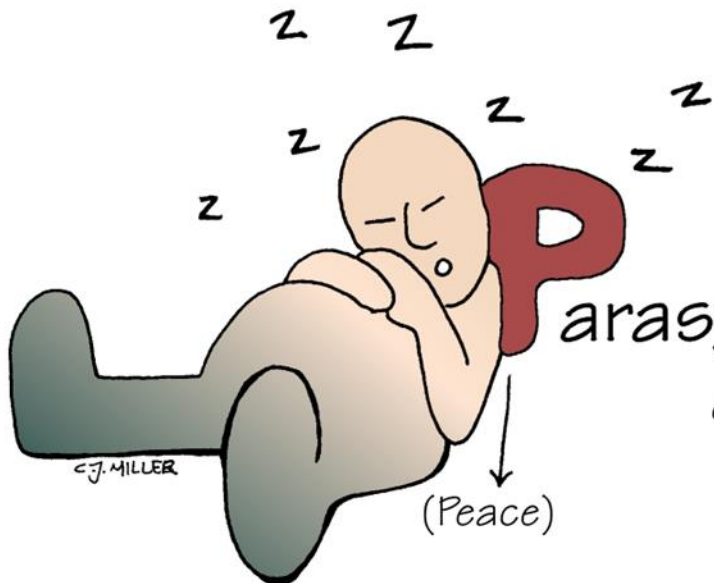


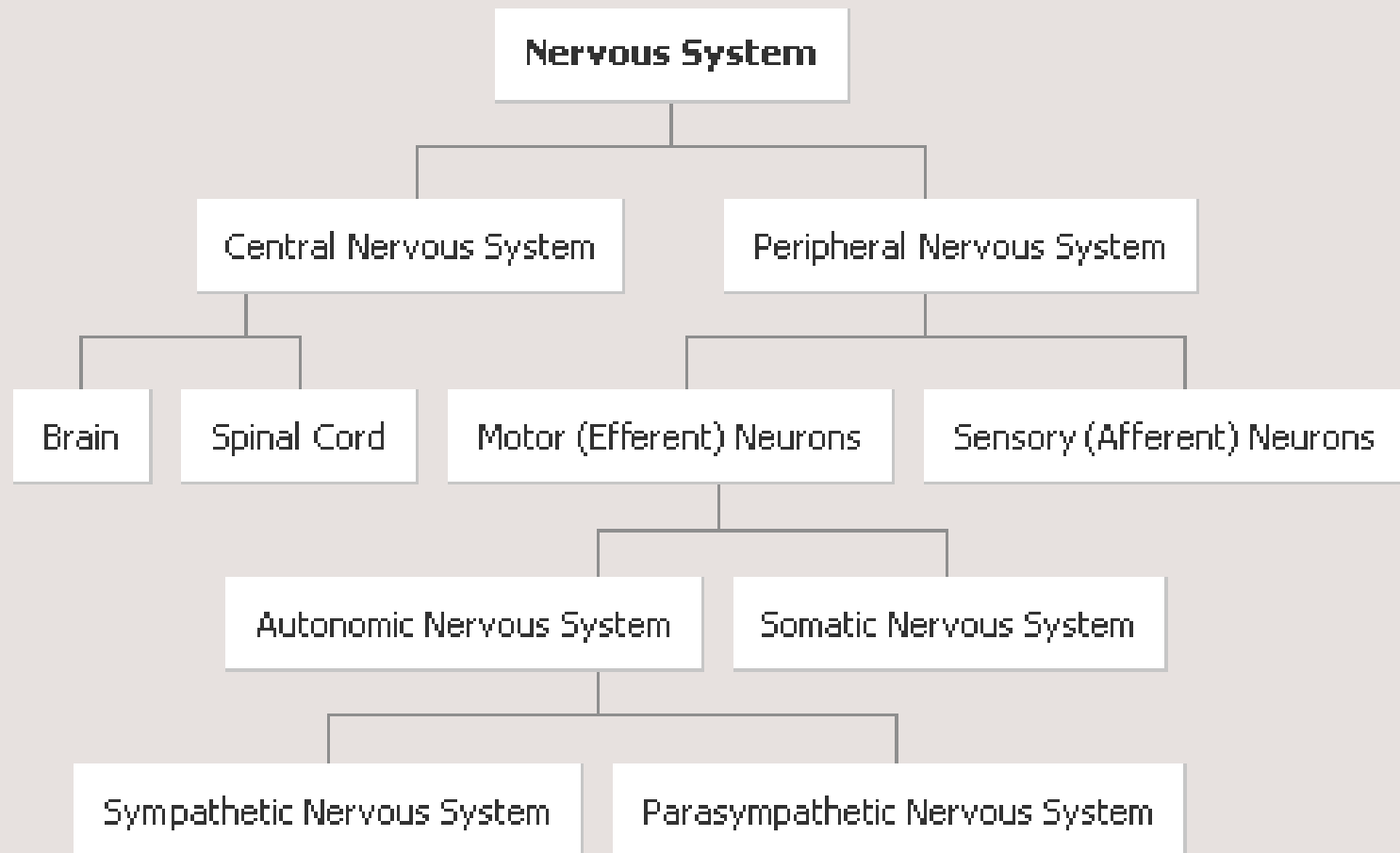
# “AUTONOMIC NERVOUS SYSTEM RESPONSE”

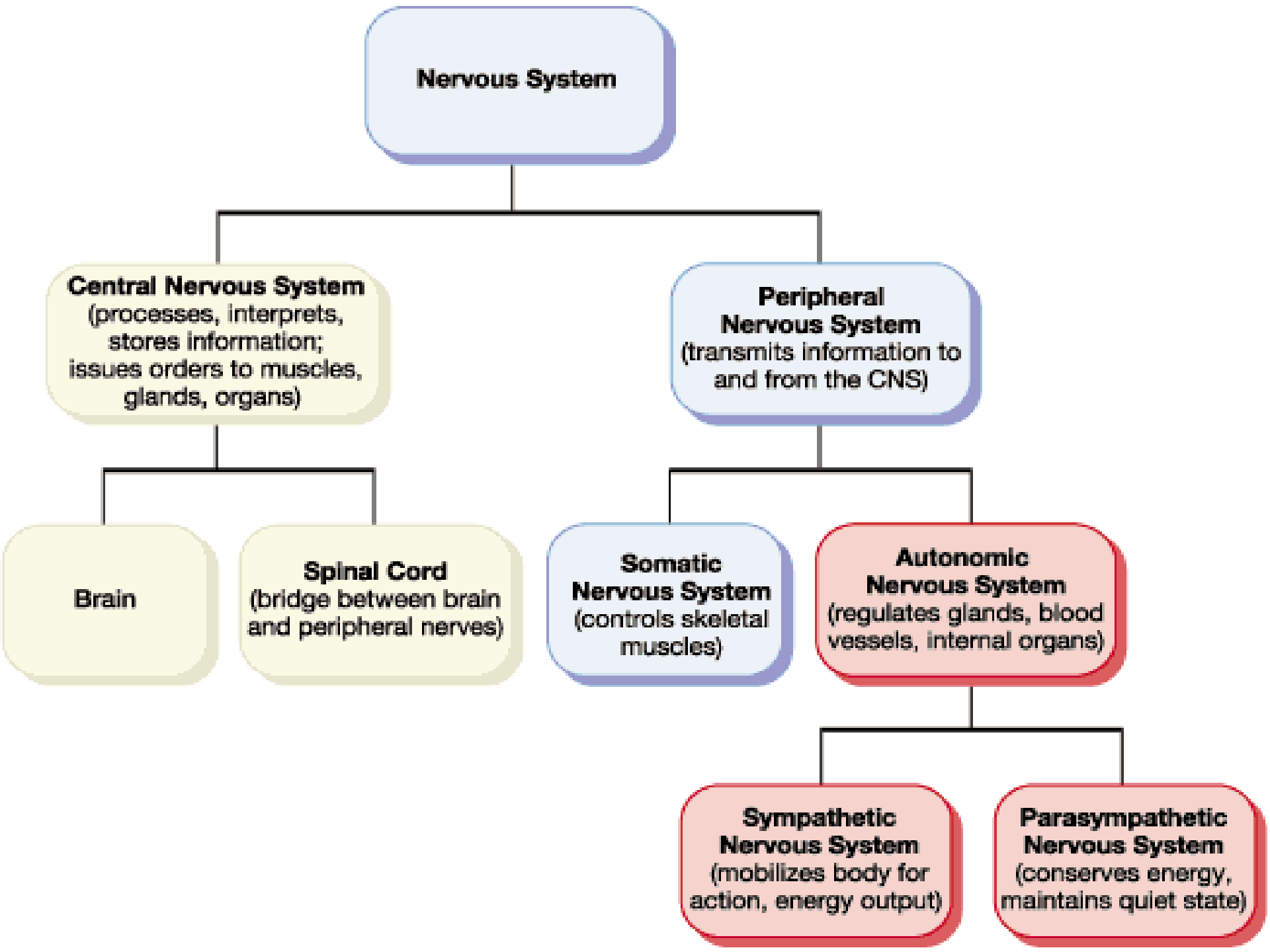
**S**ympathetic Response  
“Fight or Flight”  
(Stress)

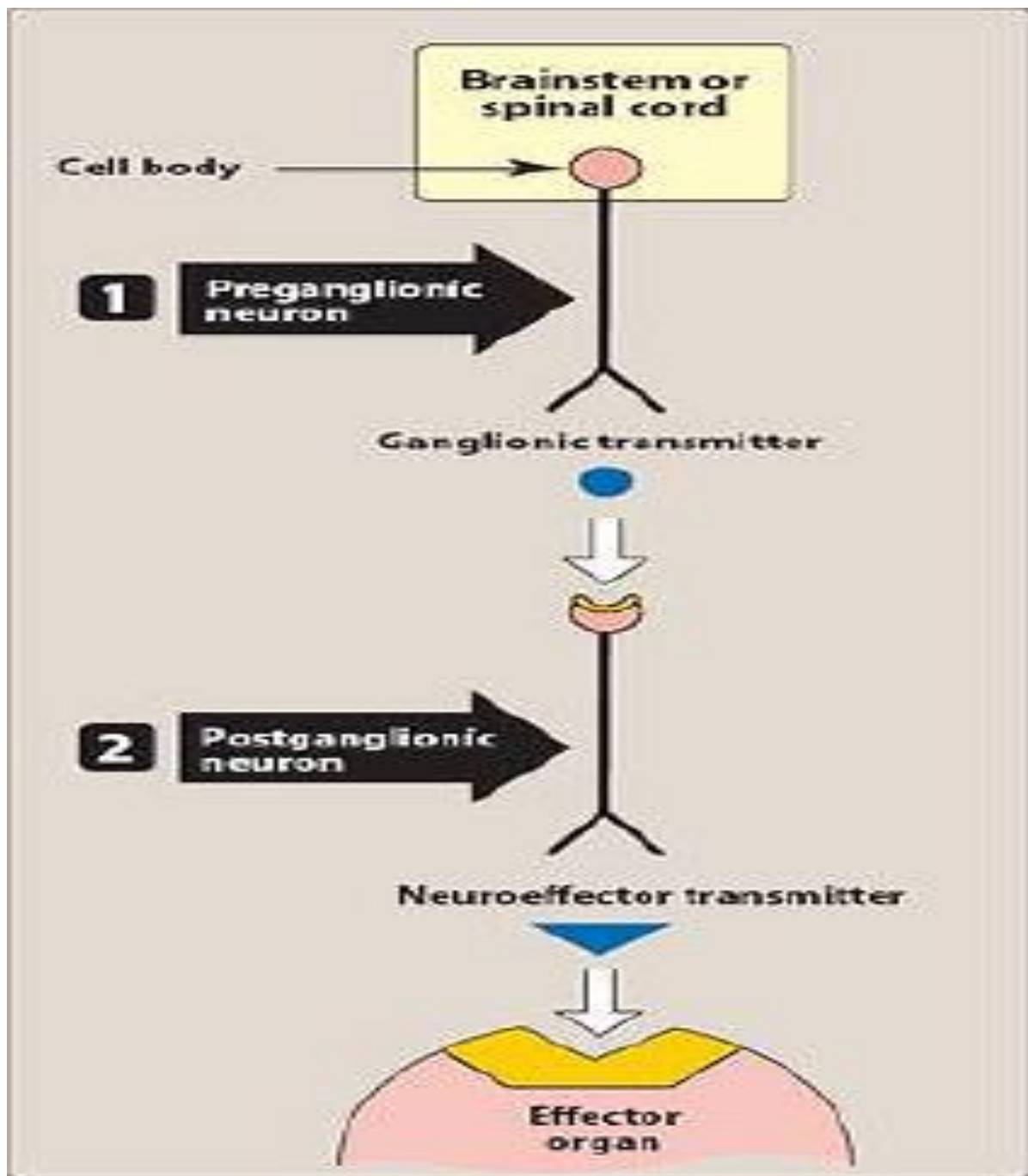


**P**arasympathetic Response  
“Rest & Digest”  
(Peace)



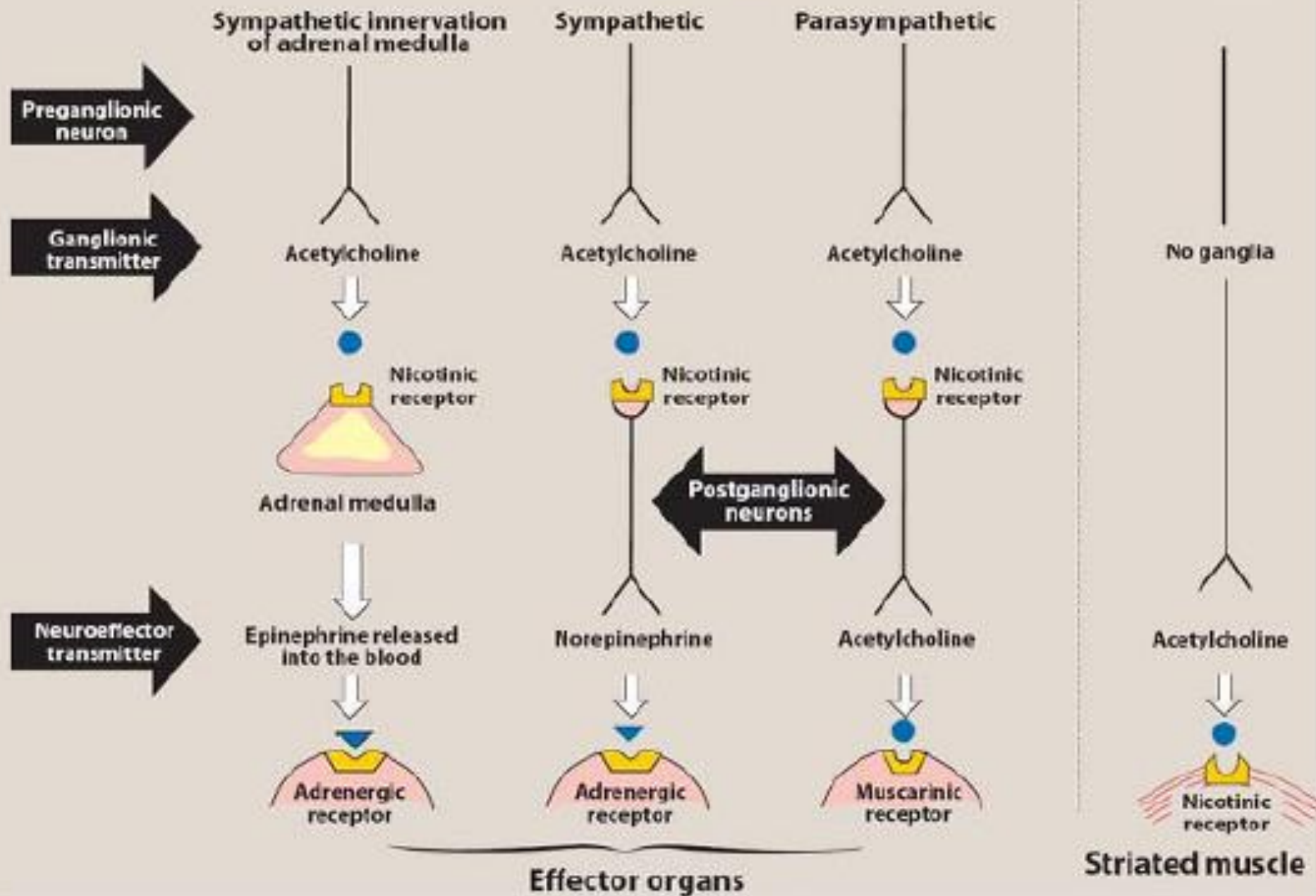






# AUTONOMIC

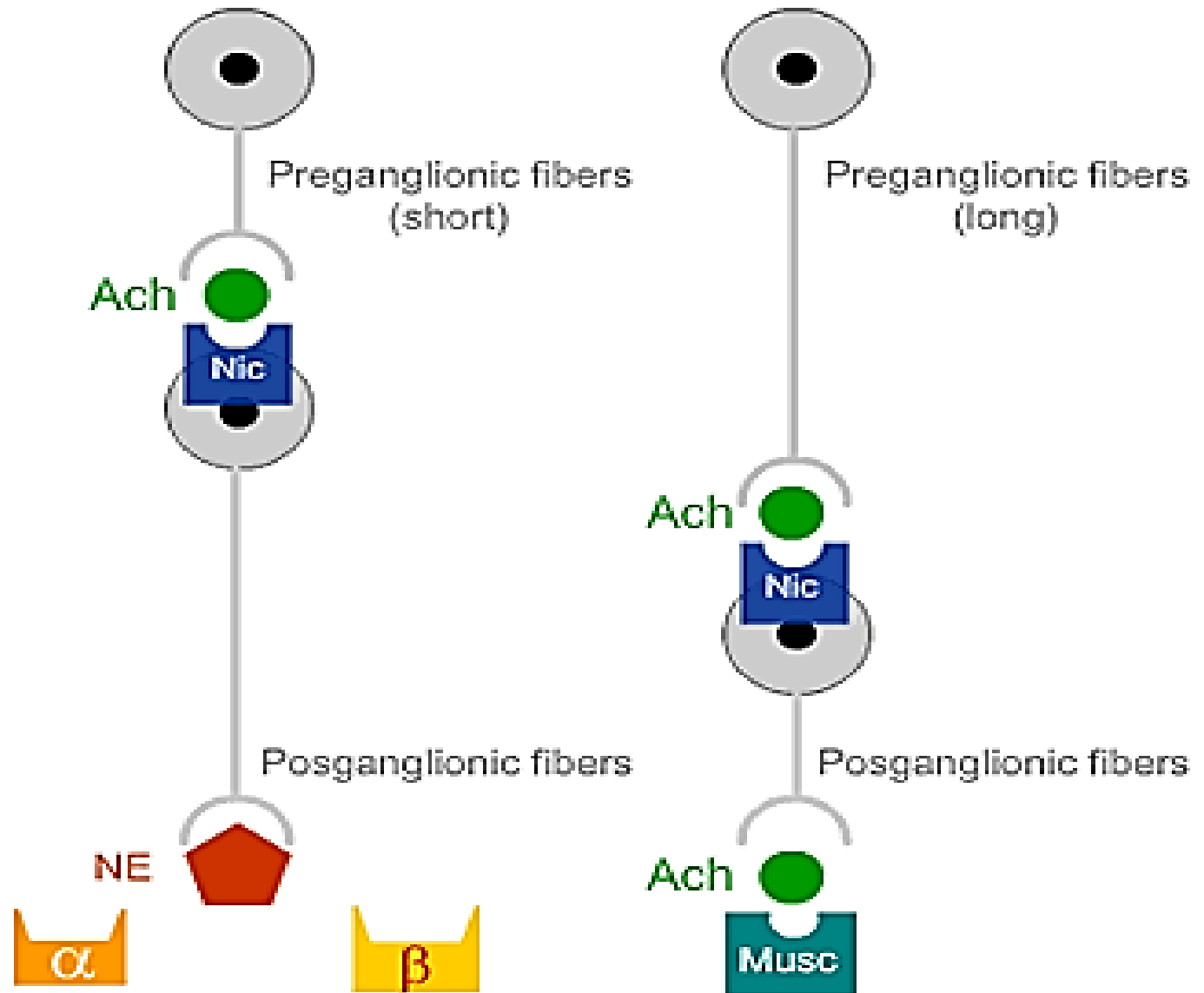
# SOMATIC



## Sympathetic

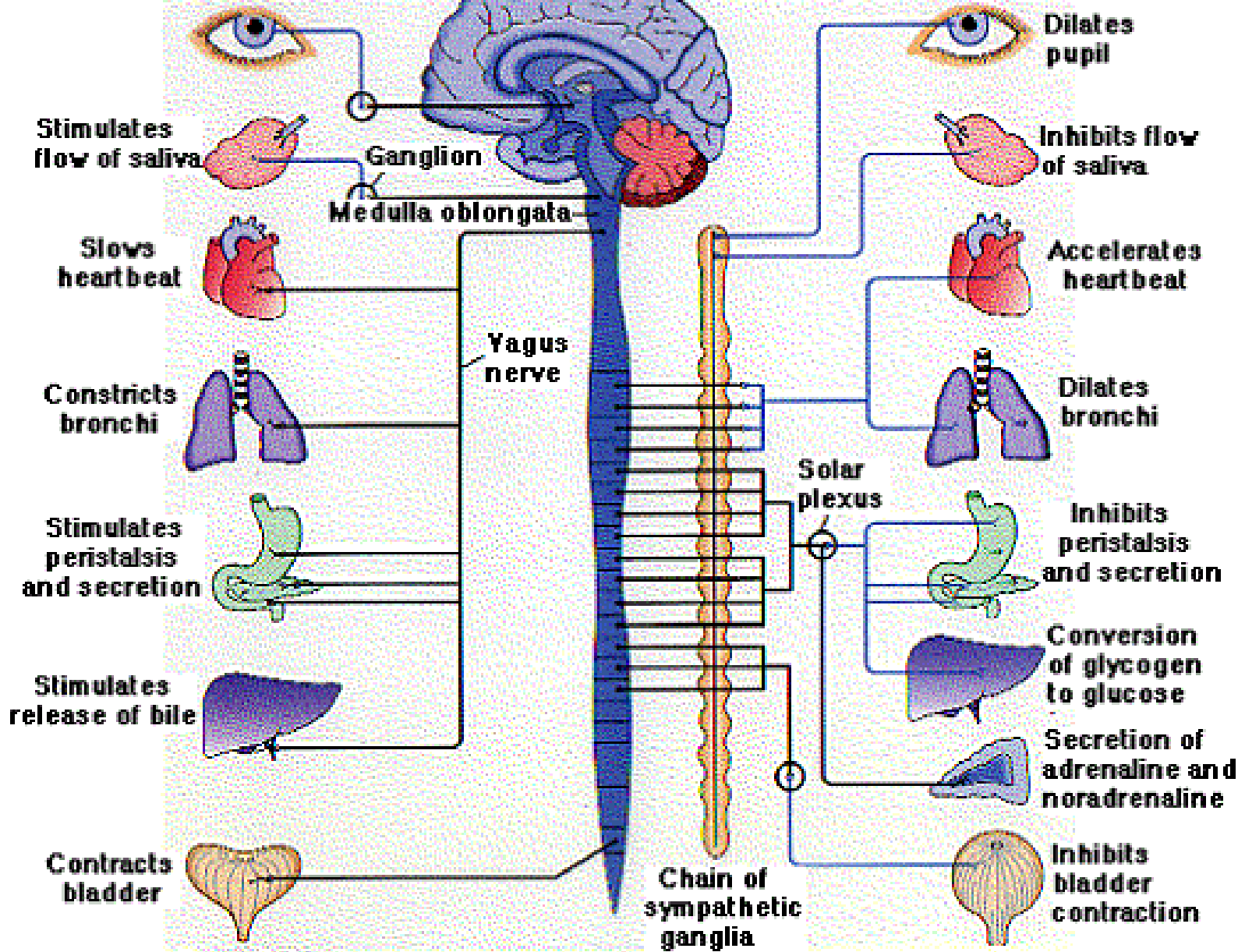
## Parasympathetic

<b>Ach</b> ● Acetylcholine
<b>Nic</b> Nicotinic receptor
<b>Musc</b> Muscarinic receptor
<b>NE</b> ● Norepinephrine
<b>α</b> <b>β</b> Adrenergic receptors



# Parasympathetic

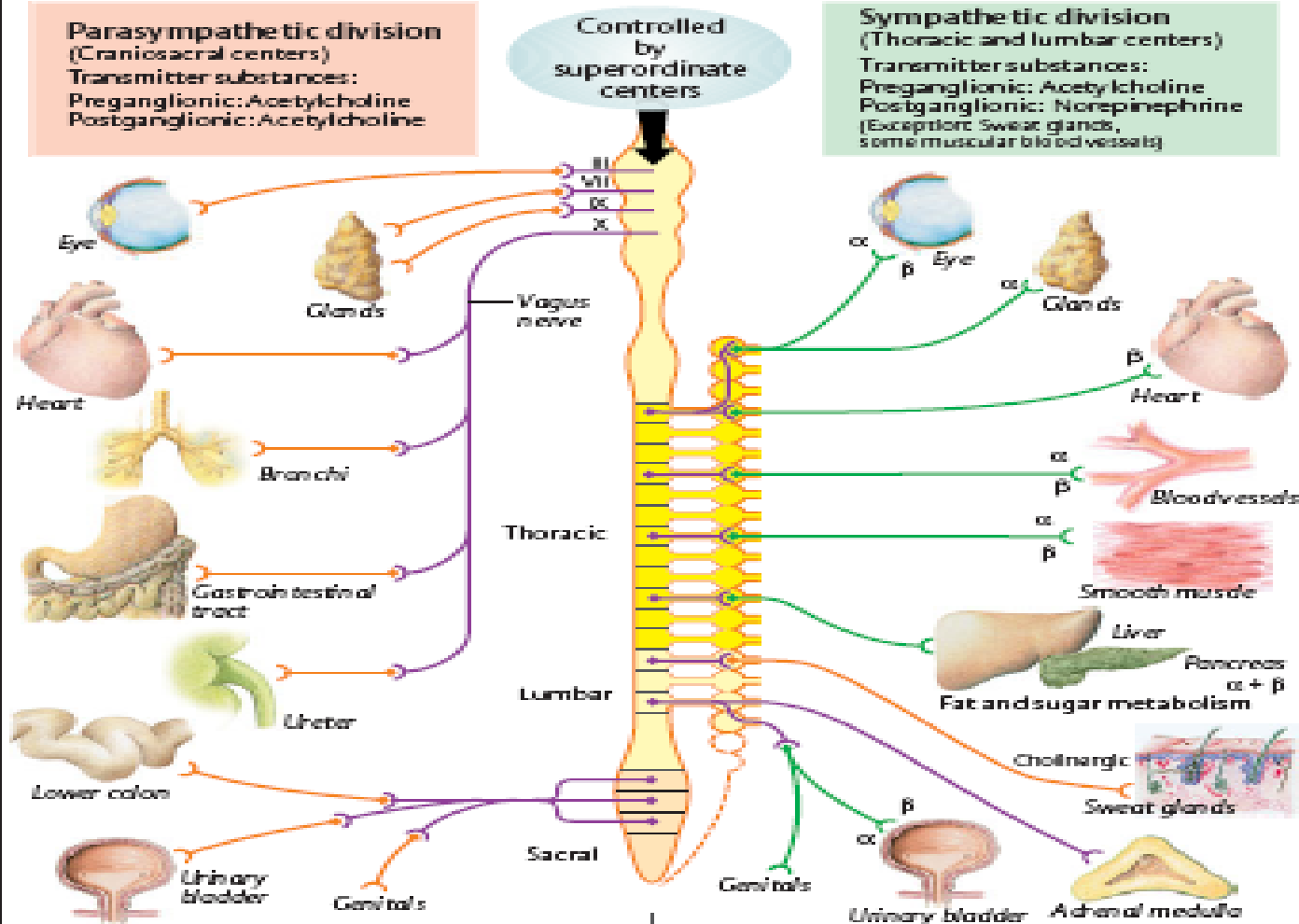
# Sympathetic



# A. Schematic view of autonomic nervous system (ANS)

**Parasympathetic division**  
(Craniosacral centers)  
Transmitter substances:  
Preganglionic: Acetylcholine  
Postganglionic: Acetylcholine

**Sympathetic division**  
(Thoracic and lumbar centers)  
Transmitter substances:  
Preganglionic: Acetylcholine  
Postganglionic: Norepinephrine  
(Except for sweat glands,  
some muscular blood vessels)



## Cholinceptors

- Nicotinic receptors:**
- All postganglionic, autonomic ganglia cells and dendrites
  - Adrenal medulla
- Muscarinic receptors:**
- All target organs innervated by postganglionic parasympathetic nerve fibers (and sweat glands innervated by sympathetic fibers)

## Adrenoceptors:

- $\alpha$  Usually excitatory (except in GI tract, where they are indirect relaxants)
- $\beta$  Usually inhibitory (except in heart, where they are excitatory)
  - $\beta_1$  mainly in heart
  - $\beta_2$  in bronchi, urinary bladder, uterus, gastrointestinal tract, etc.

— Postganglionic: Cholinergic

— Preganglionic: Cholinergic

— Postganglionic: Adrenergic



# Lesson 3 The Autonomic Nervous System

## FIGHT



Stand your ground, defend your position, attack, dig in, persevere!

## *Flight*



Give way, retreat, discard, remove yourself, give up, move on.

or

# FIGHT or FLIGHT

## NOTICEABLE EFFECTS

PUPILS DILATE  
MOUTH GOES DRY  
NECK + SHOULDER  
MUSCLES TENSE  
HEART PUMPS FASTER  
CHEST PAINS  
PALPITATIONS  
SWEATING  
MUSCLES TENSE  
FOR ACTION  
BREATHING FAST  
+ SHALLOW -  
HYPERVENTILATION  
OXYGEN NEEDED  
FOR  
MUSCLES

## HIDDEN EFFECTS

BRAIN GETS BODY  
READY FOR ACTION  
ADRENALINE  
RELEASED FOR  
FIGHT/FLIGHT  
BLOOD PRESSURE  
RISES  
LIVER RELEASES  
GLUCOSE TO PROVIDE  
ENERGY FOR MUSCLES  
DIGESTION SLOWS -  
OR CEASES  
SPHINCTERS CLOSE -  
THEN RELAX  
CORTISOL RELEASED  
(DEPRESSES THE  
IMMUNE SYSTEM)

**CENTRAL NERVOUS SYSTEM**

**SYMPATHETIC NERVOUS SYSTEM (arousing)**

**PARASYMPATHETIC NERVOUS SYSTEM (calming)**

Brain

Spinal cord



Dilates pupil



Contracts pupil



Heart

Accelerates heartbeat



Slows heartbeat



Stomach

Inhibits digestion



Stimulates digestion

Pancreas



Liver

Stimulates glucose release by liver



Stimulates gallbladder

Adrenal gland



Kidney

Secretion of epinephrine norepinephrine



Relaxes bladder



Contracts bladder



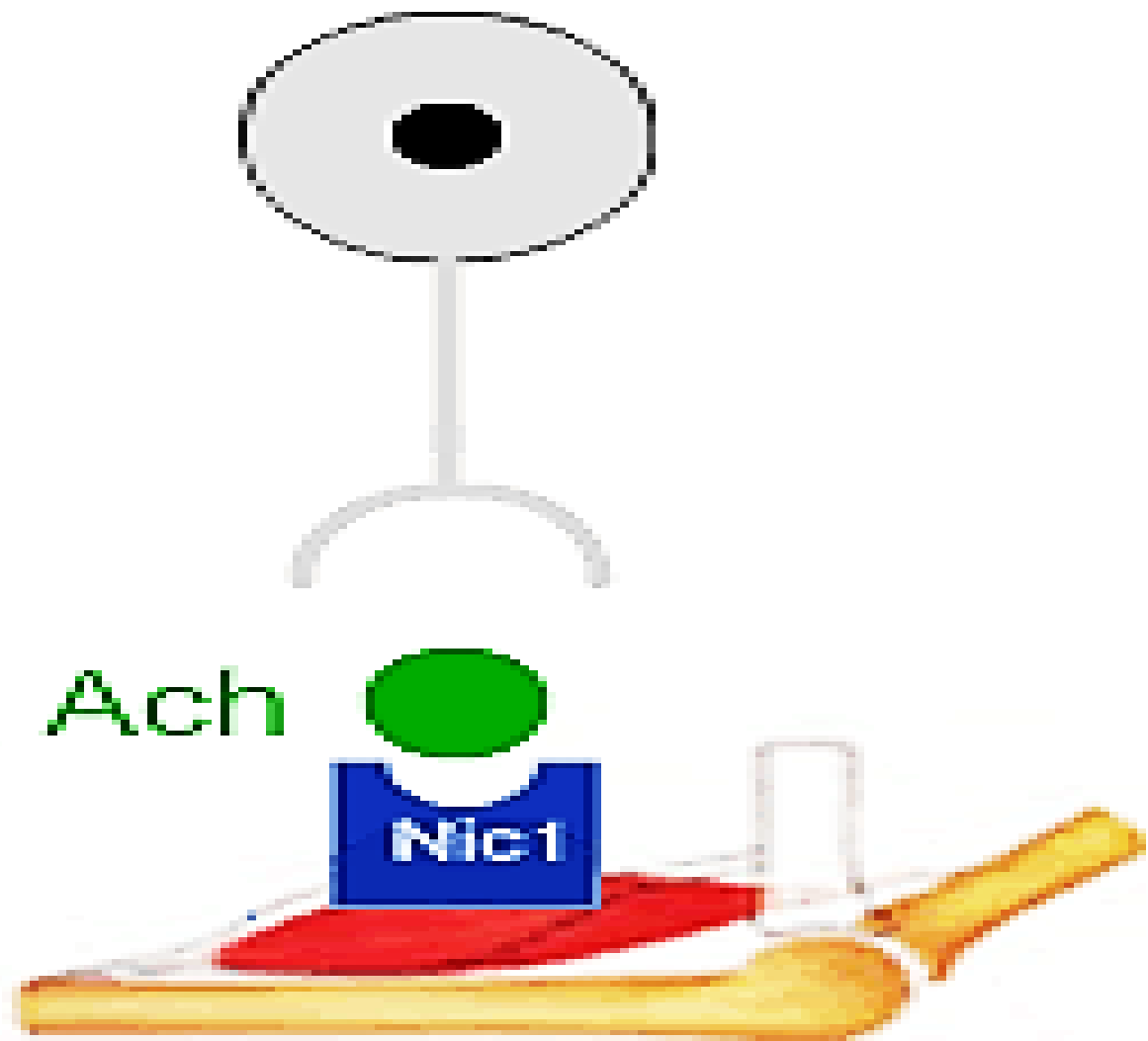
Stimulates ejaculation in male



Stimulates erection of sex organs

**Sympathetic and para-  
sympathetic actions  
often oppose each other**





**Neuromuscular  
junction**

