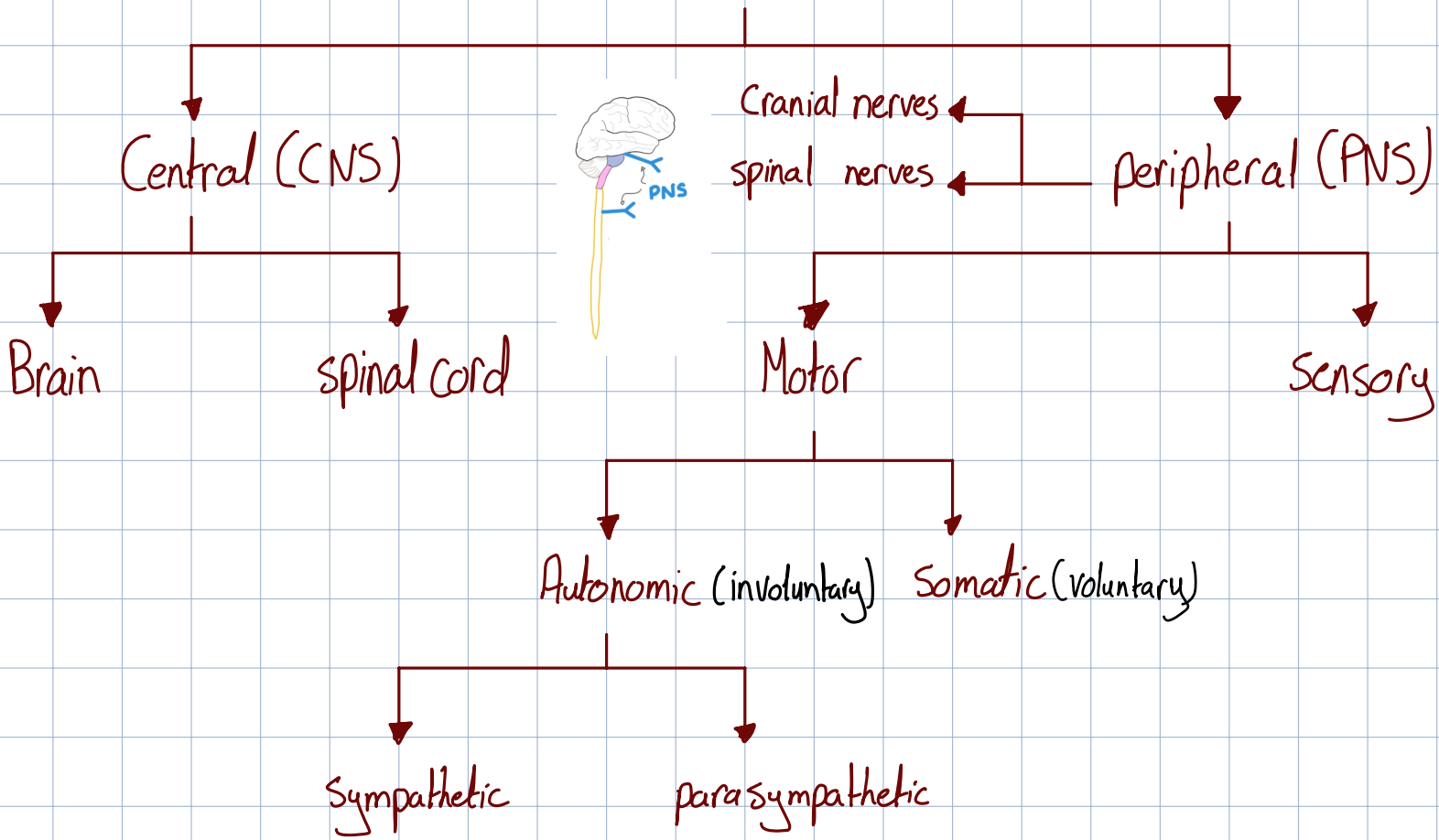
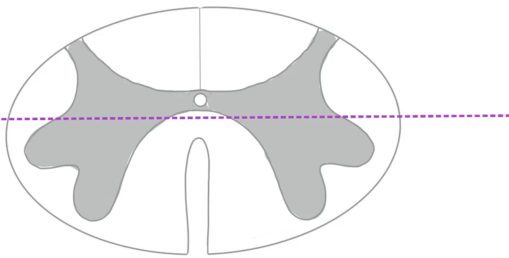


Nervous System

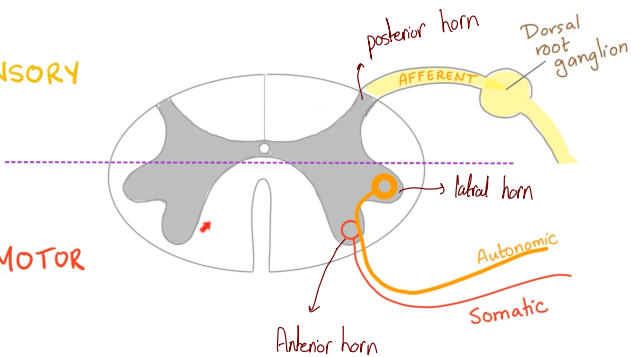


SENSORY



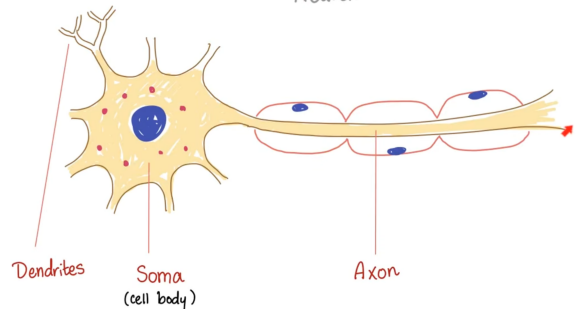
MOTOR

SENSORY

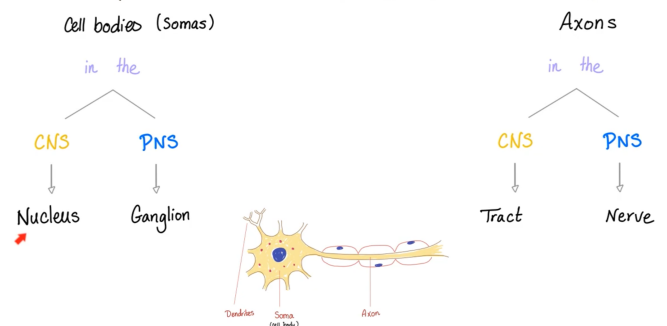


MOTOR

STRUCTURAL UNIT
"Neuron"



A collection of

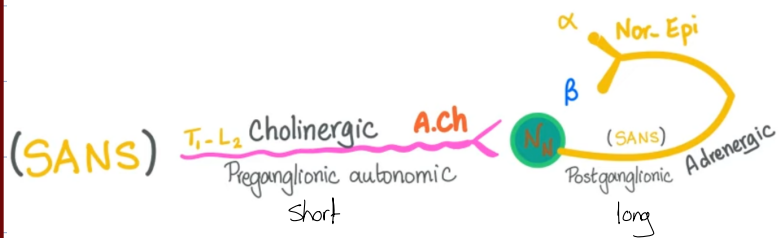
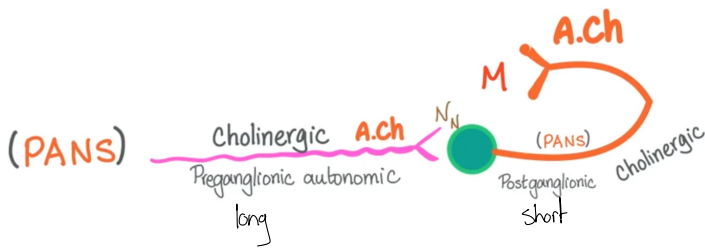
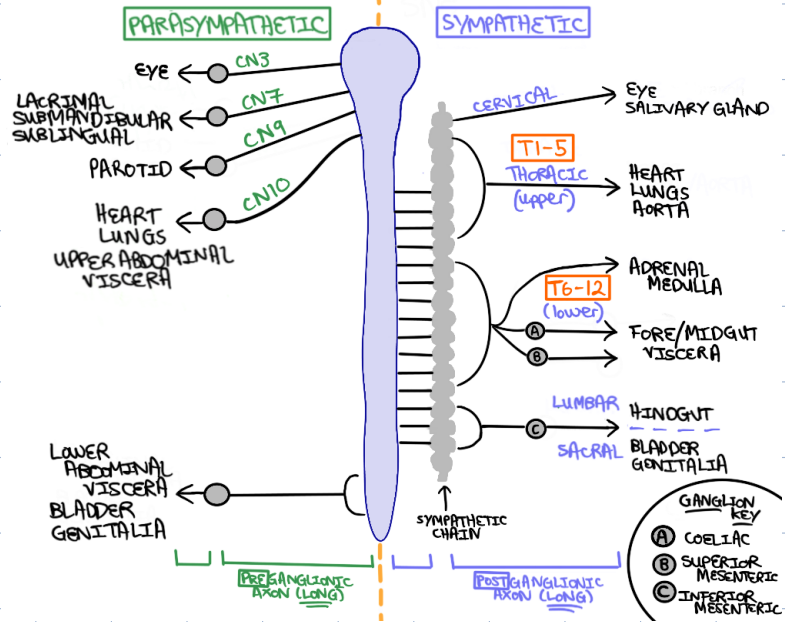


● para Sympathetic (Rest to digest)

● Sympathetic (Fight or Flight)

- Craino Sacral nerves
↳ 3, 7, 9, 10

- Thoracolumbar nerves



* all preganglionic nerve fibers are cholinergic nerve fibers (release ACh at nerve terminal)

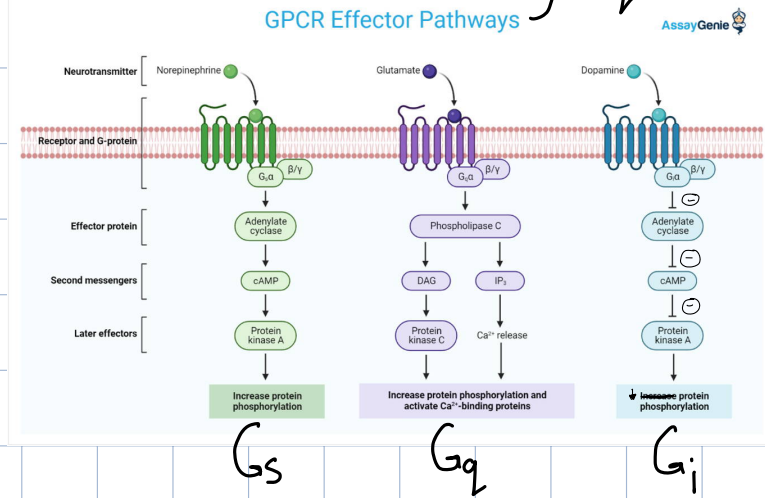
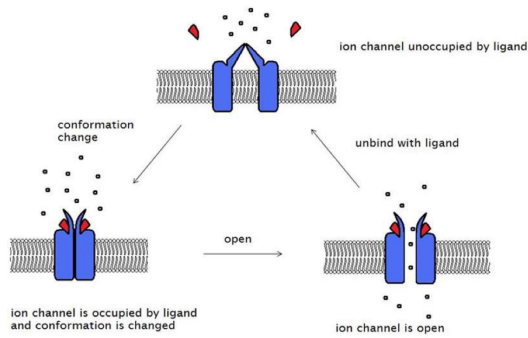
* para sympathetic postganglionic nerve fibers are cholinergic nerve fibers

* sympathetic postganglionic nerve fibers are Adrenergic nerve fibers (release nor-Epi at nerve terminal)

* Receptors :-

Types :-

Type 1 Ligand gated ion channels or Ionotropic receptors

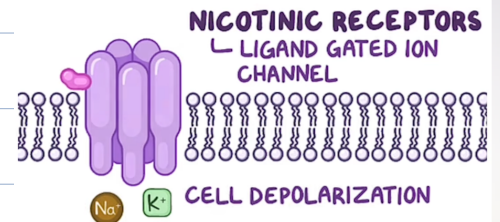


Cholinergic Receptors :-

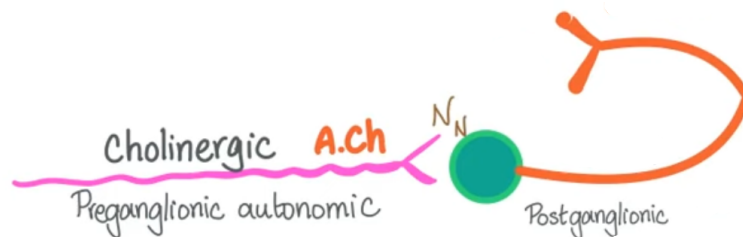
receptors that get activated when they bind to Ach

- Nicotinic receptors :-

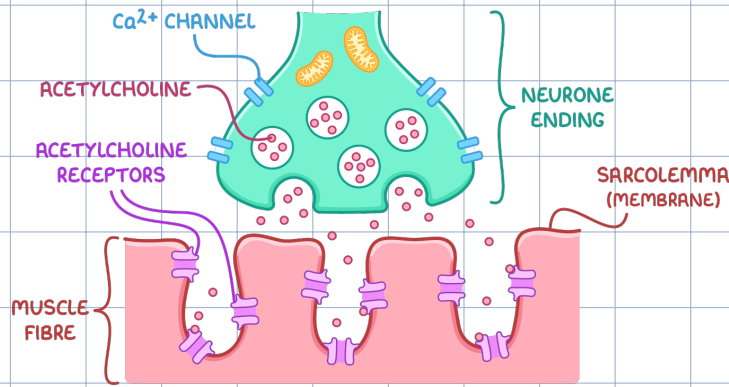
These receptors are ligand-gated ion channels, Their stimulation increase the permeability to Na⁺



1- N_N :- nicotinic neuronal (these receptors are found in autonomic ganglia (both in sympathetic and parasympathetic))



2- N_M :- nicotinic muscle (These receptors are found in neuromuscular junction)



- Muscarinic Receptors :-

These receptors are G protein coupled receptor (parasympathetic Receptors)

1- M_1 :- Found in autonomic ganglia, CNS

They are G_q so stimulate phospholipase C
 $\rightarrow \uparrow IP_3 + DAG + Ca^{+2}$

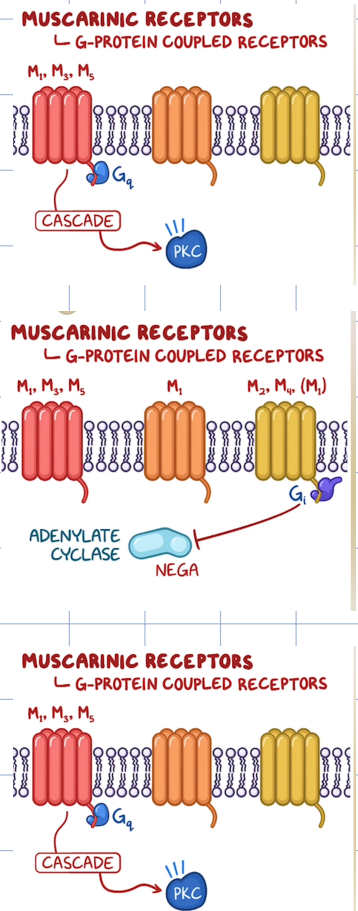
2- M_2 :- Found in heart

They are G_i so inhibit adenylyl cyclase
 $\rightarrow \downarrow cAMP$, and open K channels

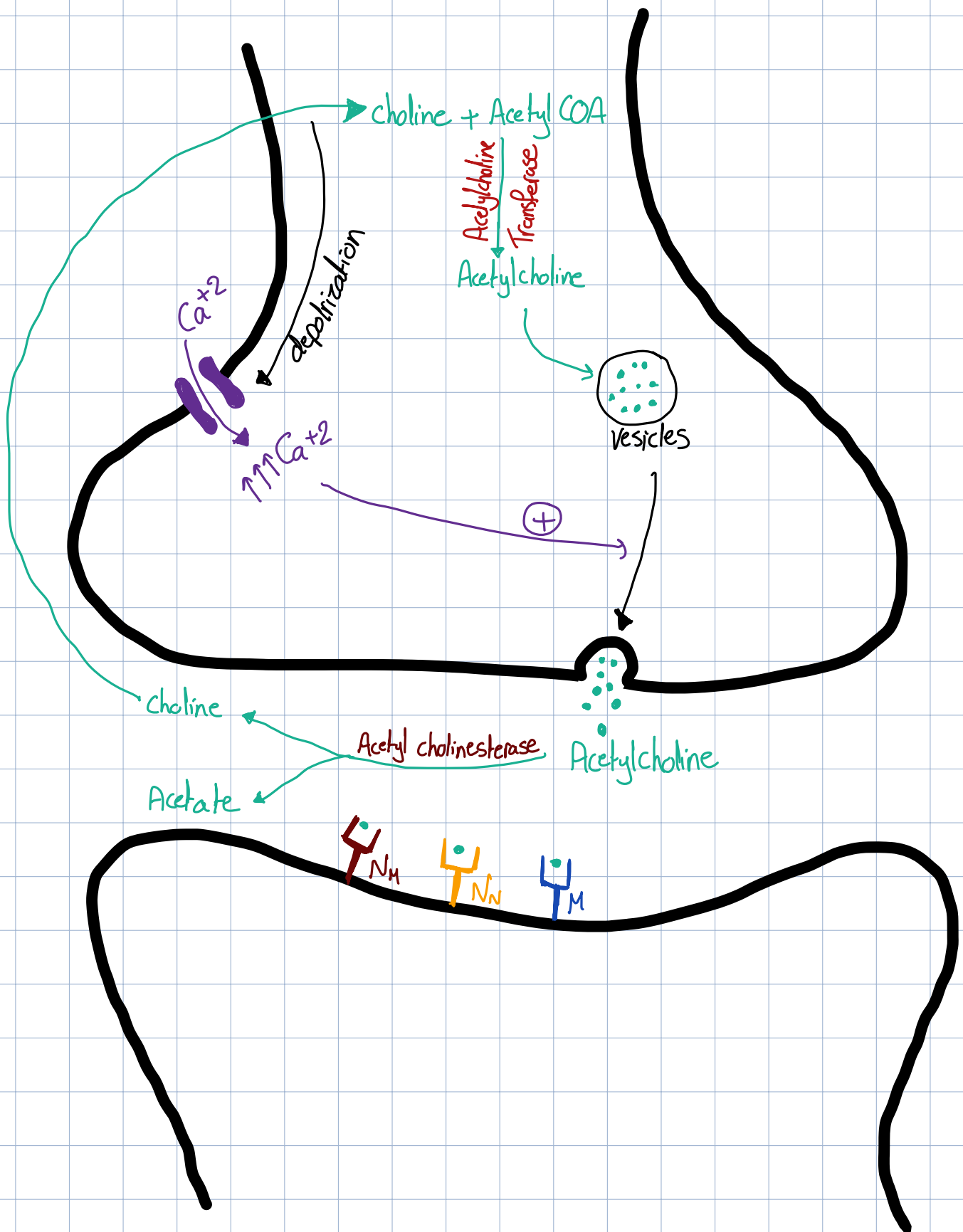
3- M_3 :- Found in smooth muscles and secretory glands

They are G_q so stimulate phospholipase C
 $\rightarrow \uparrow IP_3 + DAG + Ca^{+2}$

4- M_4 } Mainly in CNS
 5- M_5 }



* Ach synthesis, storage, release and metabolism:-



Adrenergic Receptors:-

- Receptors that get activated by catecholamines (norepinephrine, epinephrine, dopamine)
- They are G protein coupled Receptors.

1- Alpha Receptors:-

- Alpha 1 (α_1):- Found in many smooth muscle like (BV, dilator pupillae muscle, internal sphincter of bladder, pilomotor muscle, sphincters of GI tract), liver cells

Gq receptors stimulate phospholipase A₂, C, D
→ ↑ IP₃ + DAG + Ca²⁺

- Alpha 2 (α_2):- Found in CNS and in presynaptic nerve terminals and in pancreatic β cell

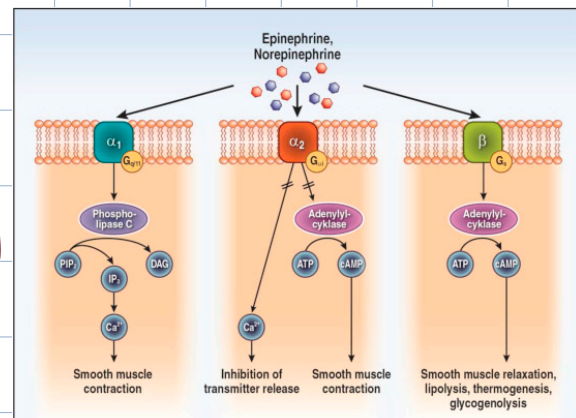
G_i receptors inhibit adenylyl cyclase → ↓ cAMP, and open K channels.

2- Beta receptors (B₁, B₂, B₃)

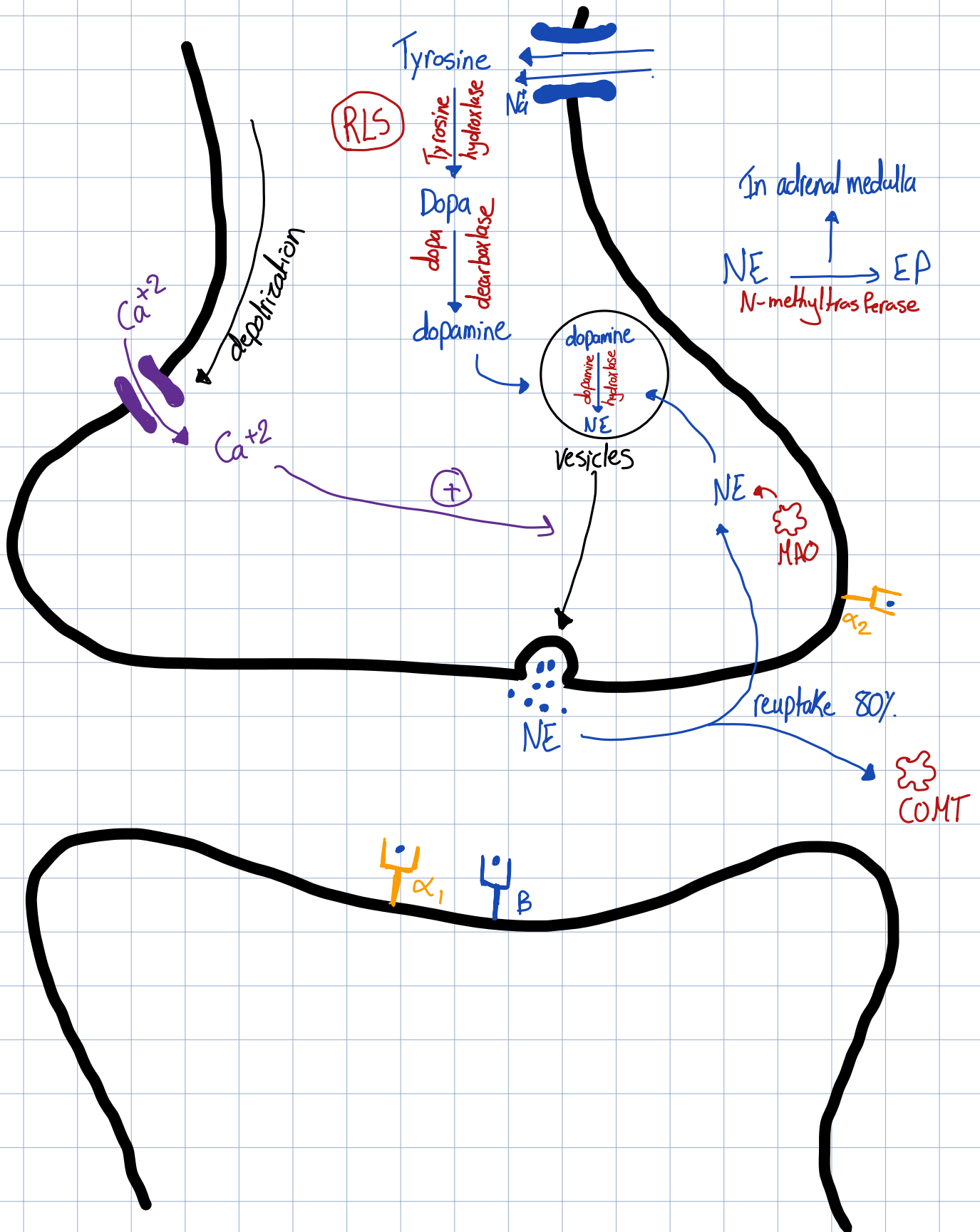
They are all G_s that stimulate adenylyl cyclase → ↑ cAMP

- B₁ Found in heart and kidneys
- B₂ Found in many smooth muscles like (bronchial smooth muscle, BV, uterine muscle, GI muscles, bladder smooth muscle), liver cells, skeletal muscle
- B₃ Found in Adipose Tissue.

3- Dopamine receptors (D₁, D₂, D₃, D₄, D₅)



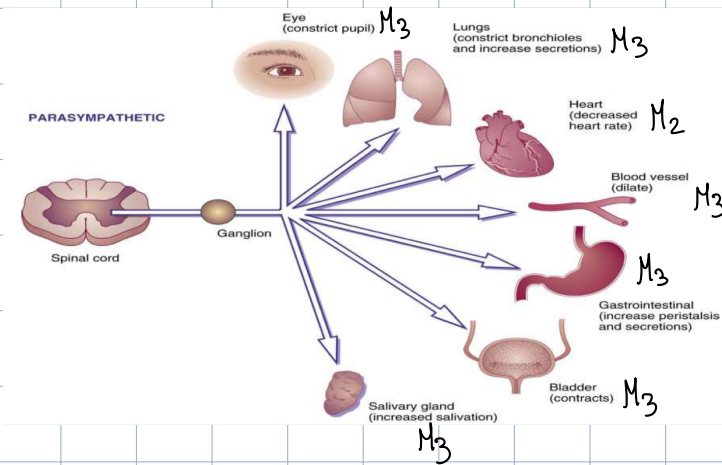
* catecholamine synthesis, storage, release and metabolism:-



● **para Sympathetic** (Rest to digest)

- **CrainoSacral** nerves
↳ 3,7,9,10

- **Muscarinic Receptors** (M_1, M_2, M_3, M_4, M_5)

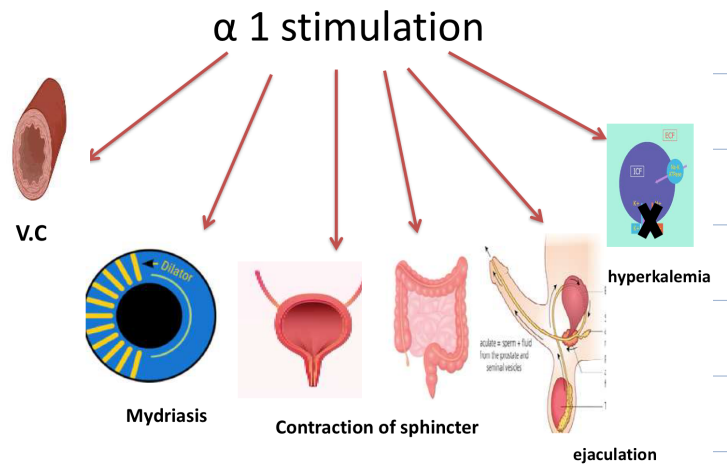


● **Sympathetic** (Fight or Flight)

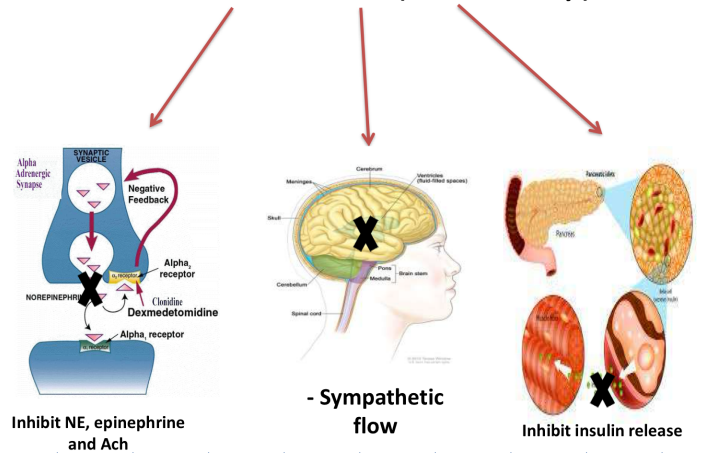
- **Thoracolumbar** nerves

- **Adrenergic Receptors** ($\alpha_1, \alpha_2, \beta_1, \beta_2, \beta_3, P_1, P_2, P_3, P_4, P_5$)

α receptors:-

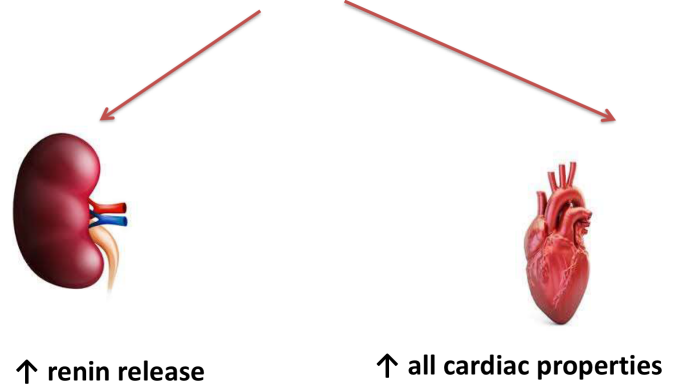


α_2 stimulation (inhibitory)

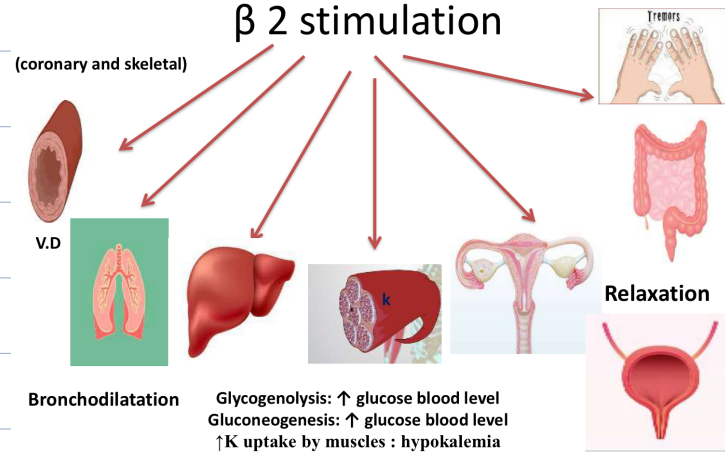


β receptors:

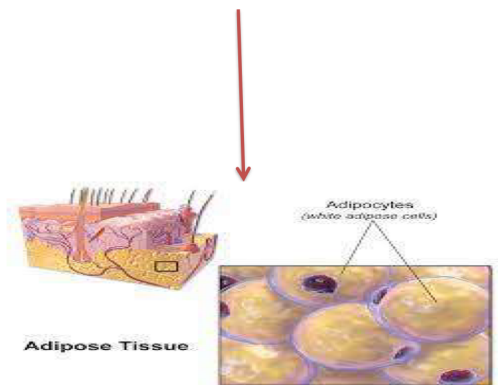
β 1 stimulation



β 2 stimulation



β 3 stimulation



+ lipolysis