

## ANS

**Somatic** –

**Visceral** –

ANS Controls:

- 
- 
- 

**SNS** – dominate system in \_\_\_\_\_. Which includes:

- x
- x

**SNS** – is \_\_\_\_obolic.

**PNS** – classified as \_\_\_\_\_

**SNS** – makes things run \_\_\_\_\_

**SNS Central Control** -

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## ANS

**Somatic** – voluntary muscle system

**Visceral** – involuntary muscle system

ANS Includes

- x Cardiac muscle
- x Glandular tissue (epithelial tissue in the form of glands)
- x All of the smooth muscle of the body.

**SNS** – dominate system in stressful situations. (Yang) (Fight or flight reaction)

physical stress

emotional stress

**SNS** – is catabolic – using energy, high blood pressure, high cardiac movement, breakdown of tissue to produce energy.

**PNS** – classified as restful, anabolic action. It's activity increases with rest. Building the body, digesting food, saving/storing energy. (Yin)

**SNS** – makes things run faster (except the GI tract), **PNS** – makes things run slower except the GI tract)

There is no control center for the ANS. The thing that comes the closest is the hypothalamus.

# ANS Pathway

ANS is both

**Number of Neurons:**

**Motor Neuron:**

x

x

x

**Sympathetic Chain**

x

x

x

**Pre-ganglion vs Post-ganglion**

x

**Supply to Lungs/Heart:**

**Supply to Abdominal Viscera:**

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# ANS Pathway

ANS is both efferent and afferent. (Nobody understand the afferent portion very well).

**Number of Neurons:** There are two neurons in the pathway. An upper and lower motor neuron.

**Motor Neuron:**

- x Cell bodies of the 1<sup>st</sup> neuron (corresponds to an upper body motor neuron) are located in the lateral horn of the Gray "H". They synapse there with the lower motor neurons. From about T1 through about L3.
- x The Axons exit through the ventral root
- x They immediately split off and enter the sympathetic trunk.

**Sympathetic Chain**

- x This sympathetic trunk extends from the neck to sacrum.
- x Sympathetic chain runs parallel to the spinal cord. One on either side. It is comprised of a series of sympathetic chain ganglia. Right outside the bony spinal column.
- x The highest ganglion in the next is the superior cervical ganglia. This is important because the cranial nerves have no sympathetic supply of their own. They get it off of the superior cervical ganglia. (They piggy back on whatever they can)

**Pre-ganglion vs Post-ganglion**

- x The neurons the exit the cord are called pre-ganglion neurons (upper motor). The neurons they synapse with in the chain ganglion are called post-ganglion neurons(lower motor).

**Supply to Lungs/Heart:** Sympathetic supply to the heart and lungs come off of spinal segments T1 through T5.

**Supply to Abdominal Viscera:** Visceral T5-T12. But, the abdominal don't synapse in the chain ganglion. Instead they pass right on thru and form a couple of named nerves call the great and lesser splanchnic nerves.

## More ANS Pathway

**Superior & Inferior Mesenteric Ganglia (celiac):**

**Supply to Pelvic area:**

**White Rami communicates:**

**Gray rami communicates:**

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## More ANS Pathway

**Superior & Inferior Mesenteric Ganglia (celiac):** These nerves synapse on their own ganglion located in the abdomen which are called the Superior and inferior mesenteric ganglia. (Celiac as well, but he didn't mention this)

**Supply to Pelvic area:** The preganglionic supply comes from the spinal cord at levels L1 thru L3. These upper motor neurons synapse with the lower motor neurons in the inferior mesenteric ganglia

**White Rami communicates:** The preganglionic neurons that leave the spinal nerve and go to the chain ganglion. – myelinated. (upper motor neuron)

**Gray rami communicates:** Start at the chain ganglion, and then rejoin the rest of the nerves going out to the skin, arteries, or whatever. They are not myelinated. (lower motor neuron)

## PSNS

**How many neurons in the pathway:** Two

**PNS to the head:**

- x
- x
- x
- x

**Upper and Lower Motor neurons synapse where:**

**PNS to the lower trunk:**

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## PSNS

**How many neurons in the pathway:** Two

**PNS to the head:**

- x CN III – ocular motor
- x CN VII - facial
- x CN IX - glossopharyngeal
- x CN X – vagus (this takes pns to all of the chest and a large part of the abdominal viscera.)

**Upper and Lower Motor neurons synapse where:** Upper motor neuron of PNS synapses with the lower motor neuron in the ganglion which is almost always on top of the organs it is going to supply.

**PNS to the lower trunk:** The colon distal to the transverse portion and the pelvic structures receive S2-S4 from the pelvic splanchnic nerves.

## Review

The review will be the competencies. Having said that. Pay particular attention to:

Embryonic origins of the neural system

Need to know neuron structure.

To cell body – dendrite

Away from cell – axons

Nissl Granules – Rough ER

White matter vs Gray matter

Myelin – 100 fold speed increase.

Larger the faster, 1 meter per second without myelin.

Polarized – pumps, etc. Sultatory conduction.

Glial Cells

Astrocytes (2 things)

oligodendrites – lay down myelin

microdendrites – phagocytosis.

ependymal cells – spinal fluid

Schwann – make myelin outside of brain

Sattelite cells – connective tissue (hold ganglia together)

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Fibers: commesurate, associative. Projection

Gyrus, sulci, fissures

Lobes of the brain and the divisions.

Spinal cord – magnum foramen down to the top of the lumbar, 31 pairs, how they come out and where they come out.

Cross section of gray “H”

Anterior Horns - motor

Posterior Horns - sensory

Cross section of brain. White matter inside/gray matter outside

Sensory Pathway

Number of neurons, names, and location, beginning and ending points for each.

#### Four Named pathways

Pain and temperature – later spinal thalamic  
Internuclear neuron (reflex)

Crude touch ventral spinal thalamic

It bifurcates (decussates immediately or travels up/down and then decussates)

Fine vesiculus gracialis (lower) vesiculus cuneatus (upper), synapse in the medulla

Goes up to the medulla and then synapses and decussates in the nucleus gracilis in nucleus cuneatus.

#### Cranial Nerves

Sensory – trigeminal CN V

- x Proprioception- nobody know.
- x Pain & temp synapses and decussates in the medulla
- x Crude Touch synapses and half of it decussates in the pons.

#### Voluntary Muscles

Upper starts in pre-central gyrus.

90% Decussates in the medulla

10% Decussates in the spinal cord at the level it exits.

Lower starts in

Corticospinal tract is used

This is pyramidal tract.

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Subcortical – instinctive/crude movement.

Basal ganglia (extra-pyramidal system)

The four areas.

Chapter 8 in the medical terminology book for this one