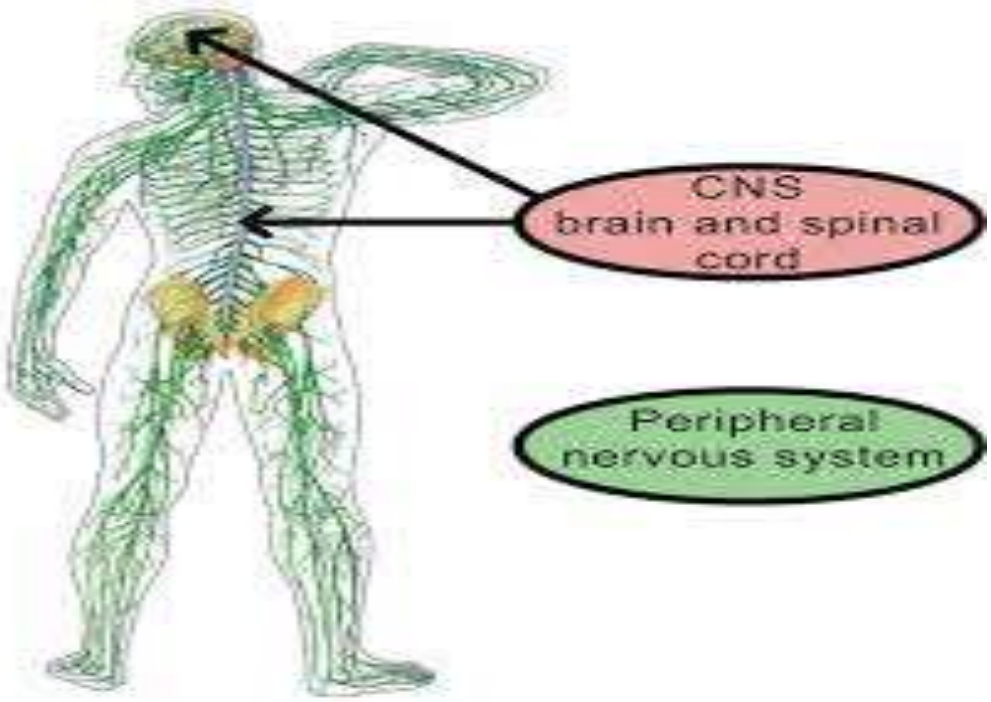
Peripheral nervous system
or
(Autonomic nervous system):


CNS
brain and spinal
cord
Peripheral
nervous system

Composed from nerves and ganglia.

Nerves: aggregation of neuron axons.

Ganglia: aggregation of neuron bodies.

Afferent neuron:

transmit information to the central nervous system.

Efferent neuron:

transmit information from CNS to the other part of the body.

Characterized by:

1.chain:

CNS ⟹ ganglia ⟹ smooth muscle and cardiac muscle.

2.innerveted smooth muscle and cardiac muscle.

3.excitatory and inhibitory.

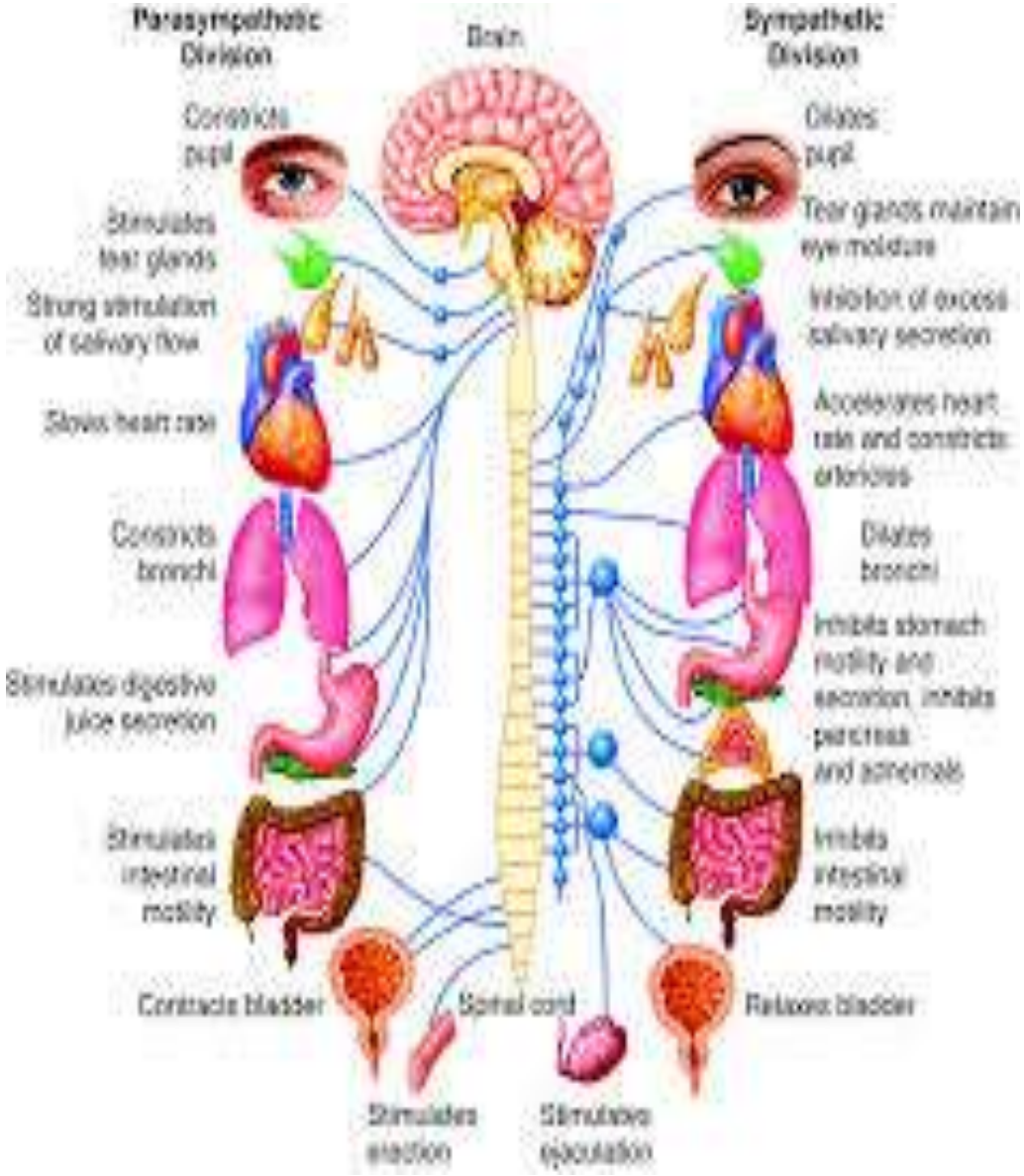
Autonomic nervous system divided into sympathetic and parasympathetic.

Sympathetic

1. origin: thoracolumber
2. ganglia close to spinal cord

parasympathetic

1. craniosacral.
2. close to effecter organ


Parasympathetic Division
Brain
Sympathetic Division
Constricts pupil
Dilates pupil
Stimulates tear glands
Tear glands maintain eye moisture
Strong stimulation of salivary flow
Inhibition of excess salivary secretion
Slows heart rate
Accelerates heart rate and constricts arterioles
Constricts bronchi
Dilates bronchi
Stimulates digestive juice secretion
Inhibits stomach motility and secretion, inhibits pancreas and adrenals
Stimulates intestinal motility
Inhibits intestinal motility
Contracts bladder
Spinal cord
Relaxes bladder
Stimulates erection
Stimulates ejaculation

3.preganglionic short	3.preganglionic long
Postganglionic long	postganglionic short
4.neurotransmitter	
Ach from preganglionic	4.Ach from both pre and post
Norepinephrine postganglionic	ganglioic

5.receptors alfa and beta	5.muscarinic and Nicotinic
6.adrenergic nerve Release norepinephrie	6.cholinergic nerve release acethylcholine

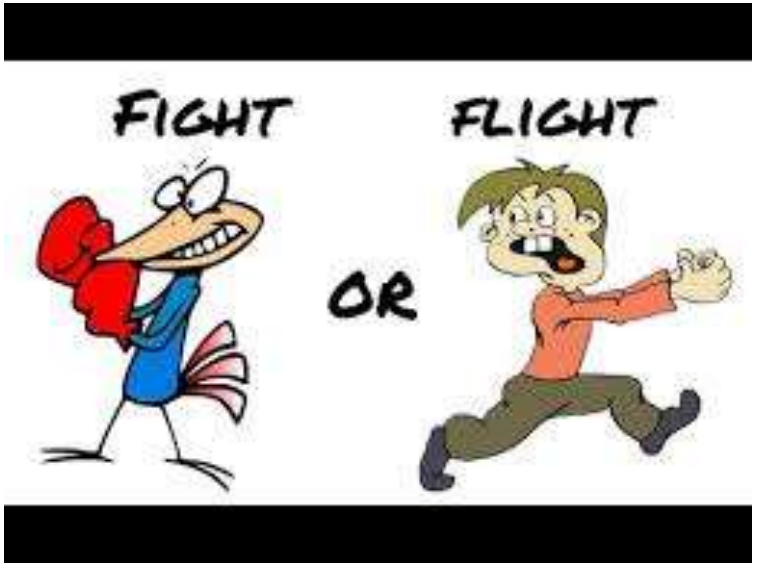
7.excitotary:physical Stress(emergency situation)

7.converse energy

8.catabolism system
Where energy glucose
And fatty acid are
Broken dawn for energy
To face emergency

8.anabolic system
building up of energy
and heat

Emergency situation
Fight or flight , challenge the attacker or run from it.



Remobilize all energy source of body.

1.heart rate blood pressure increase to push blood to skeletal muscle.

2.liver hydrolyze glycogen to release glucose.

3.dilated of bronchioles to take O2.

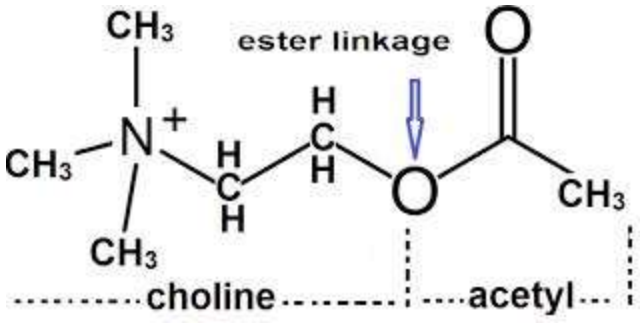
4.dilated pupil or eye to enter the light.

Biosynthesis of Ach acetylcholine:

Choline transferase

Acetate+choline ⟶ Ach in nerve ending

Release of Ach by exocytosis from presynaptic ⟶ bind to post synaptic.



Catabolism of Ach:

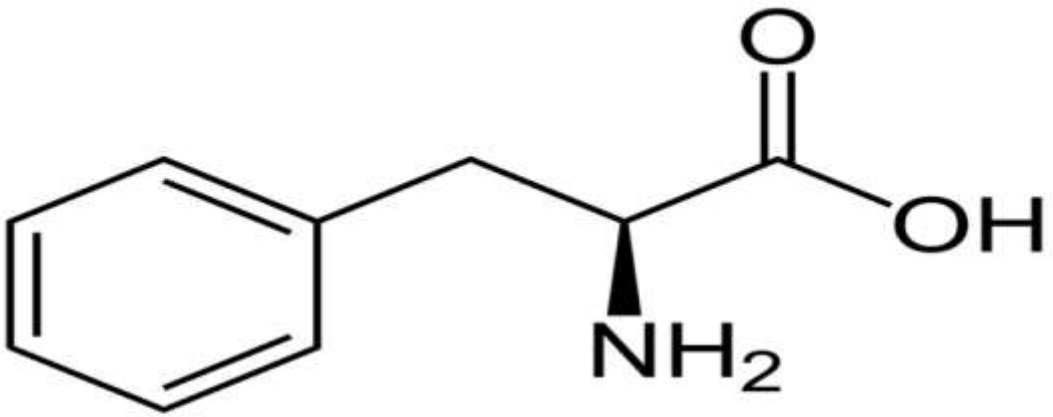
Ach esterase

Ach → acetete + choline.

Then choline will reuptake by nerve ending for re synthesis of Ach.

Biosynthesis of norepinephrine:

Phenylalanine(aromatic amino acid) is precursor for norepinephrine synthesis.



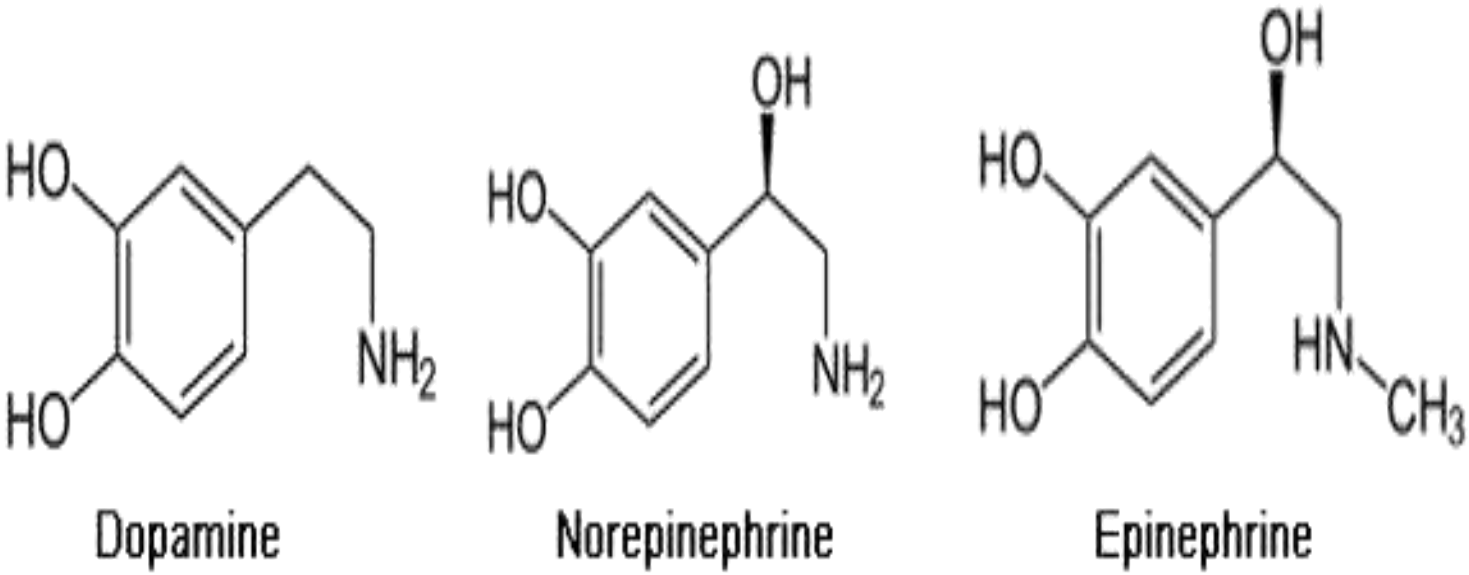
Phenylalanine

The norepinephrine synthesis by:

1.hydroxylatio n(addition of OH).

2.methylation (addition of MH2).

Phenylalanine → Dopa → Dopamine → norepinephrine → *epinephrine.*



Norepinephrine mostly release out of adrenergic nerve ending .

Epinephrine mostly from adrenal medulla (adrenal medulla consider as ganglia loss its post synaptic axon).

Catabolism of catecholamine:

By two enzyme:

1.MAO monoaminoxydase inside nerve ending.

2.C-OMT catacholomine –O-methyltransferase..converted it into inactive form.

Dual innervations:

automatic recipricol innervations:

Most organ receive sympathetic and parasympathetic innervations in opposed effect.

Except salivary gland which increase secretion under sympathetic and parasympathetic.

Sympathetic ⟶ thick or viscous saliva

Parasympathetic ⟶ perfuse or watery saliva.

Table shows different organ affected by sympathetic and parasympathetic:

Organ	sympathetic	parasympathetic
1.heart	increase activity	decrease
2.bronchial	dilatation	constriction
3.intestine	inhibition	stimulation

4.urinary	inhibition	stimulation
5.male reproductive System	ejaculation	erection
6.mammary gland	inhibit lactation	no effect