Anatomy and Physiology I

Neurologic System

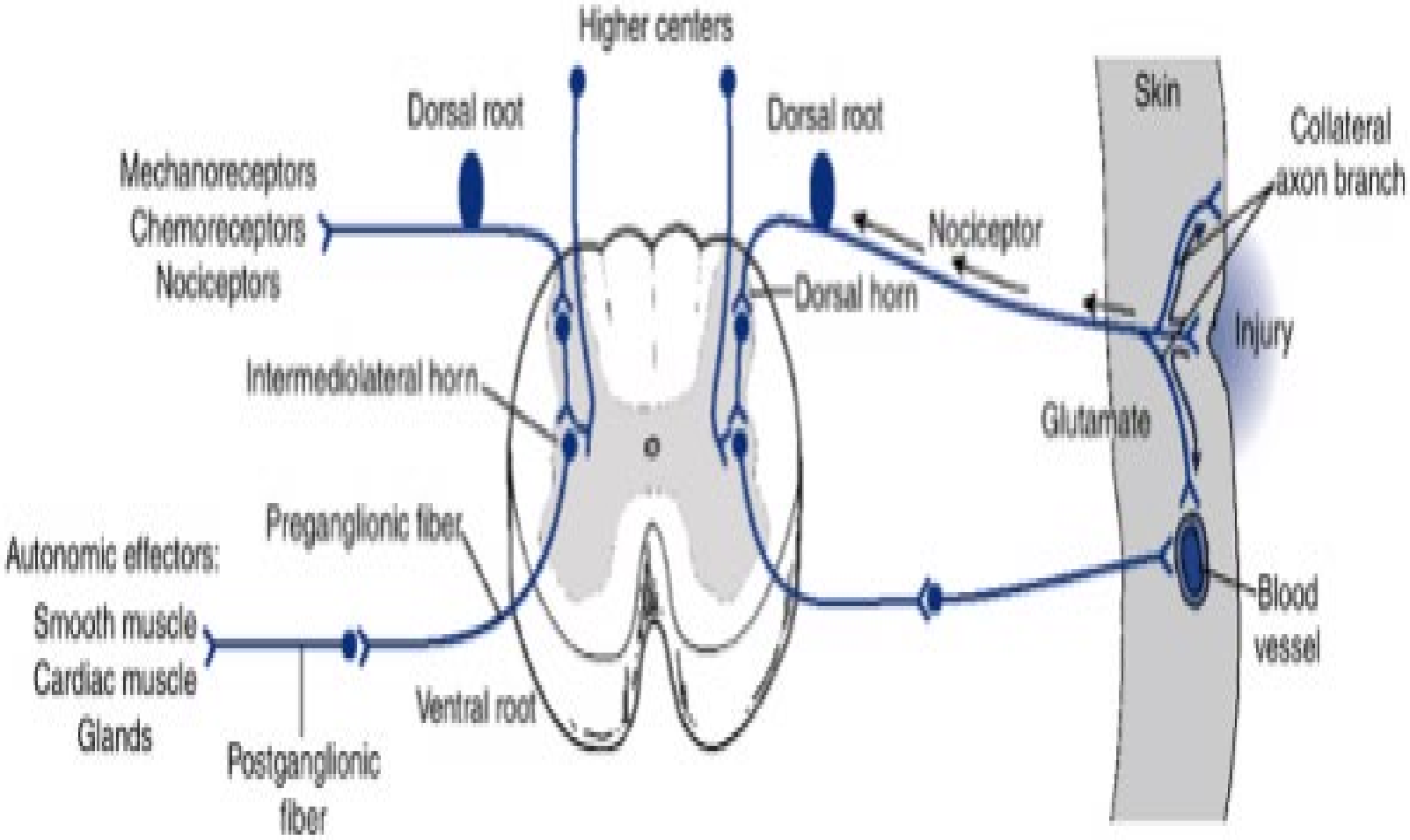
Neural transmitters

The Neuromuscular Junction

Objectives

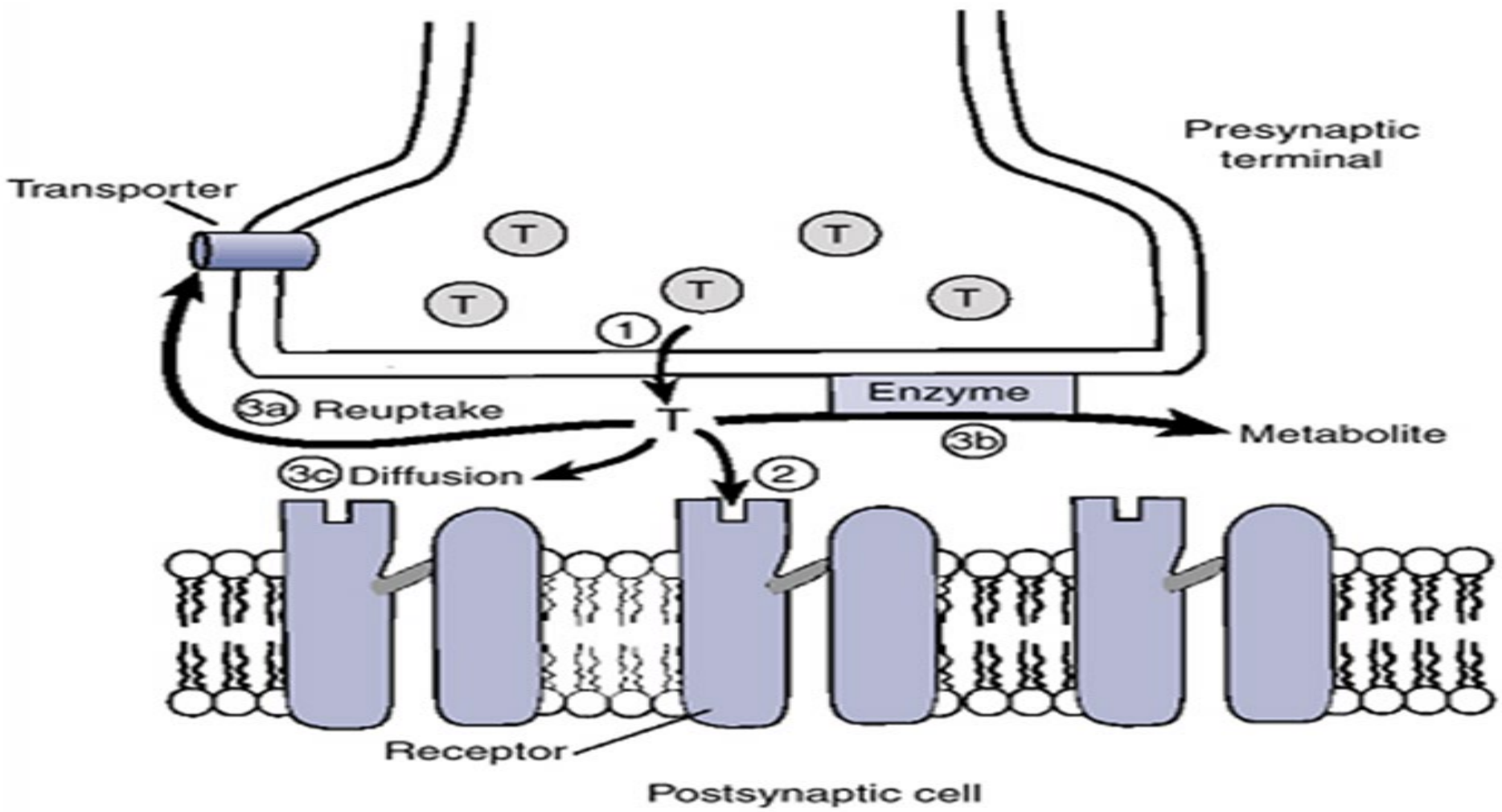
- Identify the receptors and neurotransmitters of the autonomic nervous systems.
- Contrast the receptors and neurotransmitters of the autonomic and somatic nervous systems.
- Outline the process of neurotransmission in the autonomic and somatic nervous systems.

Neural Conduction



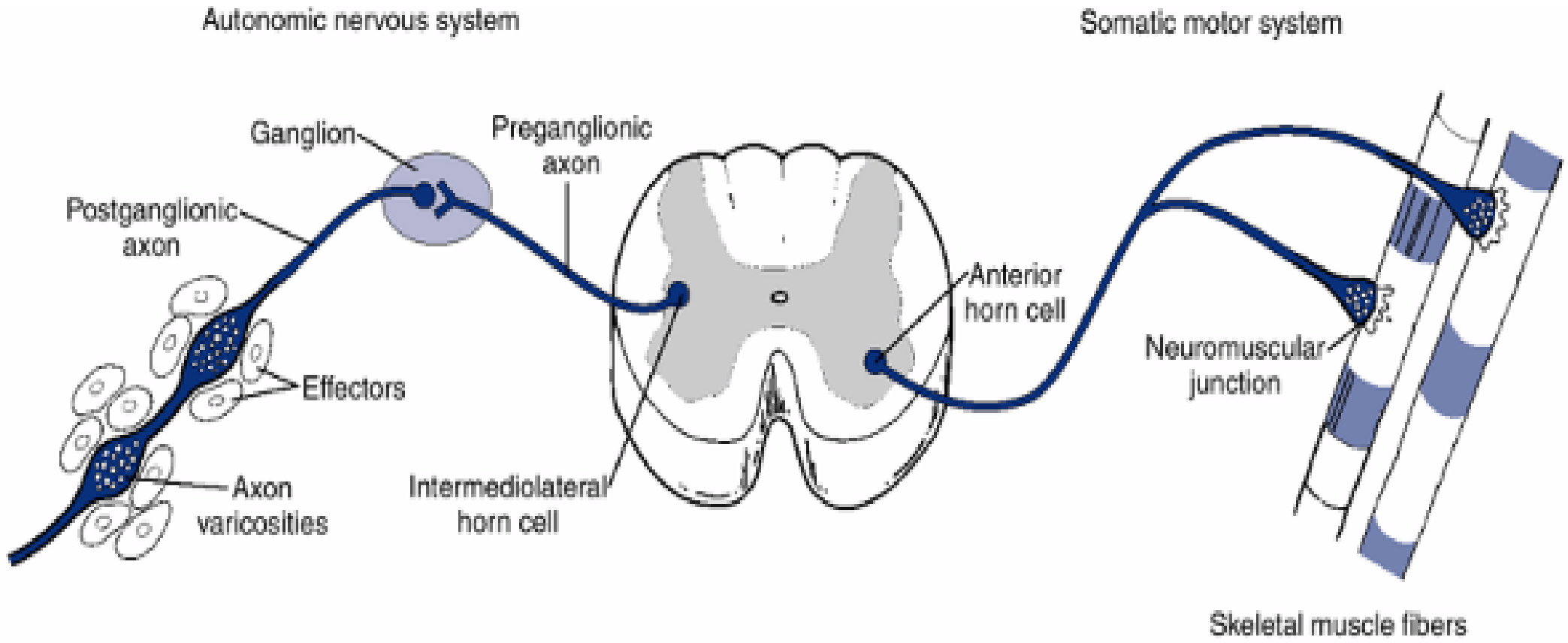
Rhoades. Medical Physiology: Principles for Clinical Medicine. 3rd Edition. P. 120

The Synaptic Cleft



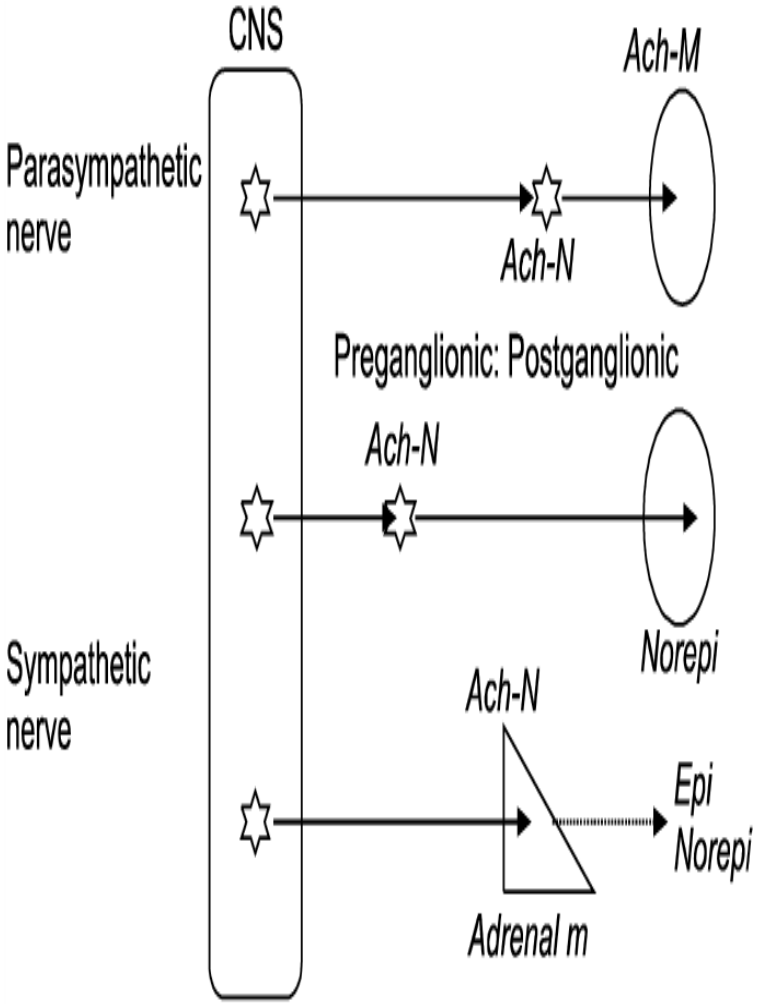
Rhoades. Medical Physiology: Principles for Clinical Medicine. 3rd Edition. P. 51

Autonomic vs. Somatic Terminal Axon



Rhoades. Medical Physiology: Principles for Clinical Medicine. 3rd Edition. P. 112

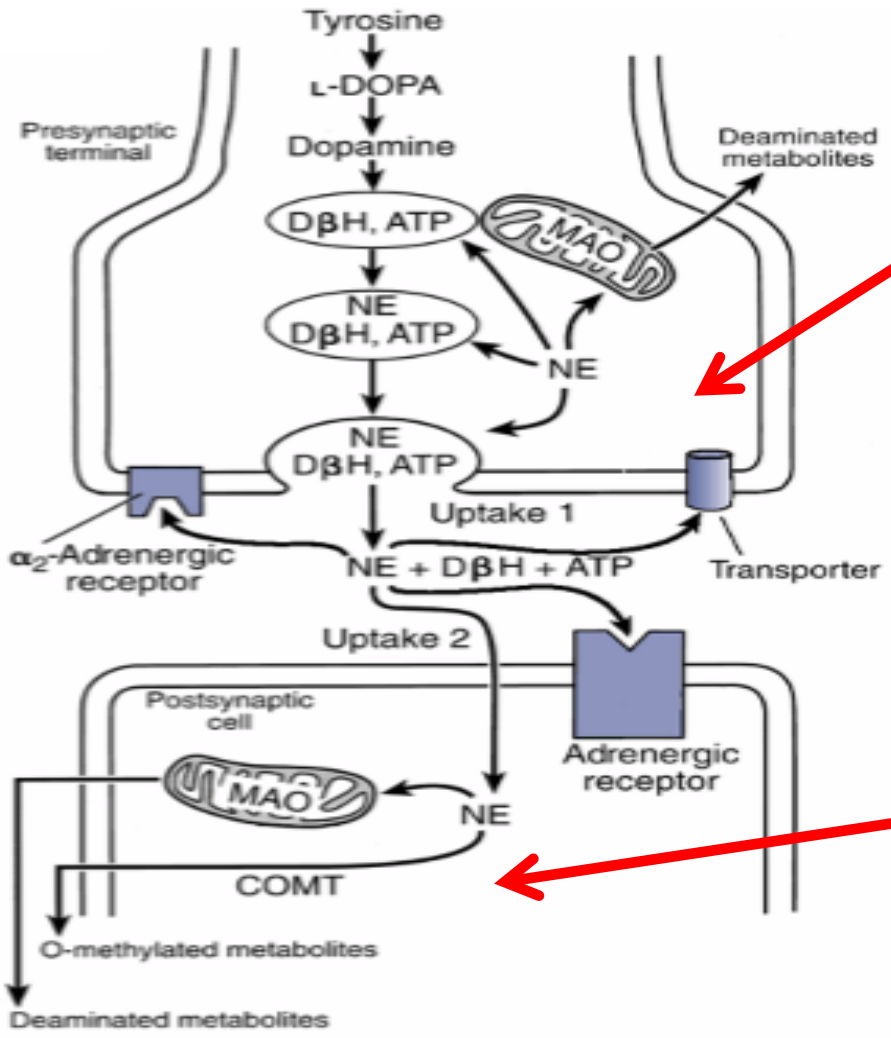
Autonomic Neurotransmitters and Receptors



	Parasympathetic	**Sympathetic**
Preganglionic	Acetylcholine → nicotinic receptor	Acetylcholine → nicotinic receptor
Postganglionic	Acetylcholine → muscarinic receptor	Norepinephrine → α- or β-adrenergic receptors Acetylcholine → muscarinic receptor (sweat glands and skeletal muscle blood vessels ONLY)

Park. 2017. Anatomy and Physiology of the Autonomic Nervous System. Research in Vestibular Science

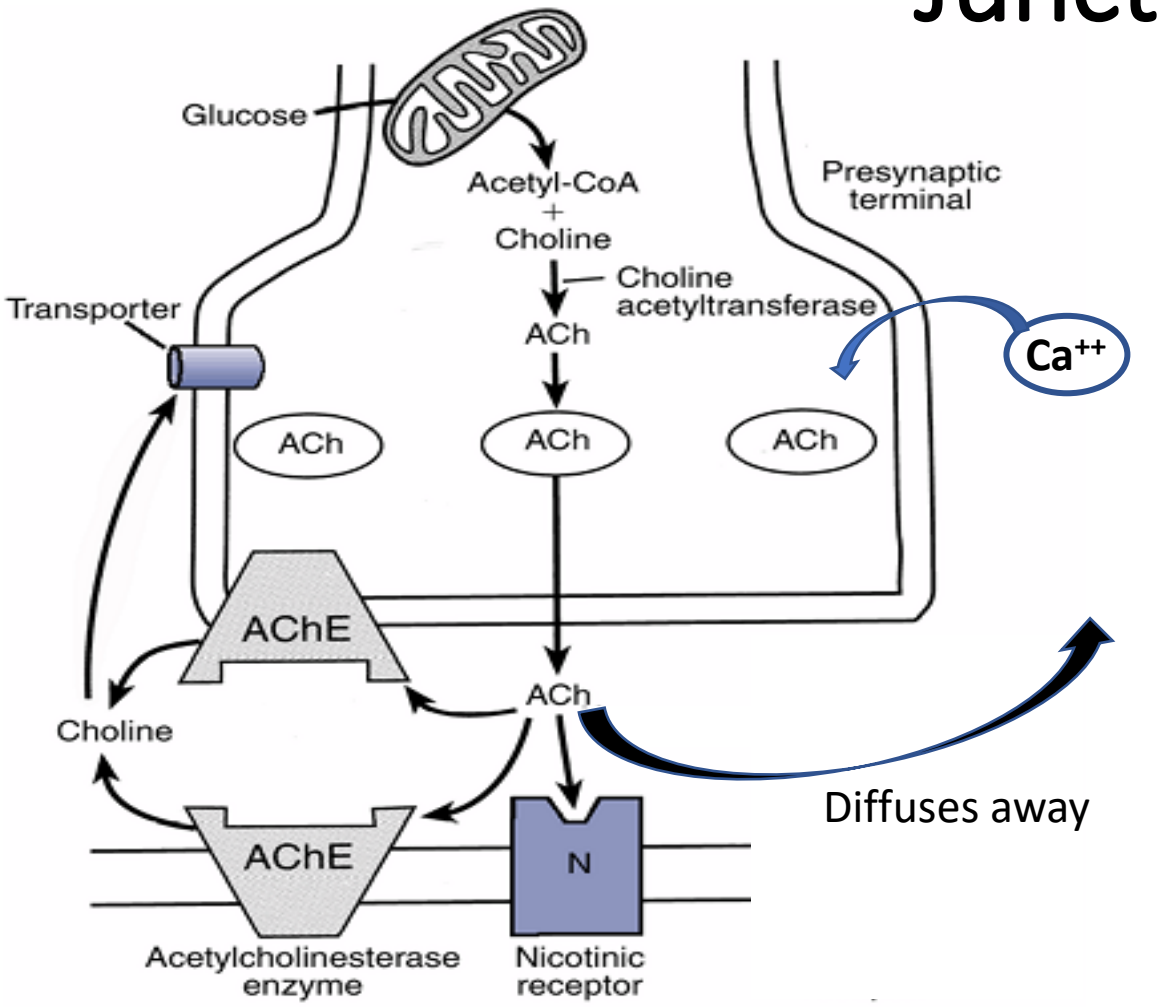
Neurotransmitter: Norepinephrine



1. (80%) Transport mediated reuptake of Norepinephrine.
   - Broken down by monoamine oxidase (MAO) and recycled.

2. (20%) Transport into the postsynaptic target organ cell
   - Broken down by MAO and catechol-O-methyltransferase (COMT)

Somatic Nervous System: The Neuromuscular Junction



Receptor: Nicotinic

Neurotransmitter: Acetylcholine

Enzyme to break down neurotransmitter: **Acetylcholinesterase**

Rhoades. Medical Physiology: Principles for Clinical Medicine. 3rd Edition. P. 53

Important Monoamine Neurotransmitters

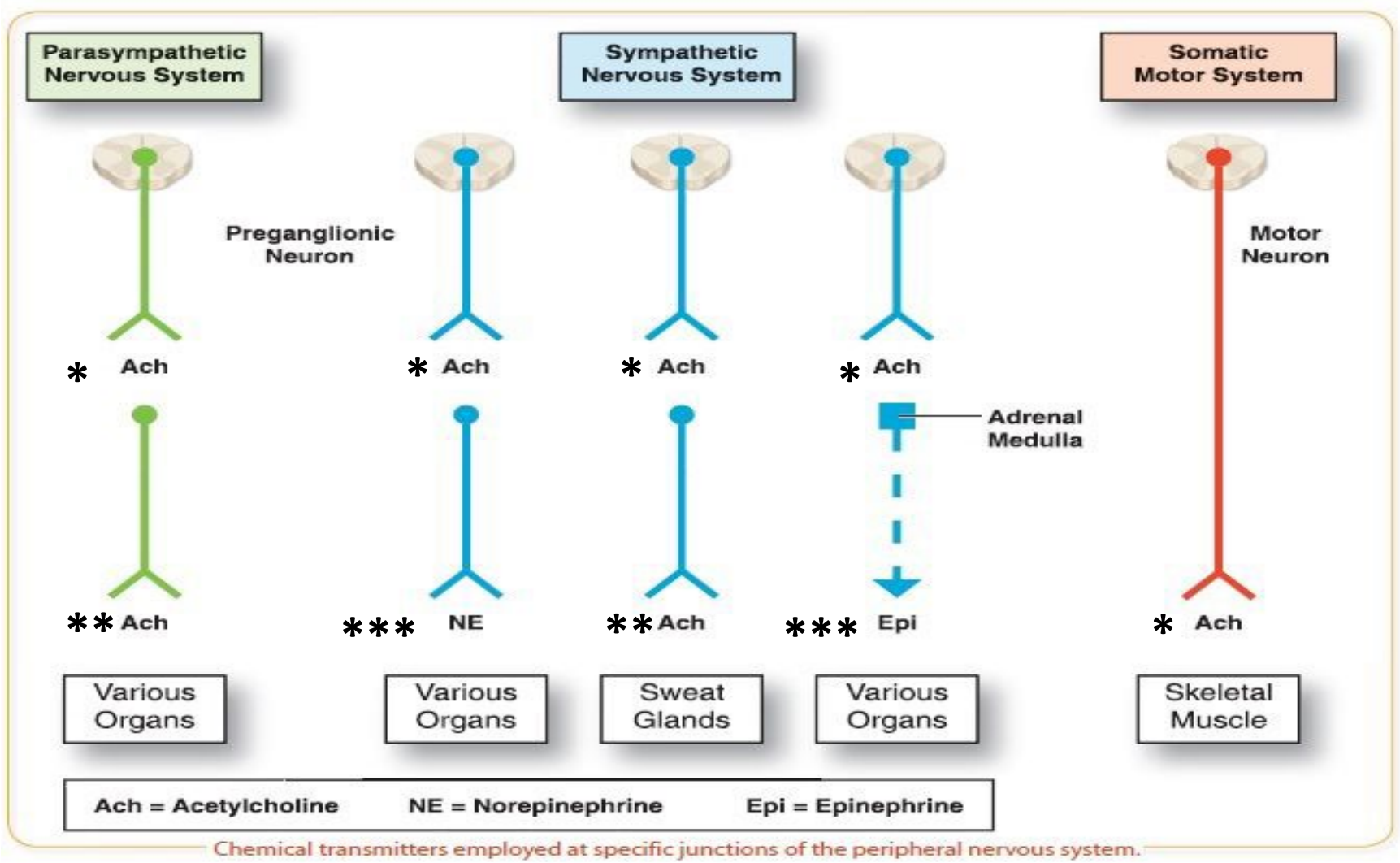
System	Cholinergic	Biogenic amines
Neurotransmitters	Acetylcholine	Serotonin (5-HT), dopamine, norepinephrine, (epinephrine)
Receptors	Nicotinic and muscarinic receptors	5-HT receptors, D1 and D2 receptors, α-adrenergic and β-adrenergic receptors
Elimination	Degradation by acetylcholinesterase	Reuptake by neurons
Postsynaptic effect	Nicotinic receptor causes depolarization. Muscarinic receptors can cause both depolarization or hyperpolarization depending on the subtype.	Depolarization or hyperpolarization depends on the specific receptor. For example, D1 receptors cause depolarization and D2 receptors cause hyperpolarization.

Betts.2013. Anatomy and Physiology. Pg.. 538

Visual: Autonomic vs. Somatic Nervous System

Receptor Type

* Nicotinic
** Muscarinic
*** Adrenergic



Chemical transmitters employed at specific junctions of the peripheral nervous system.

https://i.pinimg.com/originals/fd/fc/e1/fdfce1ab306b24496cc2d92d17cbb12e.jpg

Summary Questions