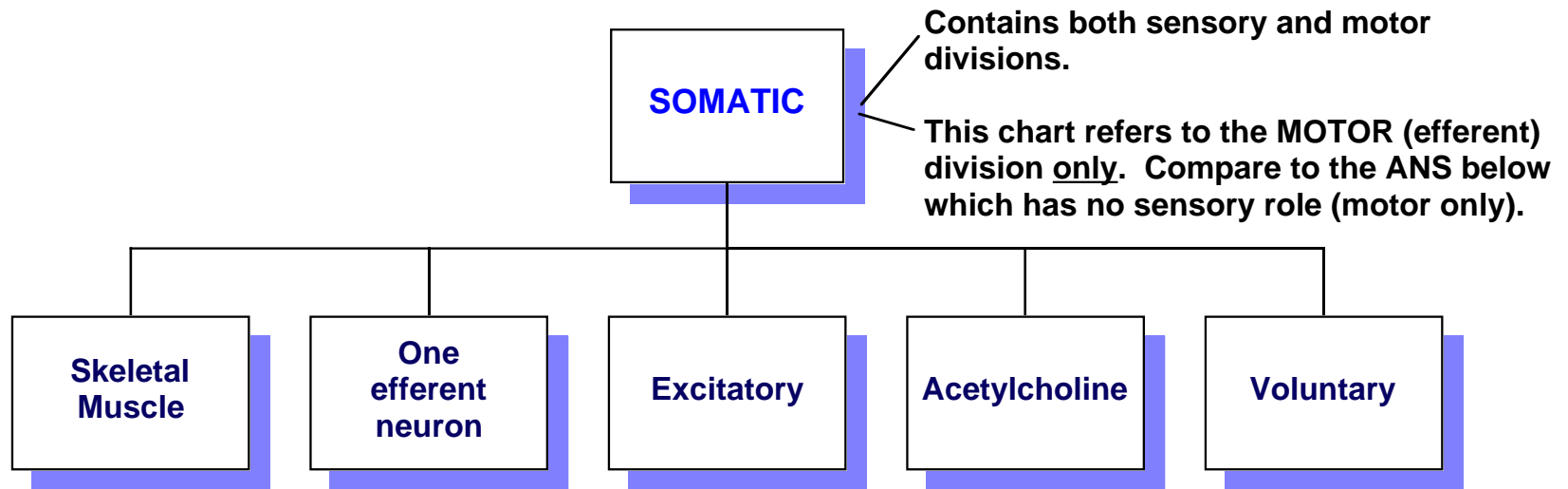
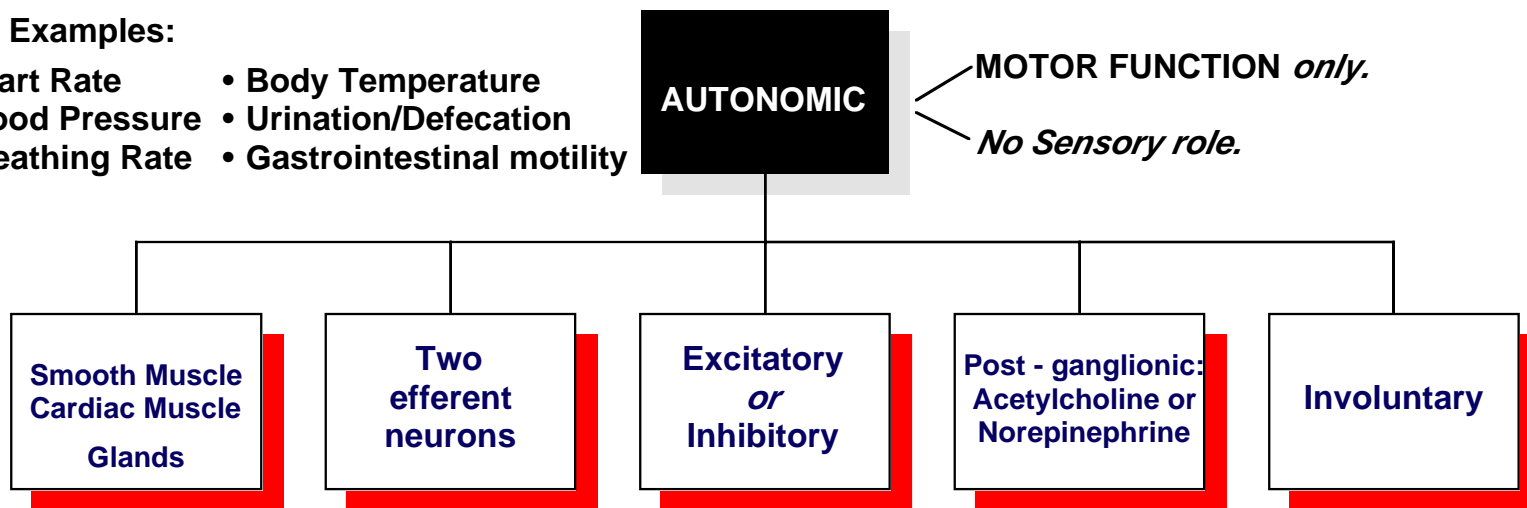


# PERIPHERAL NERVOUS SYSTEM

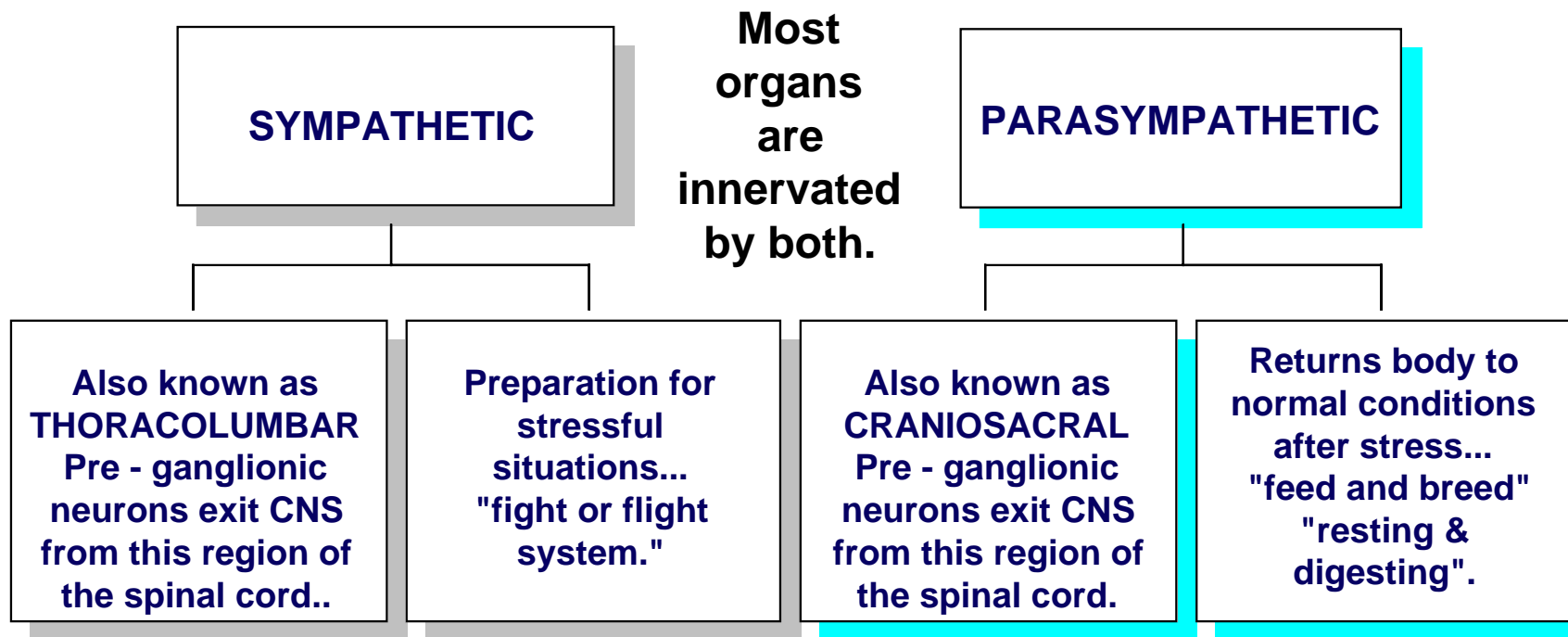


## ANS Examples:

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



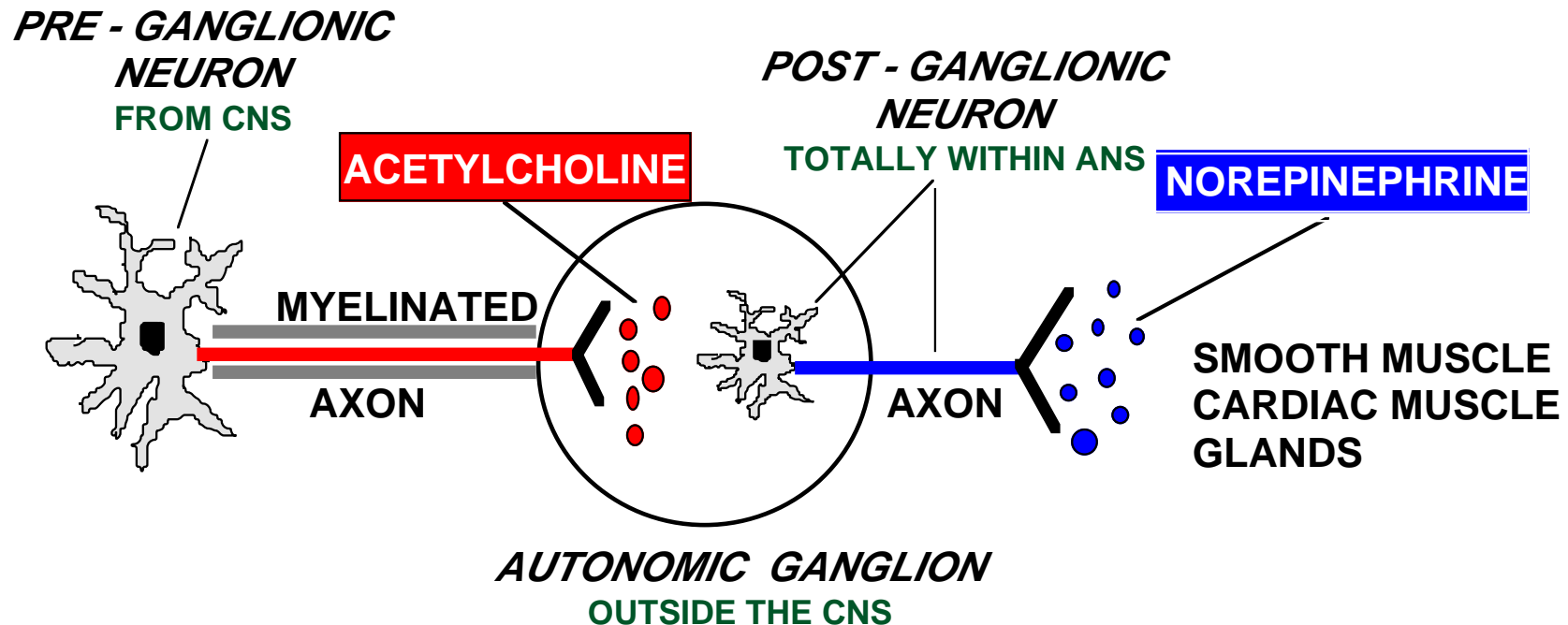
## TWO DIVISIONS of the AUTONOMIC NERVOUS SYSTEM...



*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.

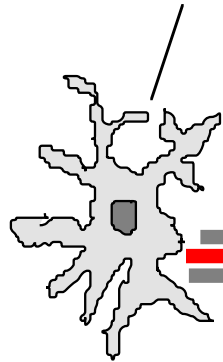
# SYMPATHETIC DIVISION of ANS: *NEUROTRANSMITTERS*



**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*

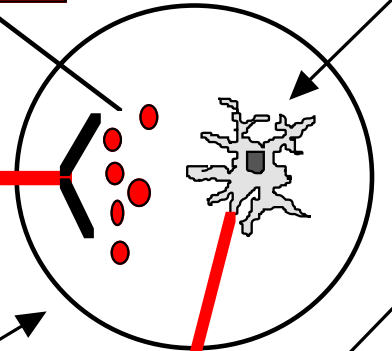


MYELINATED

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

ACETYLCHOLINE  
always excitatory

stimulated by NICOTINE

Found on All  
Post-ganglionic neurons of ANS

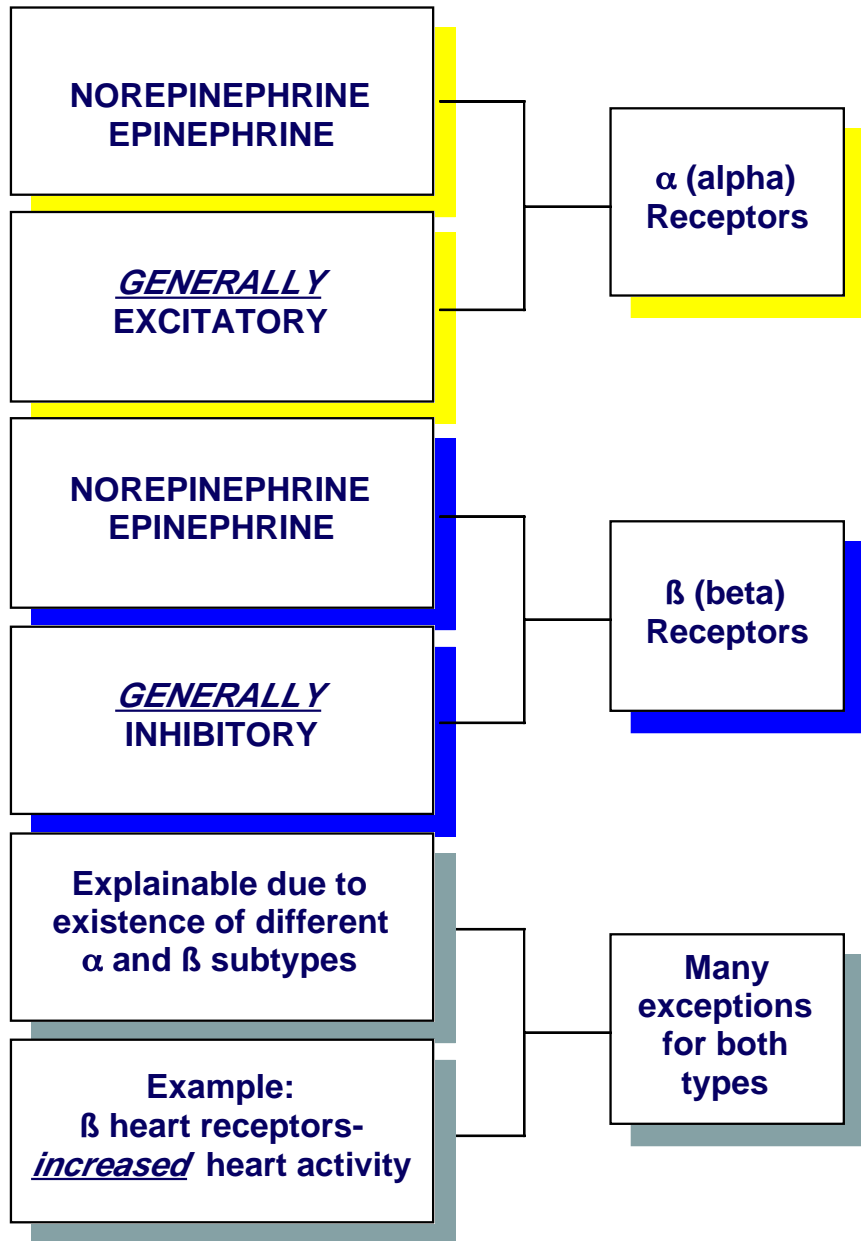
Found on ADRENAL MEDULLA  
(Hormone - producing cells of-)

Found on MOTOR END PLATES  
Skeletal Muscle  
(Somatic NS innervation here)

NICOTINIC  
Receptors

**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.