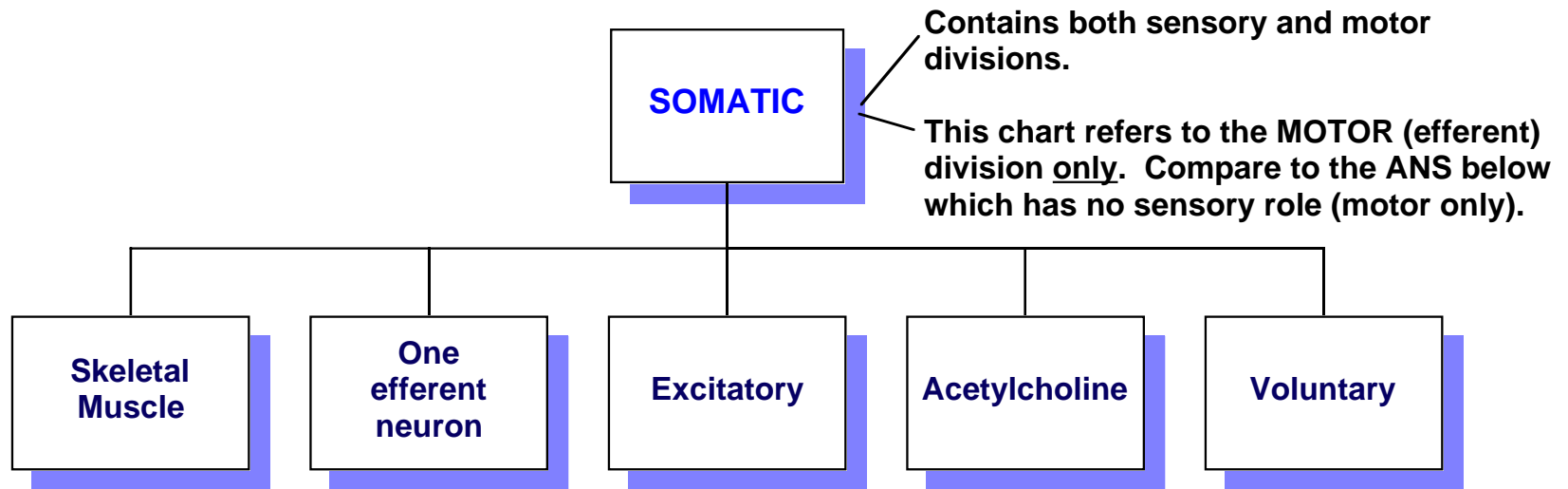
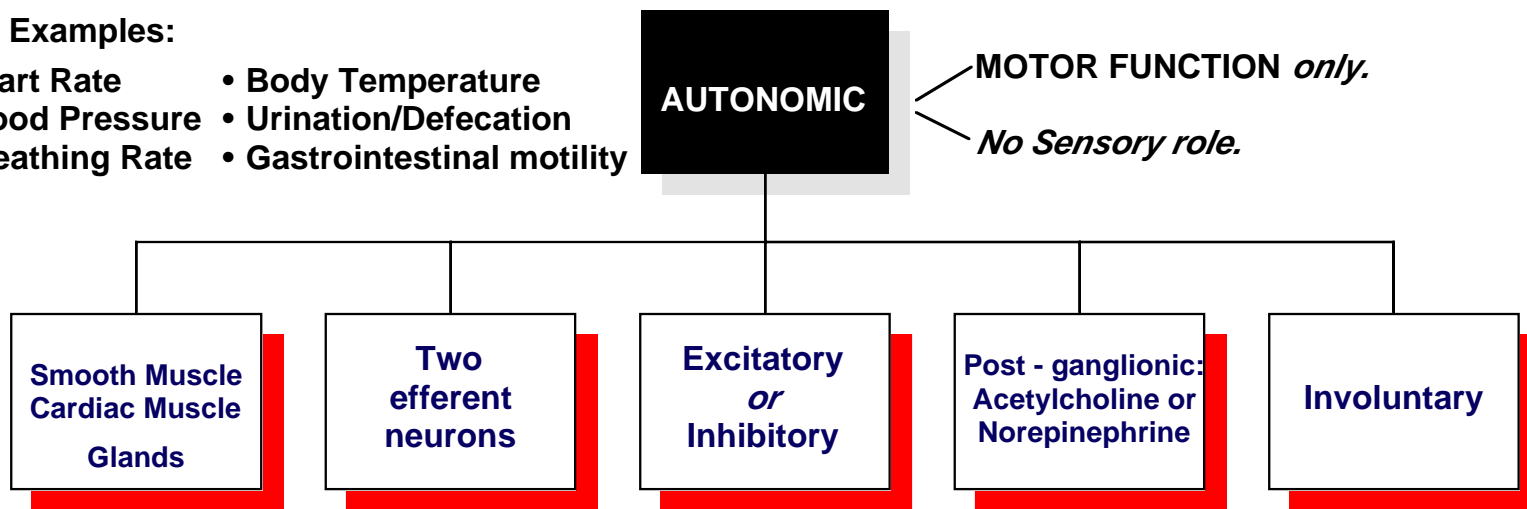


PERIPHERAL NERVOUS SYSTEM

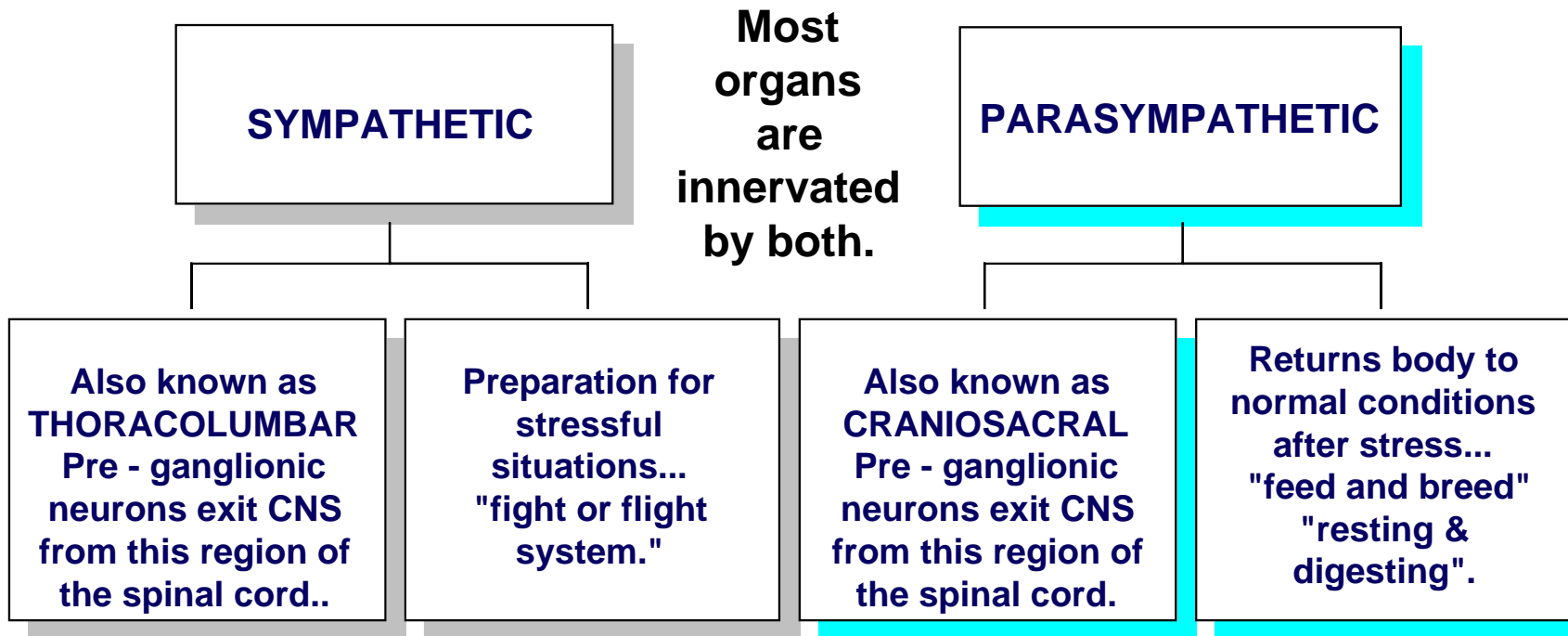


ANS Examples:

- Heart Rate
- Blood Pressure
- Breathing Rate
- Body Temperature
- Urination/Defecation
- Gastrointestinal motility



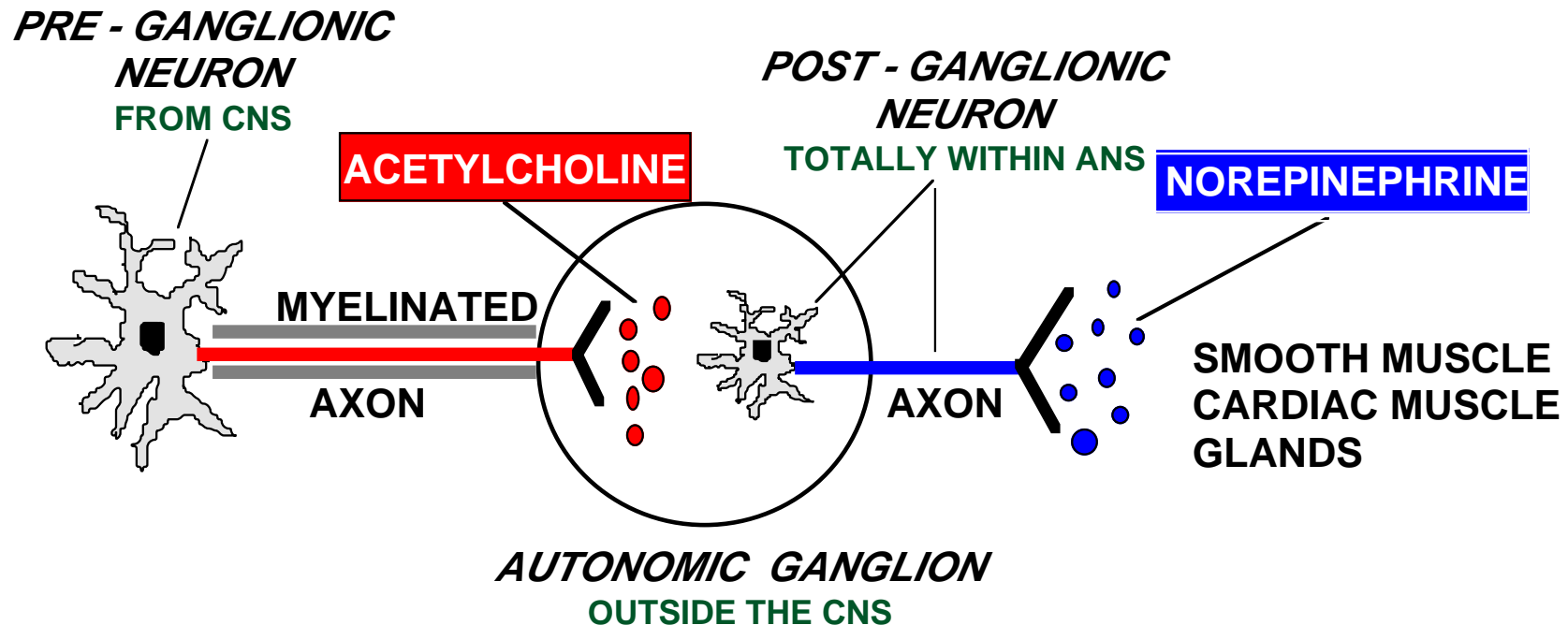
TWO DIVISIONS of the AUTONOMIC NERVOUS SYSTEM...



Generally, the sympathetic and parasympathetic nervous systems have opposite effects on cells/organs.

Both may be active; the overall effect is influenced by the degree which one may predominate over the other and the particular nature of receptor sites.

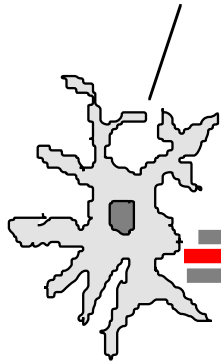
SYMPATHETIC DIVISION of ANS: *NEUROTRANSMITTERS*



EXCEPTION #1 Innervation of the **ADRENAL MEDULLA**.
The myelinated, Acetylcholine - producing pre - ganglionic axon shown above goes directly to the adrenal medulla (not a 2 neuron efferent pathway- only 1!).
Result: Adrenal medulla releases its own norepinephrine, but mostly epinephrine (adrenalin), which is carried via the blood stream to responsive receptor sites .

EXCEPTION #2 Innervation of **SWEAT GLANDS, EXT. GENITALIA, SOME SK. MUSCLE BLOOD VESSELS**.
Here, the post- -ganglionic neuron releases **Acetylcholine**, **not norepinephrine**.

*PRE - GANGLIONIC
NEURON
FROM CNS*

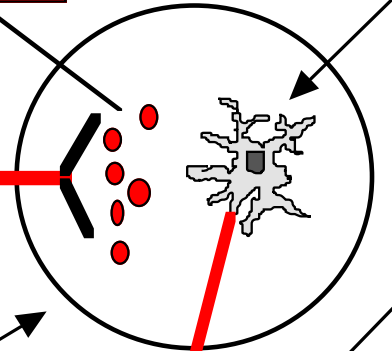


MYELINATED

AXON

ACETYLCHOLINE

*POST - GANGLIONIC
NEURON
TOTALLY WITHIN ANS*



AXON

*AUTONOMIC GANGLION
OUTSIDE THE CNS*

ACETYLCHOLINE

SMOOTH MUSCLE
CARDIAC MUSCLE
GLANDS

**PARASYMPATHETIC DIVISION
of the ANS:
NEUROTRANSMITTERS**

CHOLINERGIC RECEPTORS (Membrane Proteins)

Bind **ACETYLCHOLINE** and other molecules with similar activity

MUSCARINIC Receptors

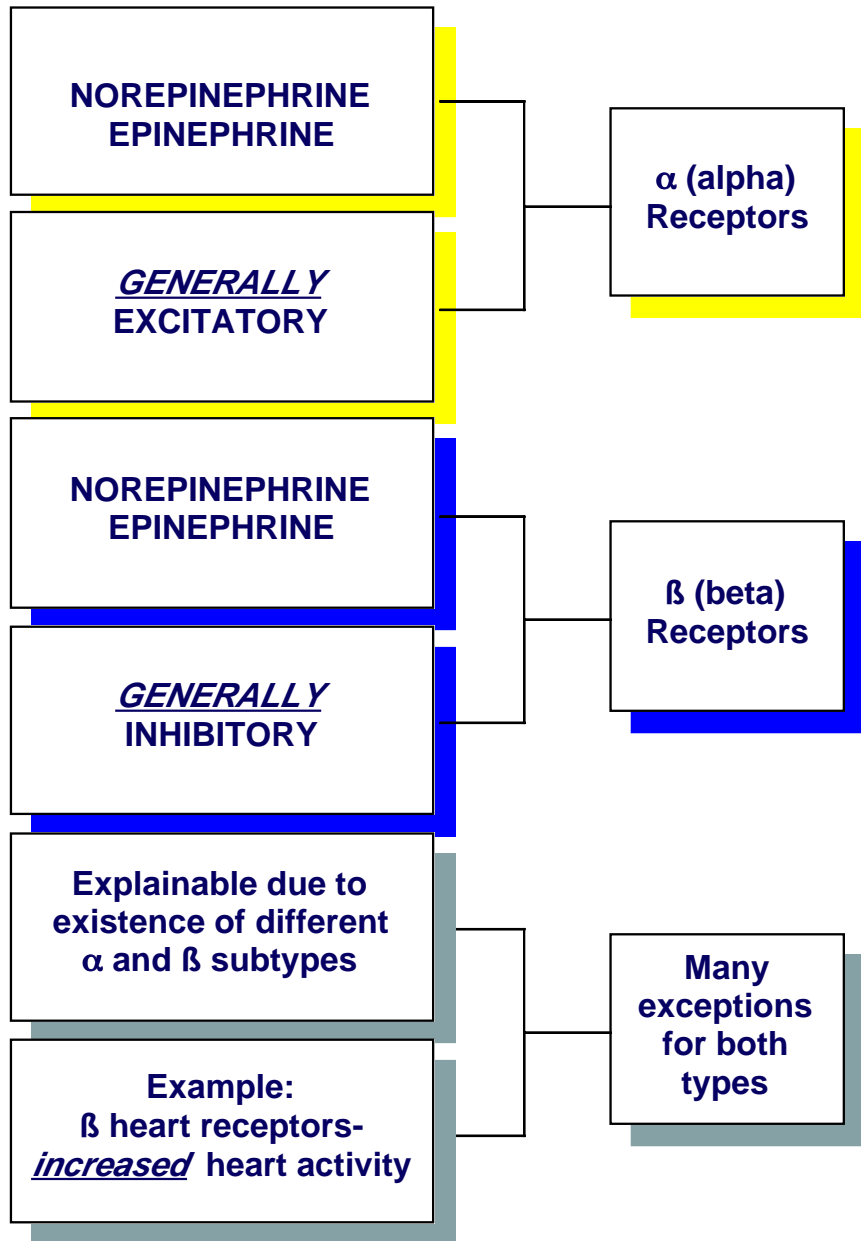
- ACETYLCHOLINE excitatory OR inhibitory
- stimulated by MUSCARINE (a mushroom poison)
- Found on All PARASYMPATHETIC Targets
- Found on Some SYMPATHETIC Targets

NICOTINIC Receptors

- ACETYLCHOLINE always excitatory
- stimulated by NICOTINE
- Found on All Post-ganglionic neurons of ANS
- Found on ADRENAL MEDULLA (Hormone - producing cells of-)
- Found on MOTOR END PLATES Skeletal Muscle (Somatic NS innervation here)

CHOLINERGIC FIBERS:
NERVE FIBERS WHICH PRODUCE ACETYLCHOLINE (ACh).

ADRENERGIC RECEPTORS (Membrane Proteins)



- BIND CATECHOLAMINES
NOREPINEPHRINE
EPINEPHRINE
- and other molecules with similar activity.
- Found on autonomic effector organs regulated by catecholamines.

ADRENERGIC FIBERS:
NERVE FIBERS WHICH PRODUCE
NOREPINEPHRINE.

EPINEPHRINE, remember,
is produced by the adrenal medulla.