

Nervous System Autonomic Nervous System

Reading: Chapter
9

Neural vs. Endocrine Communication

Neural	Endocrine
-electrical/hardwired	-chemical
-fast	-slow
-short-term changes	-long-term and/or cyclical changes
-no direct effect on met.	-affects metabolism
-some voluntary actions	-involuntary
-reflexes	

General Functions of the Nervous System

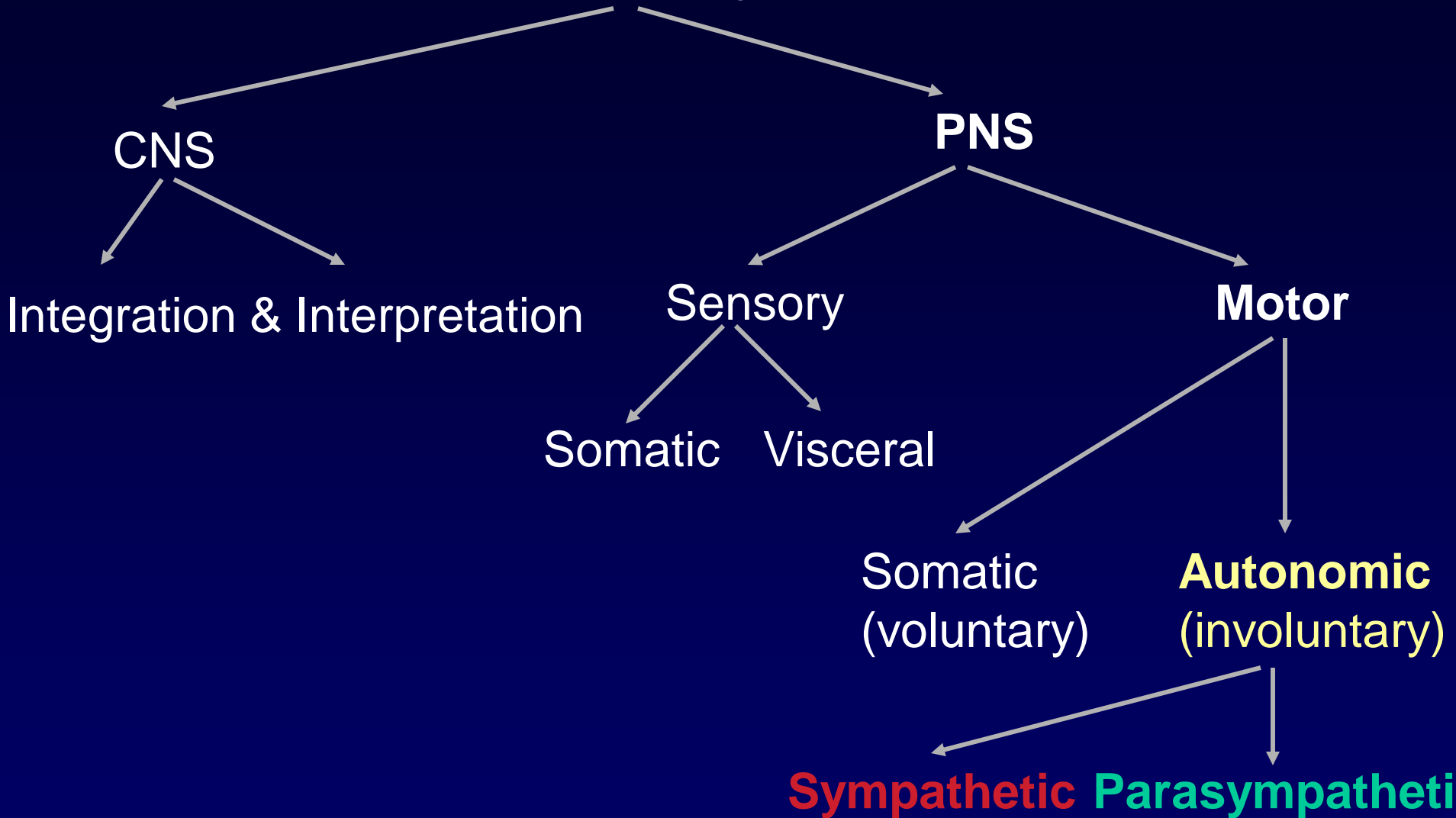
1. Receives sensory input
2. Integrates and processes information
3. Motor output to effectors

Organization of the Vertebrate Nervous System

Anatomical: CNS (brain + spinal cord)
PNS (12 pairs cranial + 31 pairs spinal nerves)

Functional: *(Chart)*

Nervous System



Quick Terminology Review

Ganglia = cell body OUTSIDE of CNS

Motor Control in the PNS

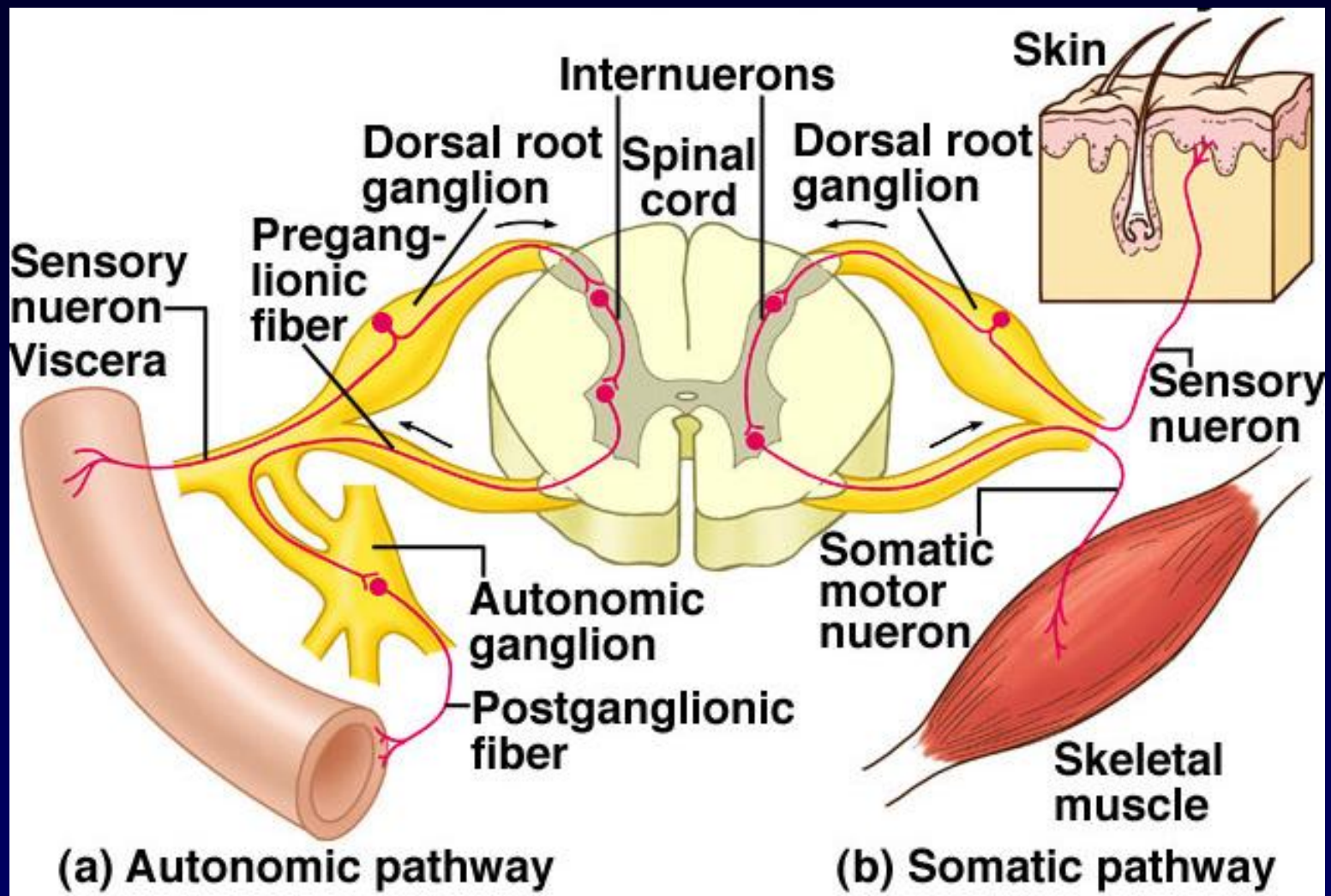
Somatic (carcass ONLY) mostly

- 1 nerve cell
- no ganglia
- excitatory
- skeletal muscle
- specialized neuromuscular jxn.
- voluntary
- fast, myelinated
- cranial OR spinal
- Acetylcholine

Autonomic (viscera)

- 2 cells (pre- & post-ganglionic)
- ganglia (sympathetic chain, collateral & terminal ganglia)
- excitatory OR inhibitory
- smooth & cardiac muscle, glands
- whole organ is reactive
- involuntary
- slow, little myelination
- cranial OR spinal
- Acetylcholine AND

overhead



Divisions of the Autonomic NS

- Divided into Parasympathetic & Sympathetic
- Divisions = bilateral (on both sides of body)
- Most organs have dual innervation (**PS** & **S**)
- **PS** & **S** systems generally work antagonistically

Parasympathetic vs. Sympathetic

Rest & Digest	Fight or Flight
craino-sacral (Cranial III, VII, IX, X, S2-4)	thoracol-umbar (T1 to L2)
“long” – “short”	“short” – “long”
Ach / Ach	Ach / NE
in visceral cavity ONLY	in carcass (vasomotor control) & viscera
terminal ganglia in/near effector ganglia	chain & collateral
no mass discharge possible	mass discharge

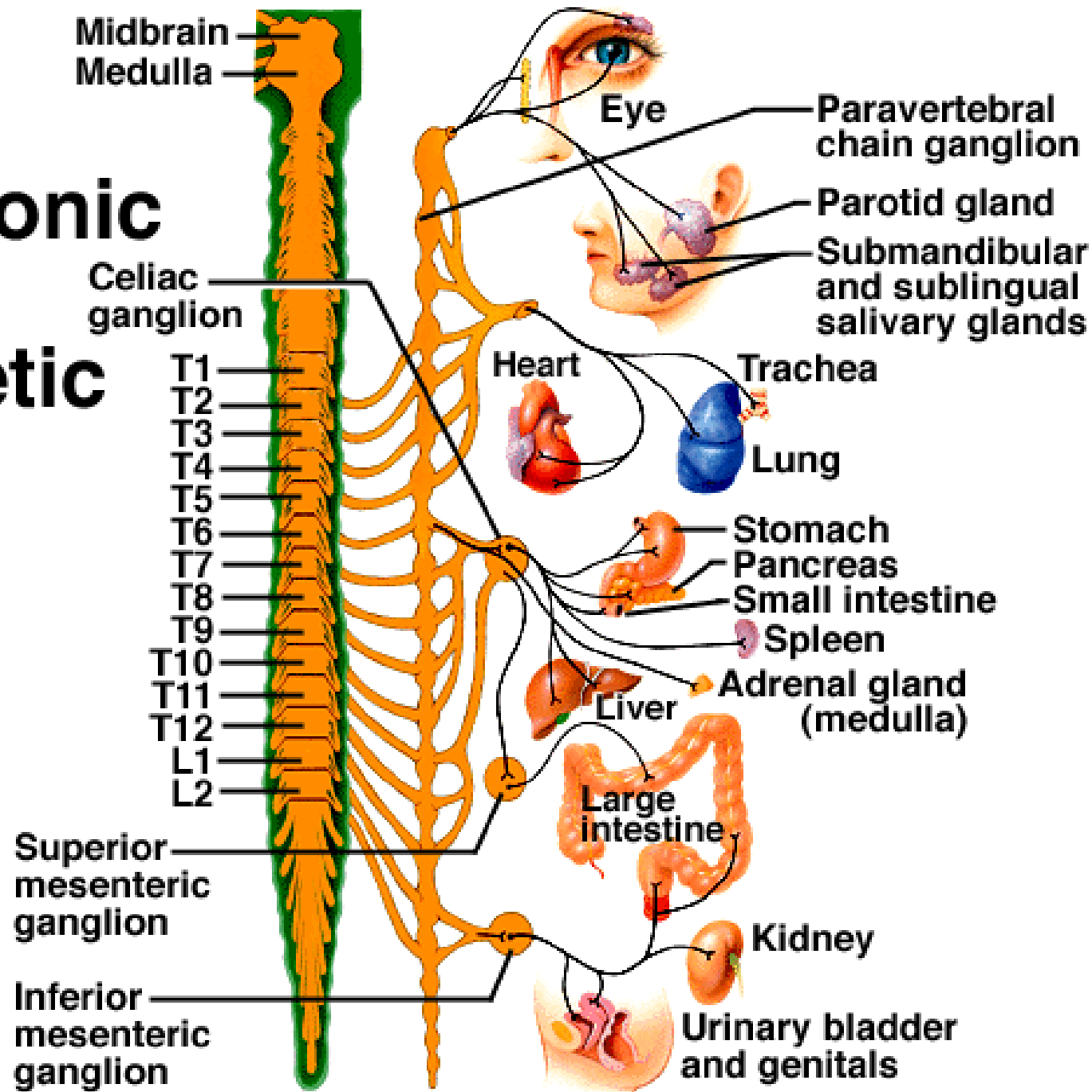
Autonomic Neurotransmitters

-Preganglionic fibers of _____ and _____ secrete: acetylcholine and are called _____

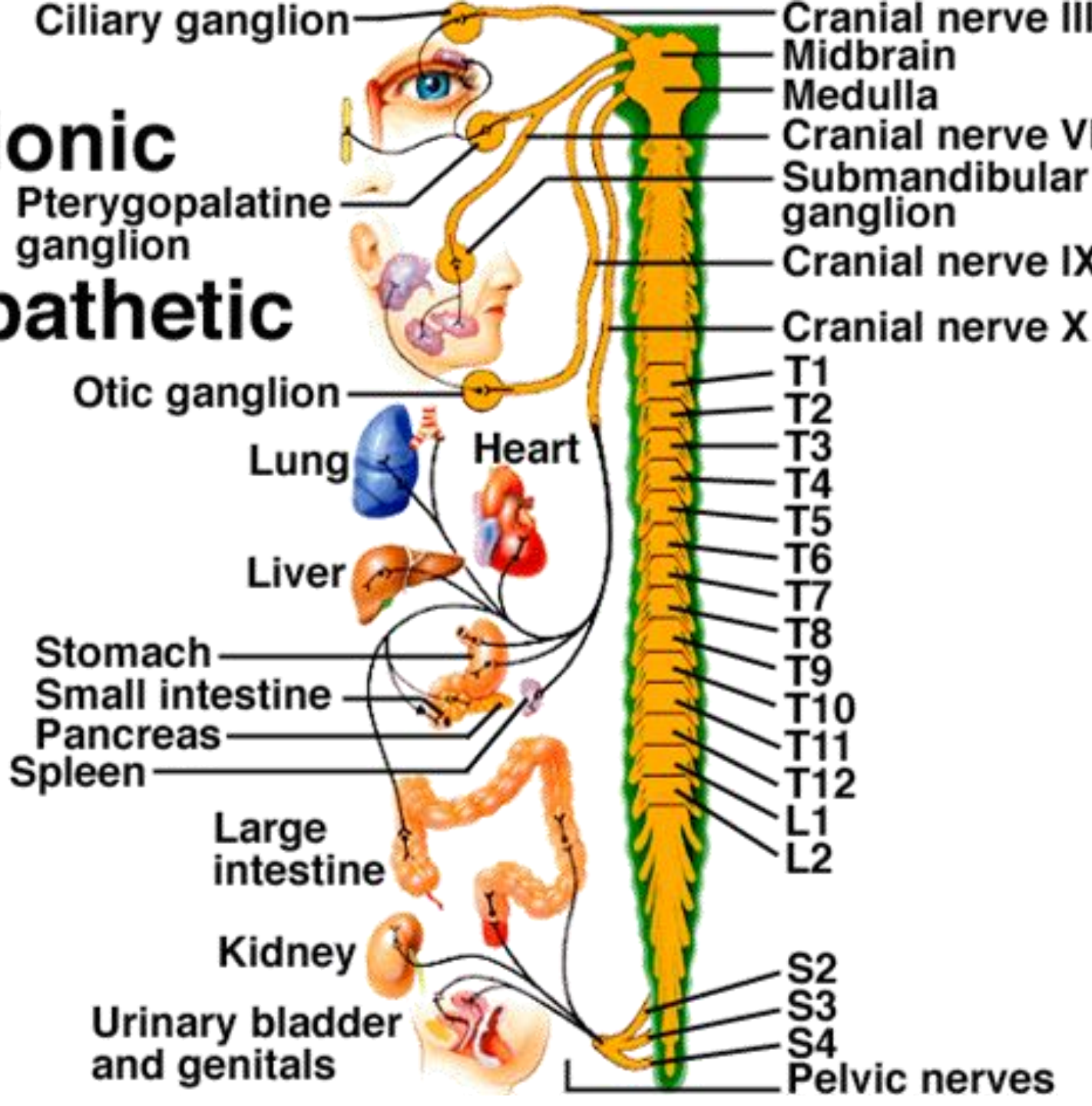
-Parasympathetic Postganglionic fibers are cholinergic and secrete: _____

-Most sympathetic postganglionic fibers secrete: _____ (noradrenalin) and are called adrenergic

Preganglionic Fibers — Sympathetic Division



Preganglionic Fibers — Parasympathetic Division



Adrenal Gland

- Sympathetic nervous system control
- Only 1 cell (no ganglia)
- Adrenal gland acts as the post-ganglionic neuron
- Adrenal gland secretes epinephrine (85%) & norepinephrine (15%) → **HORMONES**

Effect of Sympathetic & Parasympathetic Stimulation on Various Organs

Example: Tiger vs. You

Some Effects of the Autonomic NS

ORGAN	SYMPATHETIC	PARASYMPATHETIC
iris	dilates	constricts
ciliary muscles of eye	relaxes (far vision)	contracts (near vision)
salivary glands	inhibits	stimulates
bronchi	dilates	constricts
sweat glands	stimulates	no action
blood vessels	mostly constricts	no action
adrenal gland	stimulates	no action
intestinal tract	inhibits	stimulates
heart	stimulates	inhibits
bladder	inhibits	stimulates
blood glucose	increases	no action

END