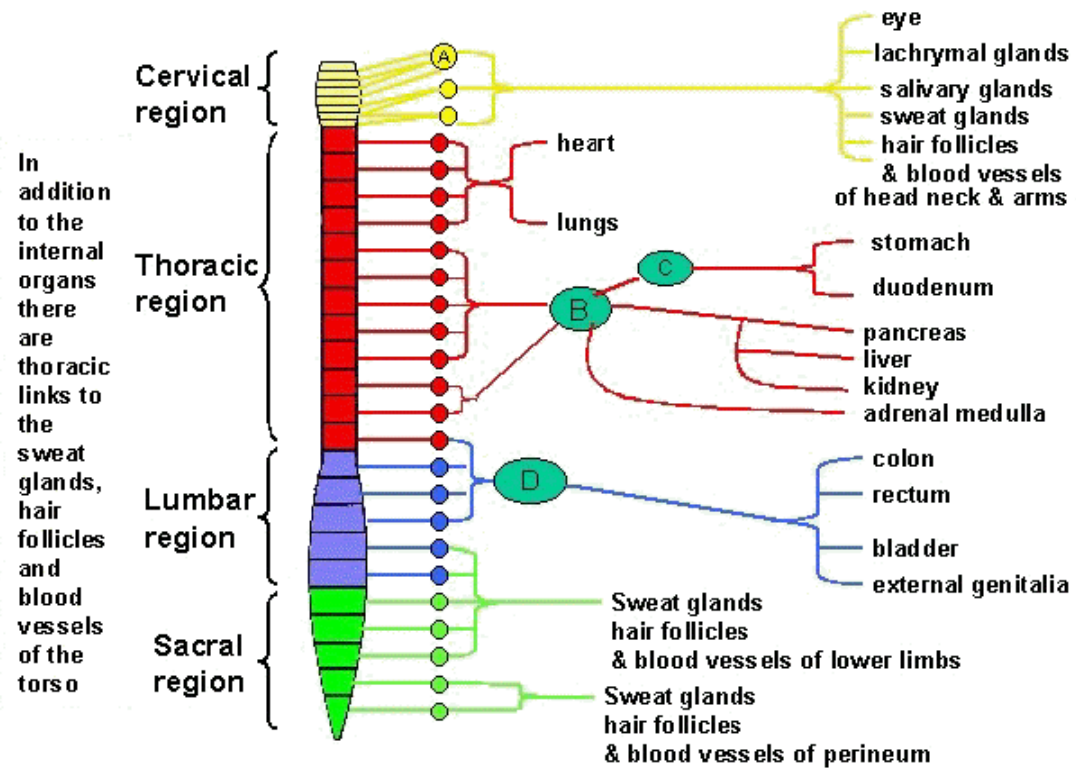
  - Increased Heart Rate and Contractility
  - Dilation of bronchioles for easier breathing

    - Constriction of arterioles in skin, digestive system, and non-exercising muscles
    - Inhibition of digestive functions
    - Widening of pupils
    - Increased glucose in blood due to glycogenolysis in liver
    - Increased fatty acid in blood from adipose tissues
    - Piloerection
    - Cold sweat (stimulated sweating with constricted skin arterioles)
- Involved in expending energy
- Originates in the thoracic and lumbar spinal cord
- Intermediate synapses near spinal cord, far from target organ. Most of the synapses are in the paravertebral ganglia near the spinal cord. Preganglionic fibres are short, postganglionic are long
- Sympathetic neurons branch extensively. One cell may innervate many target cells, leading to more generalized sympathetic responses in the body
- The Sympathetic system can also act selectively in some reflexes
- Primary target tissues are:
    - Cardiovascular system
    - Lungs
    - Smooth muscle in all organs
    - Some glands (sweat, salivary, and digestive)
    - Metabolic tissue (fat cells, liver)
- Sympathetic stimulation can cause excitation of some tissues, inhibition of others

  For example, contraction of arteriolar smooth muscle and relaxation of bronchiolar smooth muscle are both due to sympathetic stimulation

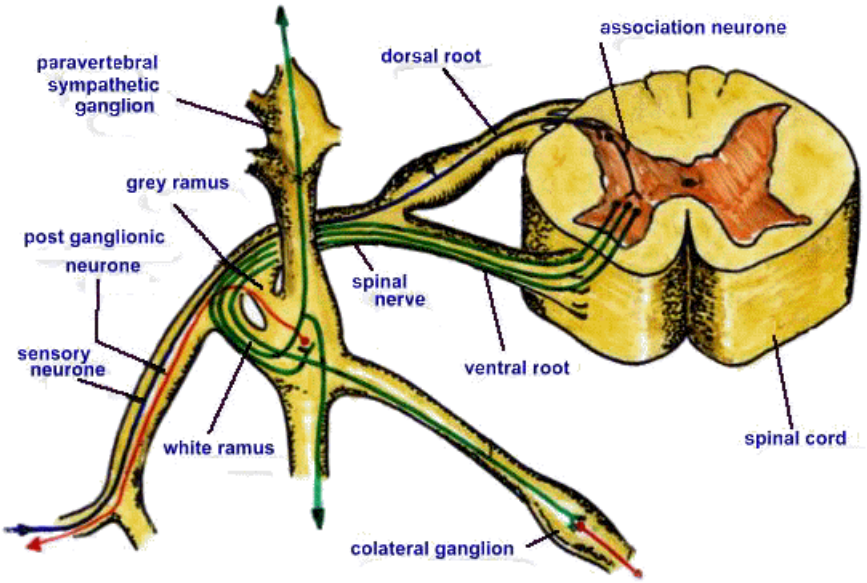
(Pictures below - Sympathetic Nervous System)

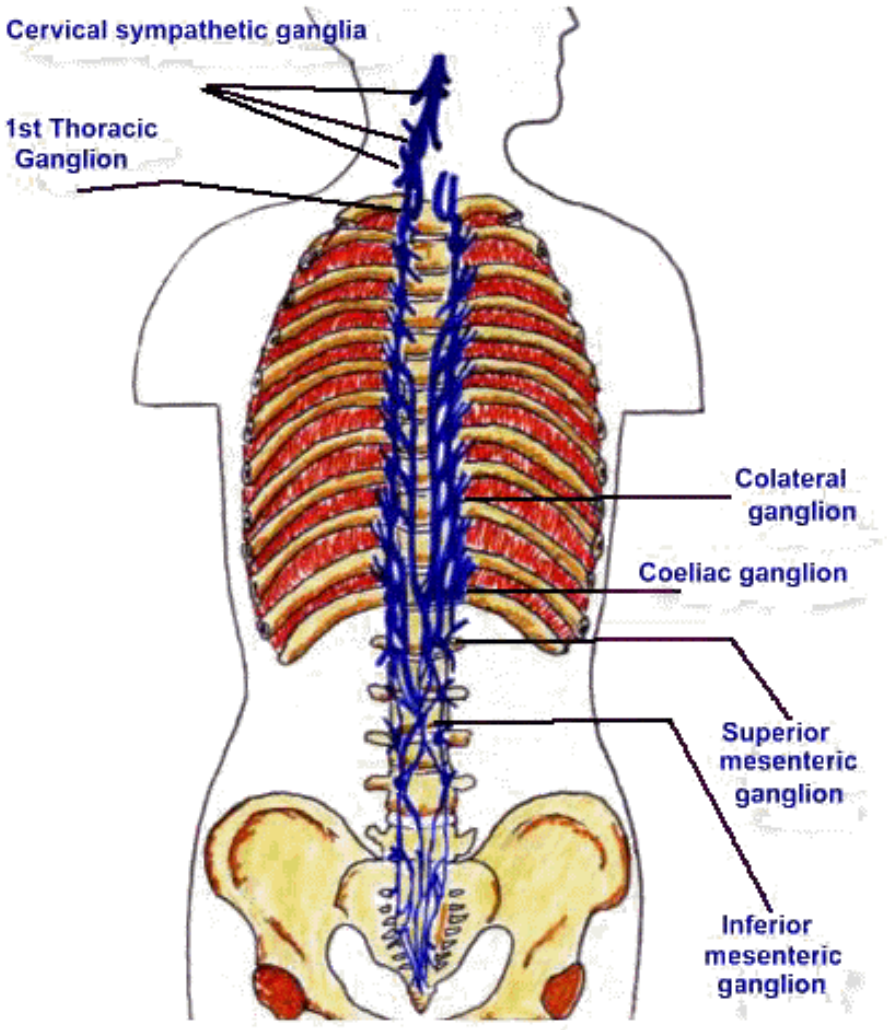




Legends (above):
A - Superior Cervical Ganglion
B - Coeliac Ganglion
C - Superior Mesenteric Ganglion
D - Inferior Mesenteric Ganglion

The coloured circles represent the paravertebral ganglionic chain





--()--

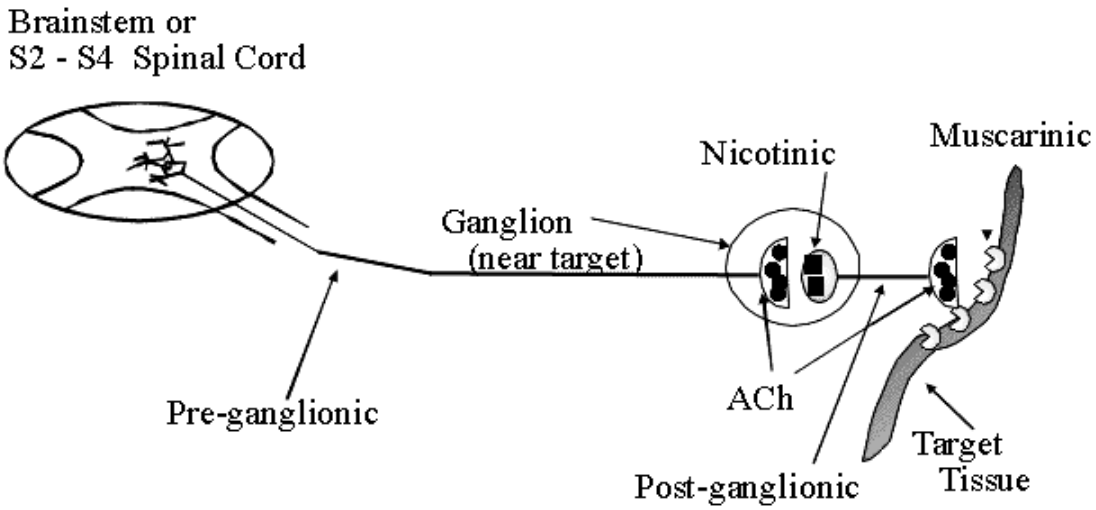
Parasympathetic Nervous System

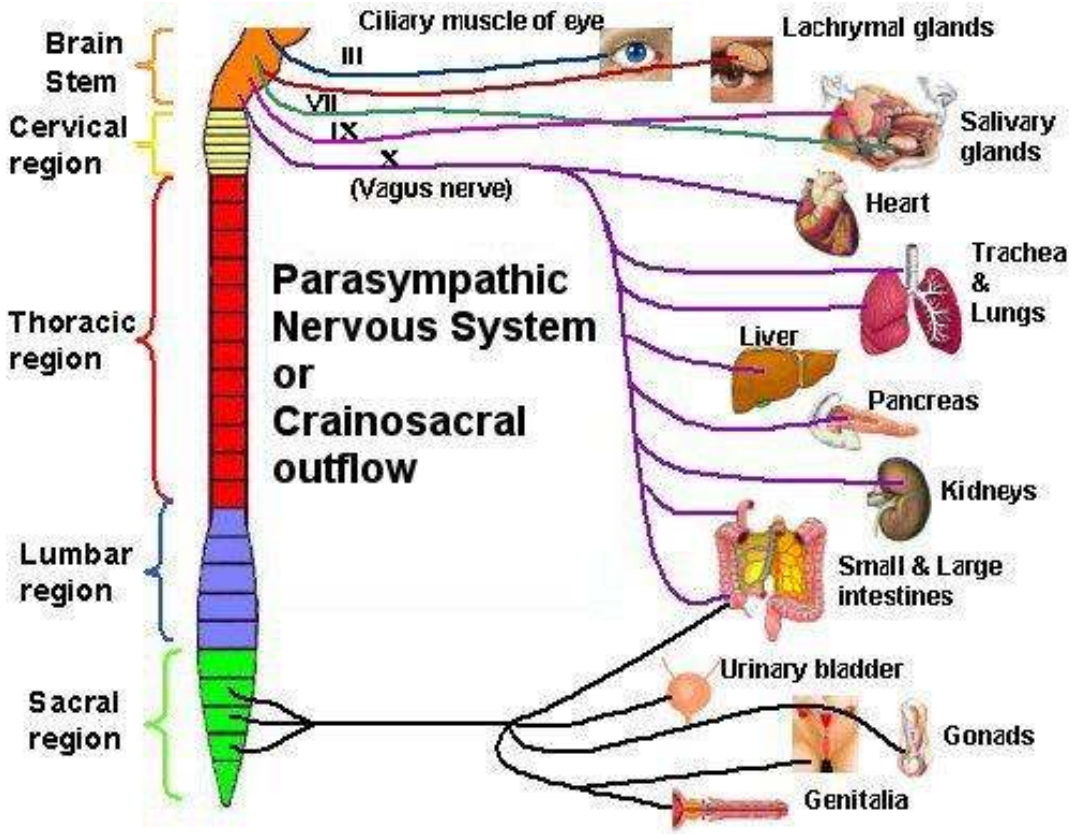
The general properties of the Parasympathetic Nervous system include:

- Responsible for 'housekeeping' functions of the body, many of which are vital for life
- Involved in conservation or restoration of energy ('rest and digest')
- Parasympathetic cells originate in the brainstem and sacral segments of the spinal cord
- The intermediate synapse is in (or near) the target organ
- Little branching of the neurons is found (one neuron innervates just a few target cells). This gives specific, fine control for regulation. No massive discharges
- Primary targets include:
    - Heart (atria)
    - Gastrointestinal system
    - Excretory organs
    - Exocrine glands
    - Eye (constriction of pupils, etc)
    - Genitalia

- Does not innervate structures in the body wall (i.e. muscle and skin), nor most blood vessels.

(Pictures below - Parasympathetic Nervous system)





Note: Unlike the Sympathetic Nervous System, the Parasympathetic Nervous System preganglionic neurones synapse with only a relatively few postganglionic neurones For this reason they are much more precise and localised in their effects

End

--()--

http://campbellmgold.com