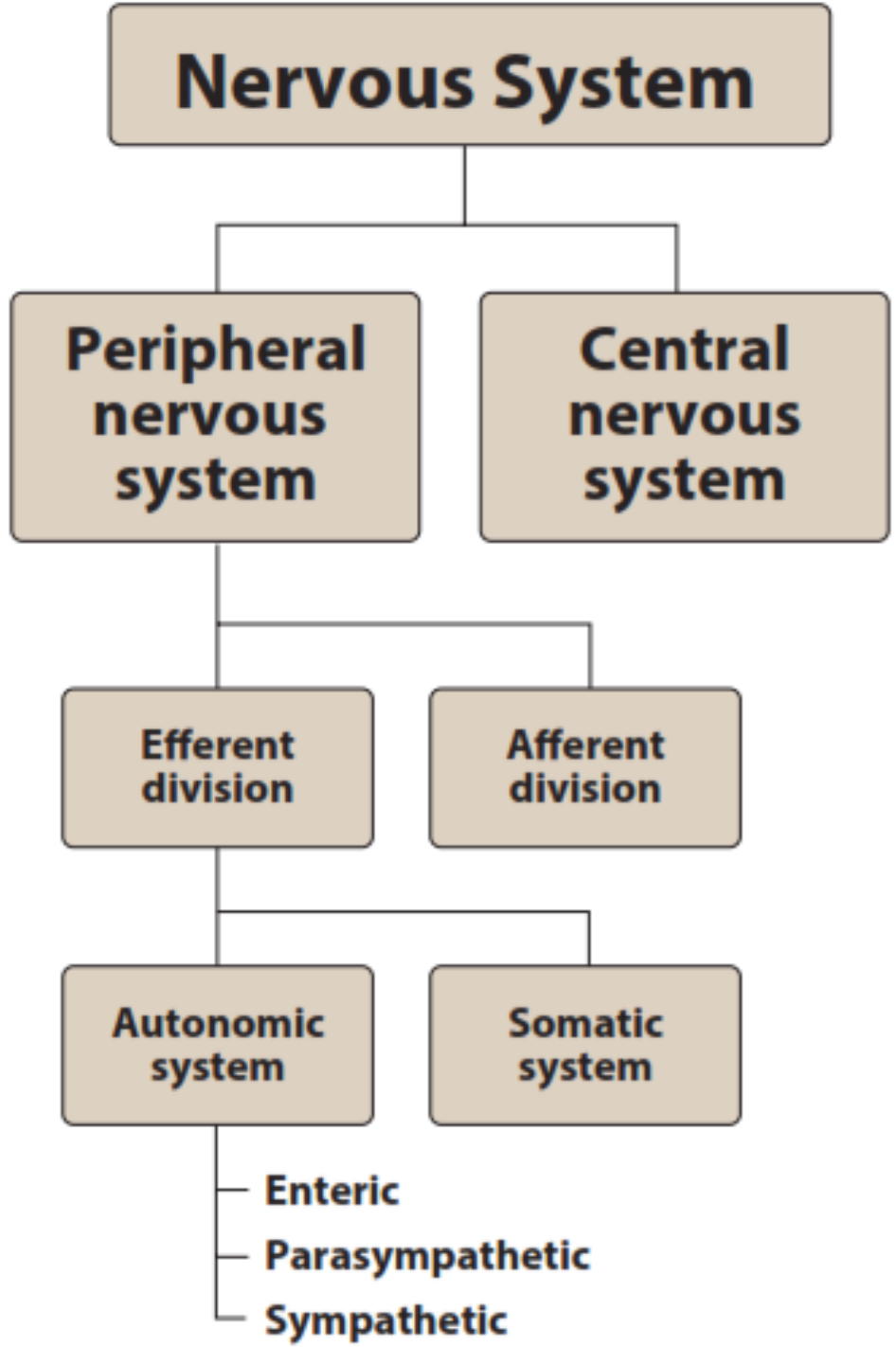
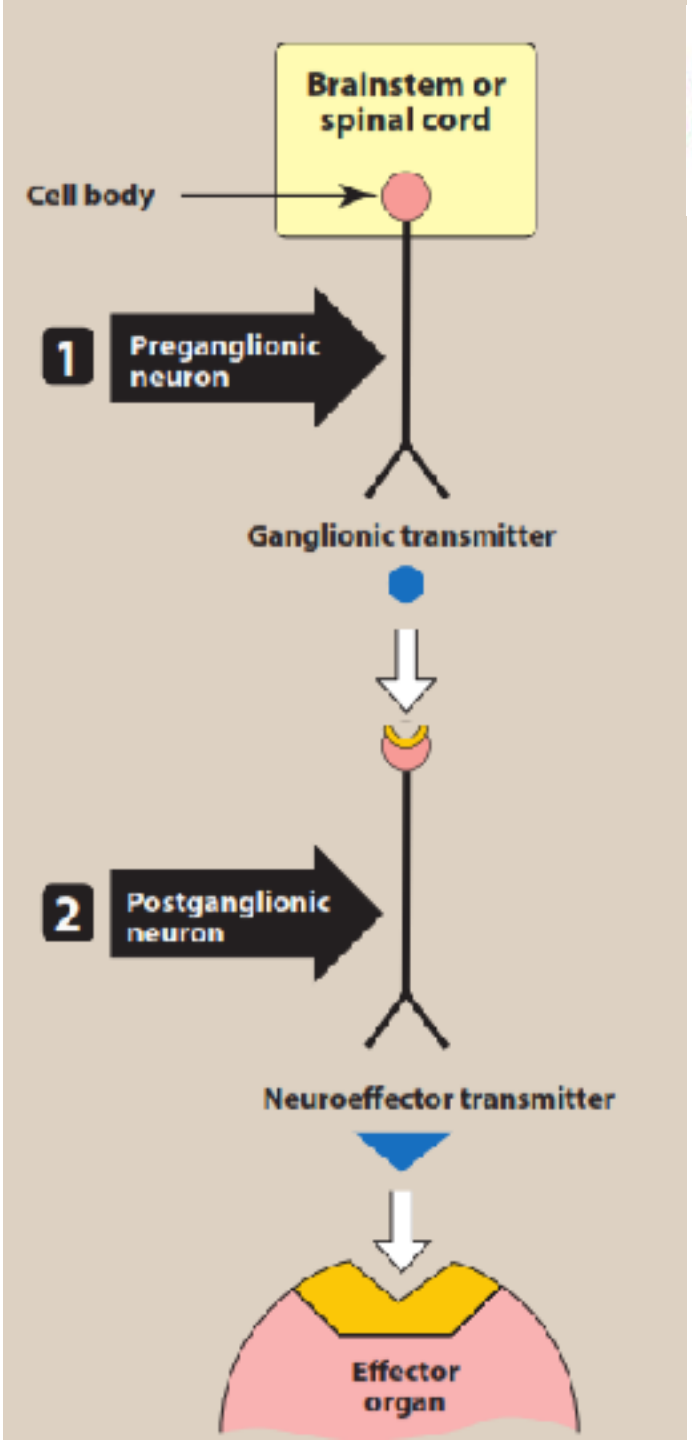
Drugs Affecting the Autonomic Nervous System

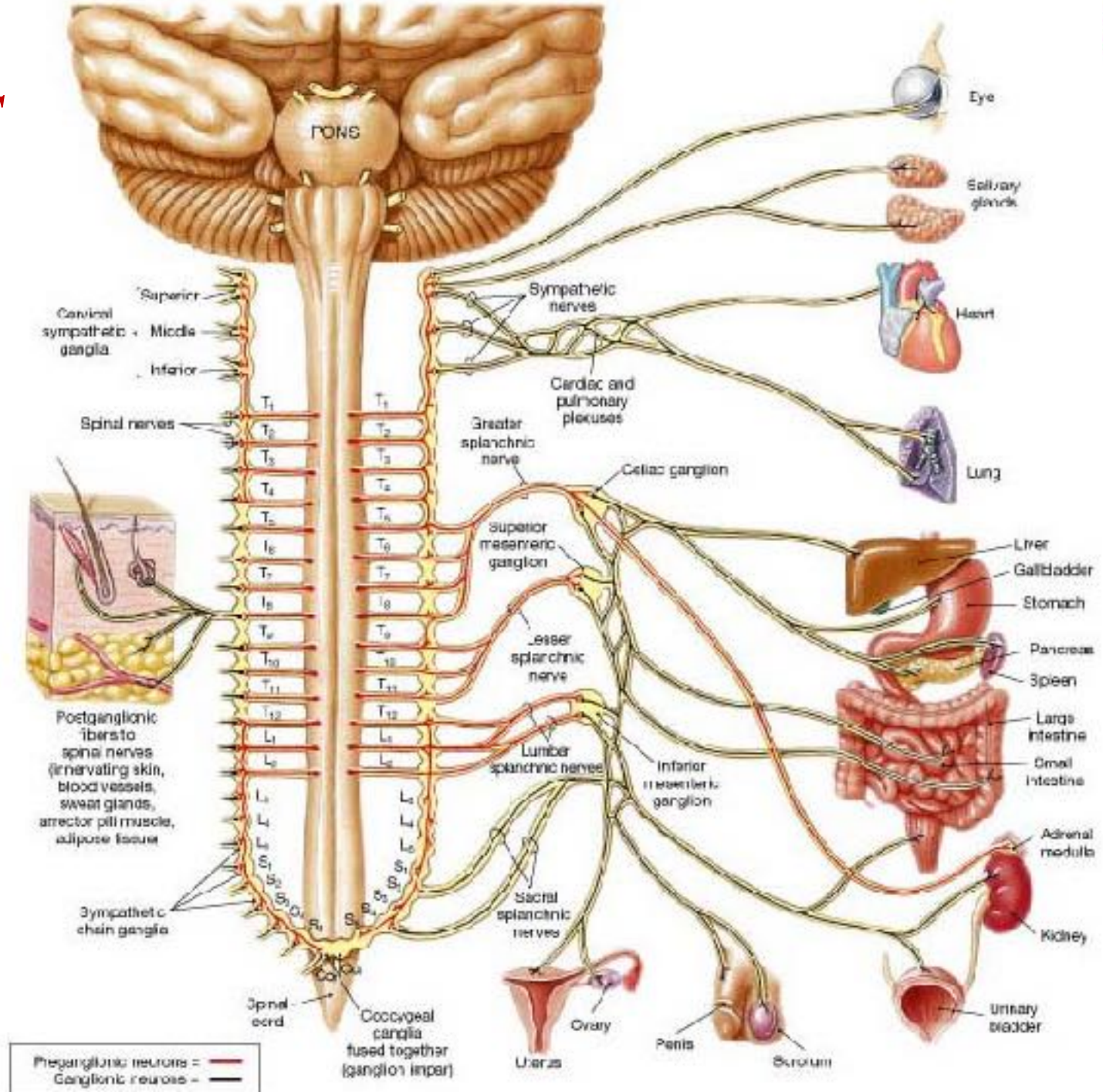

Nervous System
Peripheral nervous system
Central nervous system
Efferent division
Afferent division
Autonomic system
Somatic system
Enteric
Parasympathetic
Sympathetic

Thoracic and lumbar regions



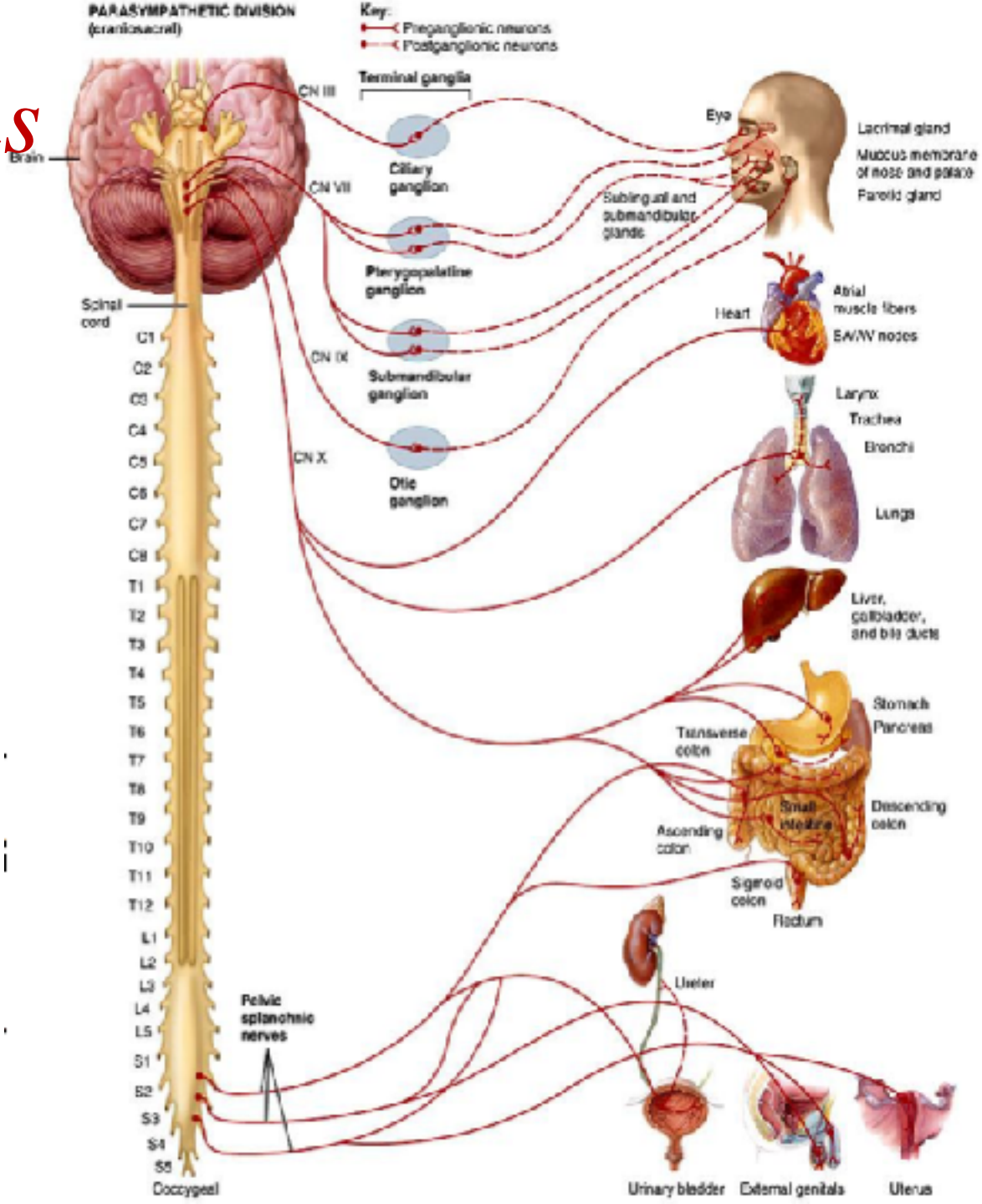
Sympathetic Neurons

Thoracic & lumbar region (T1 to L2)



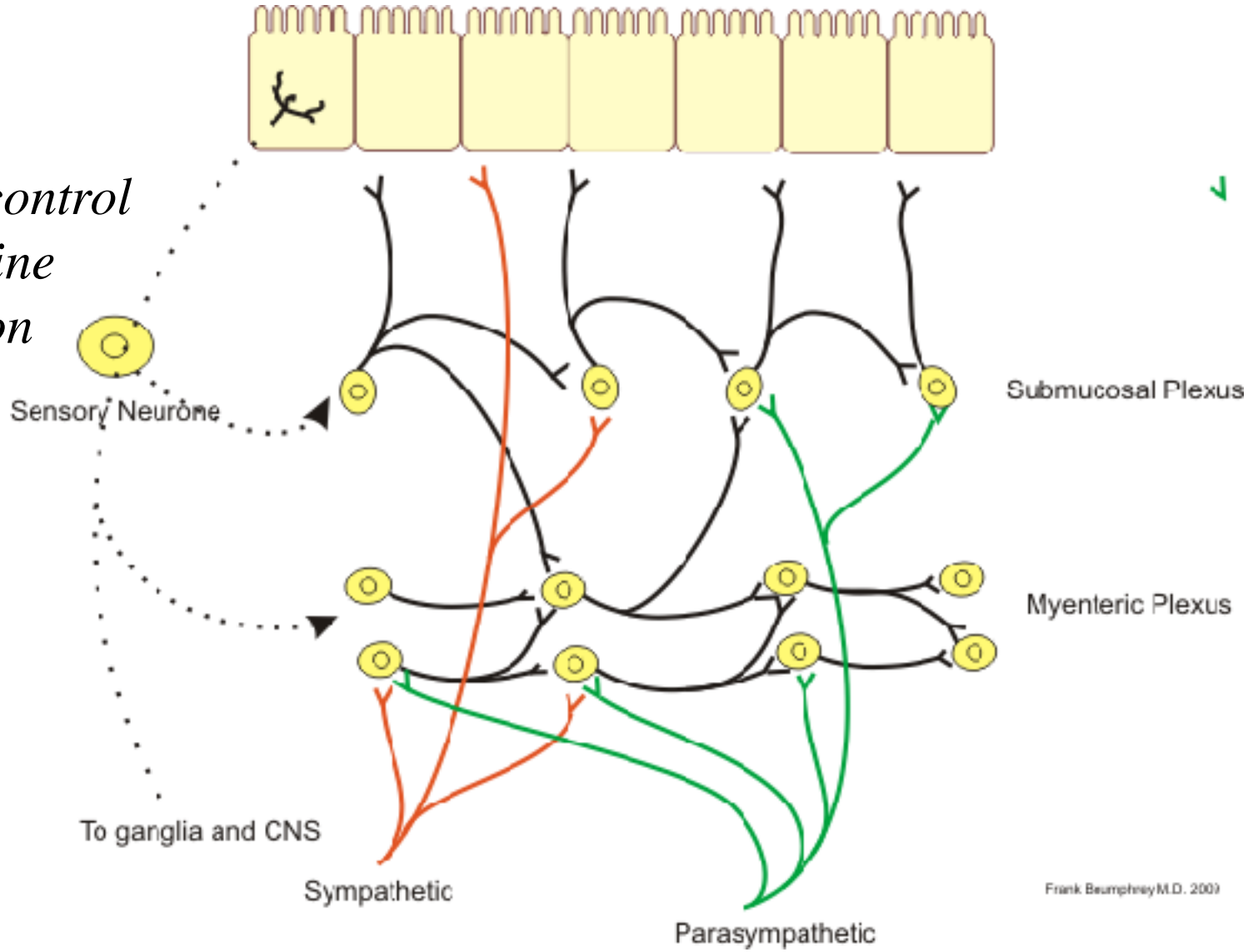
Parasympathetic Neurons

- *Cranial N III, VII, IX & X*
- *Sacral S2 – S4*



Enteric nervous system

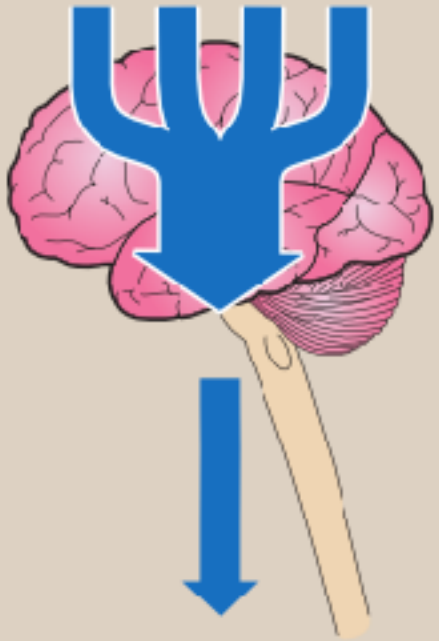
- *Collection of NF*
- *Act independently of CNS, control motility, exocrine & endocrine secretion, & microcirculation*



"Fight-or-flight" stimulus

Sympathetic output
(diffuse because postganglionic neurons may innervate more than one organ)

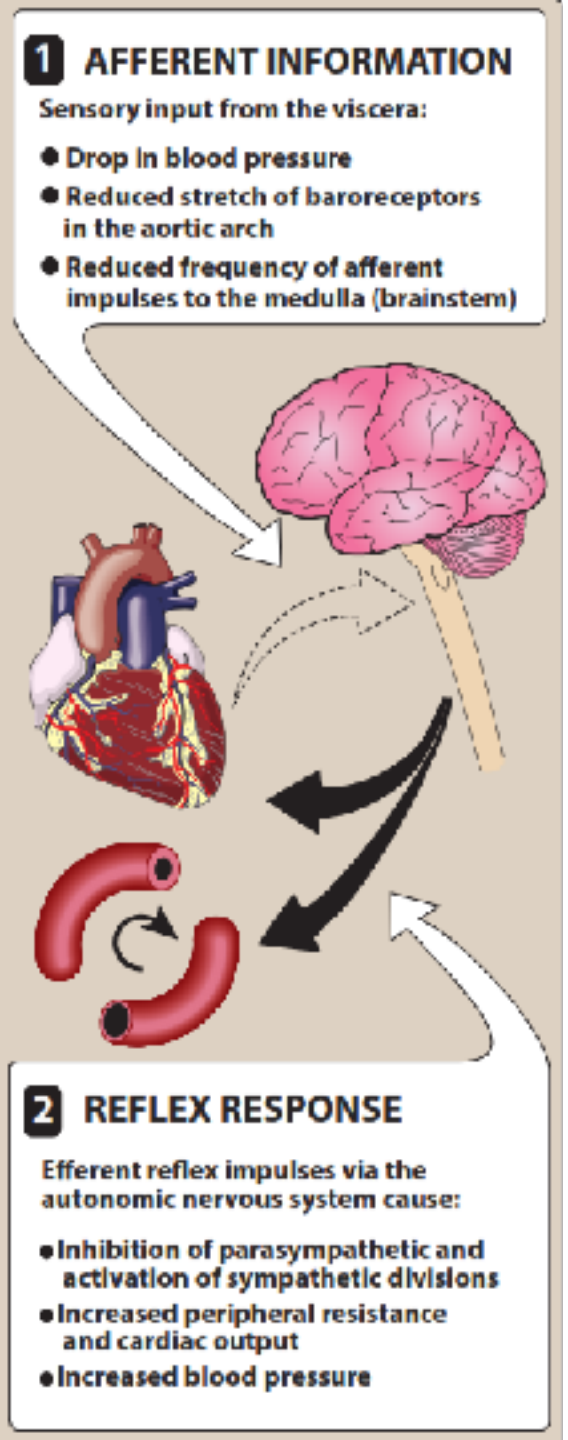
"Rest-and-digest" stimulus



Parasympathetic output
(discrete because postganglionic neurons are not branched, but are directed to a specific organ)

Sympathetic and para-sympathetic actions often oppose each other

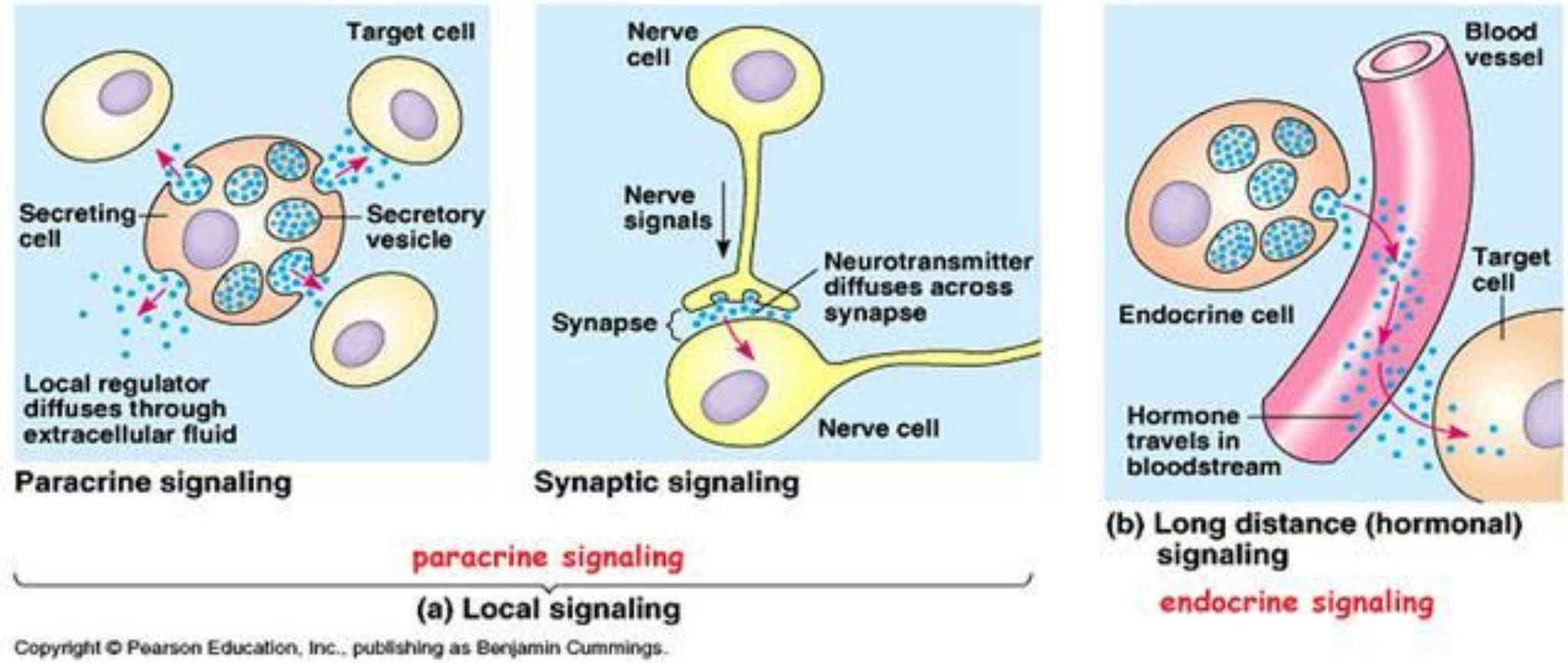
BaroreceptorReflex Arc

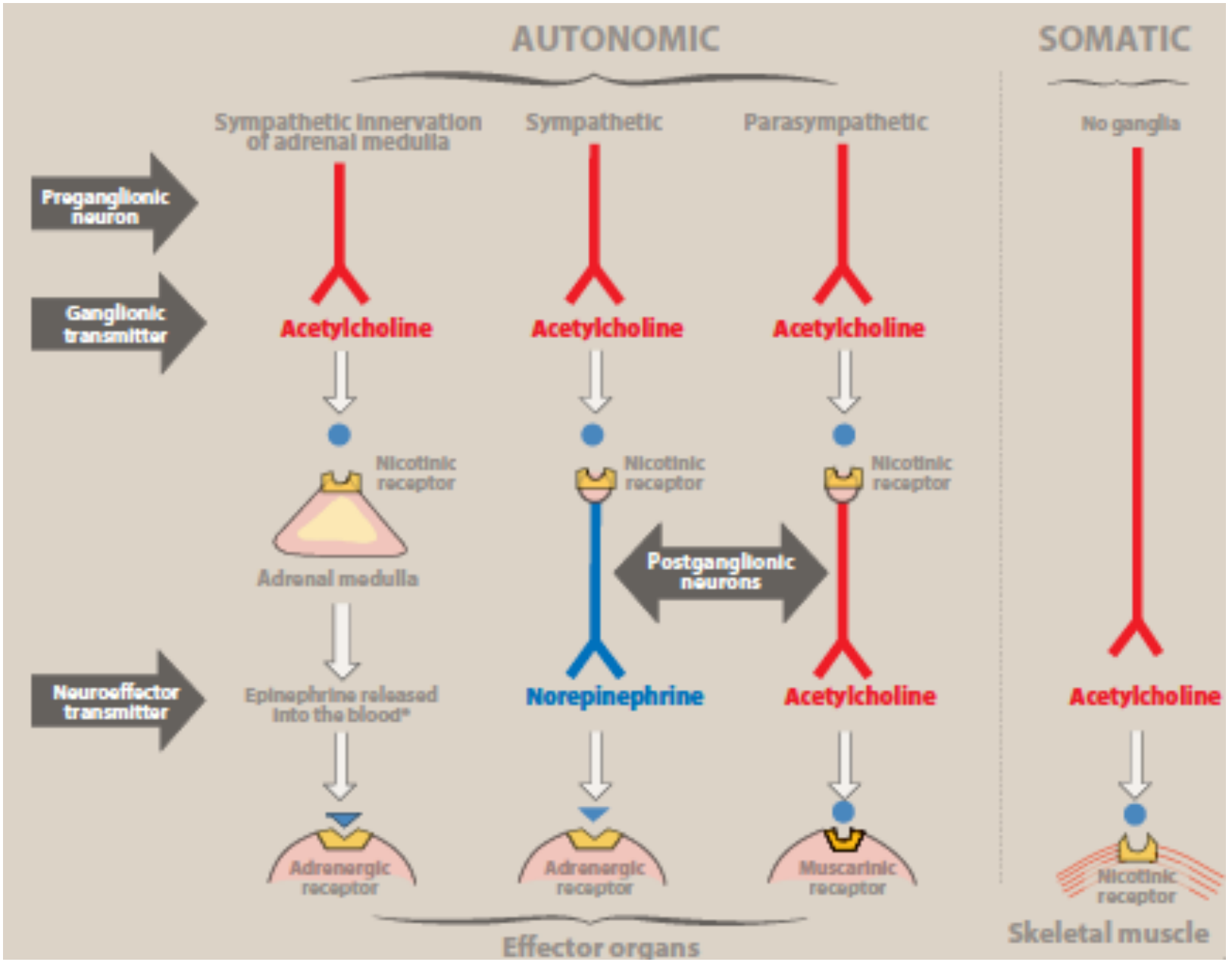


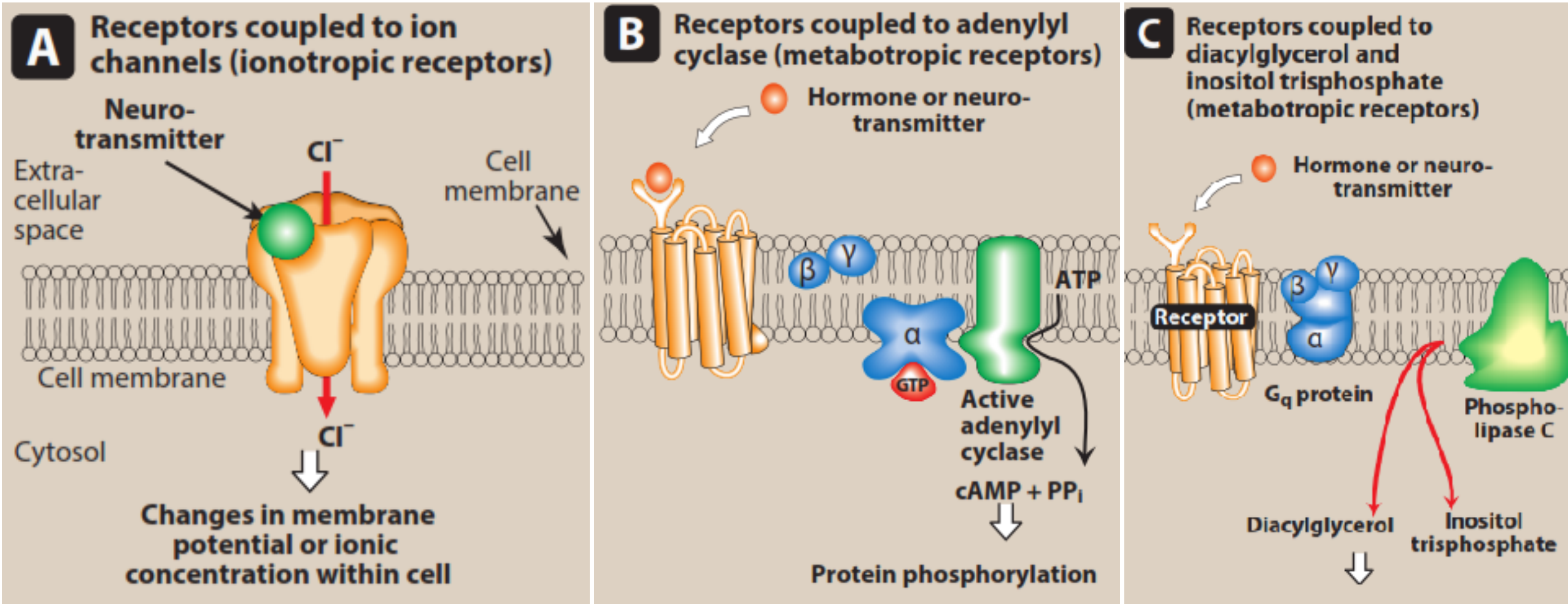
Characteristics of SNS & PSNS

	SYMPATHETIC	PARASYMPATHETIC
Sites of origin	Thoracic and lumbar region of the spinal cord (thoracolumbar)	Brain and sacral area of the spinal cord (craniosacral)
Length of fibers	Short preganglionic Long postganglionic	Long preganglionic Short postganglionic
Location of ganglia	Close to the spinal cord	Within or near effector organs
Preganglionic fiber branching	Extensive	Minimal
Distribution	Wide	Limited
Type of response	Diffuse	Discrete

Chemical Signaling Between Cells




AUTONOMIC
SOMATIC
Sympathetic innervation of adrenal medulla
Sympathetic
Parasympathetic
No ganglia
Preganglionic neuron
Ganglionic transmitter
Acetylcholine
Acetylcholine
Acetylcholine
Nicotinic receptor
Nicotinic receptor
Nicotinic receptor
Adrenal medulla
Postganglionic neurons
Neuroeffector transmitter
Epinephrine released into the blood*
Norepinephrine
Acetylcholine
Acetylcholine
Adrenergic receptor
Adrenergic receptor
Muscarinic receptor
Nicotinic receptor
Effector organs
Skeletal muscle


A
Receptors coupled to ion channels (ionotropic receptors)
Neuro-transmitter
Cl⁻
Extra-cellular space
Cell membrane
Cell membrane
Cytosol
Cl⁻
Changes in membrane potential or ionic concentration within cell
B
Receptors coupled to adenylyl cyclase (metabotropic receptors)
Hormone or neuro-transmitter
β
γ
α
GTP
ATP
Active adenylyl cyclase
cAMP + PPi
Protein phosphorylation
C
Receptors coupled to diacylglycerol and inositol trisphosphate (metabotropic receptors)
Hormone or neuro-transmitter
Receptor
β
γ
α
Gq protein
Phospho-lipase C
Diacylglycerol
Inositol trisphosphate