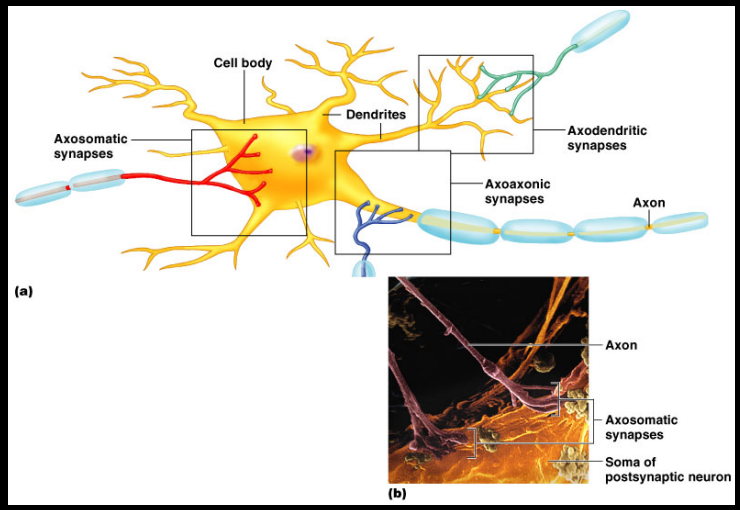
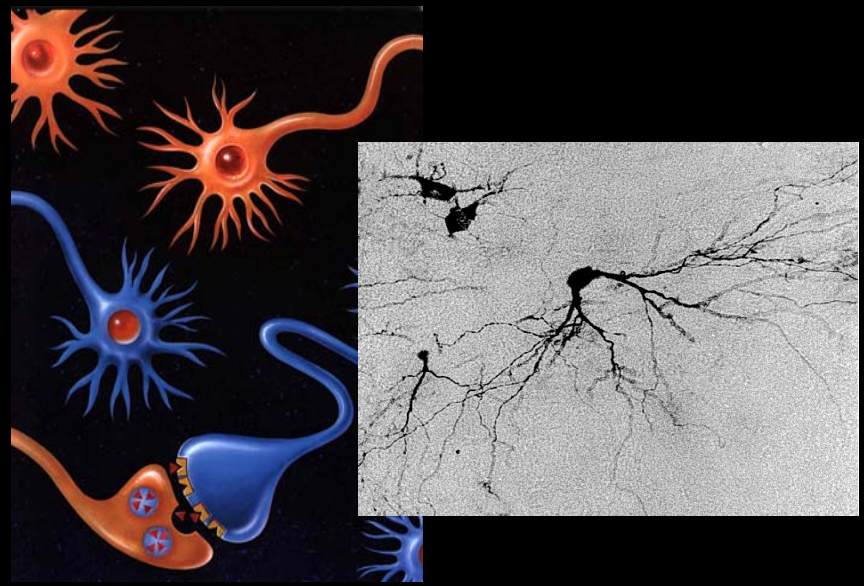
GLYCINE AND GLYCINE RECEPTORS

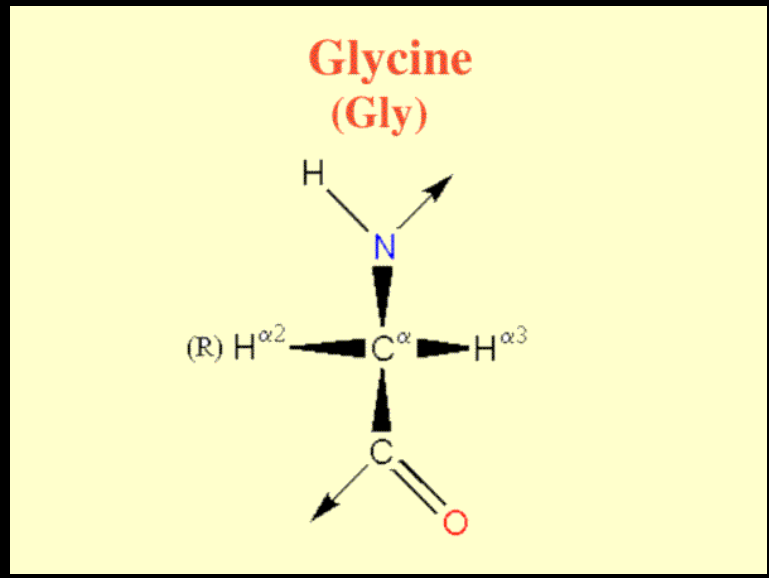




POWERED BY ALİ, EMRE, RANA

GLYCINE

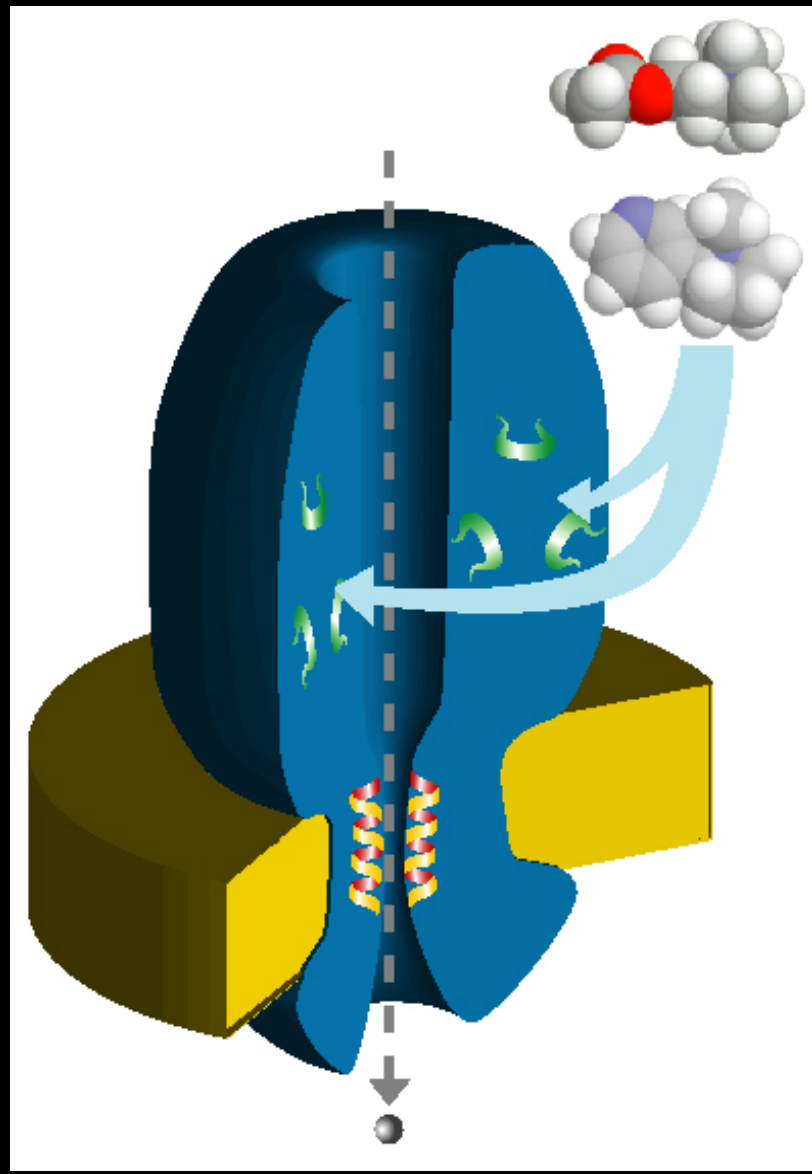
- The simplest amino asit
- It's the major inhibitory neurotransmitter in brainstem and spinal cord
- Moreover,it promotes the action of glutamate



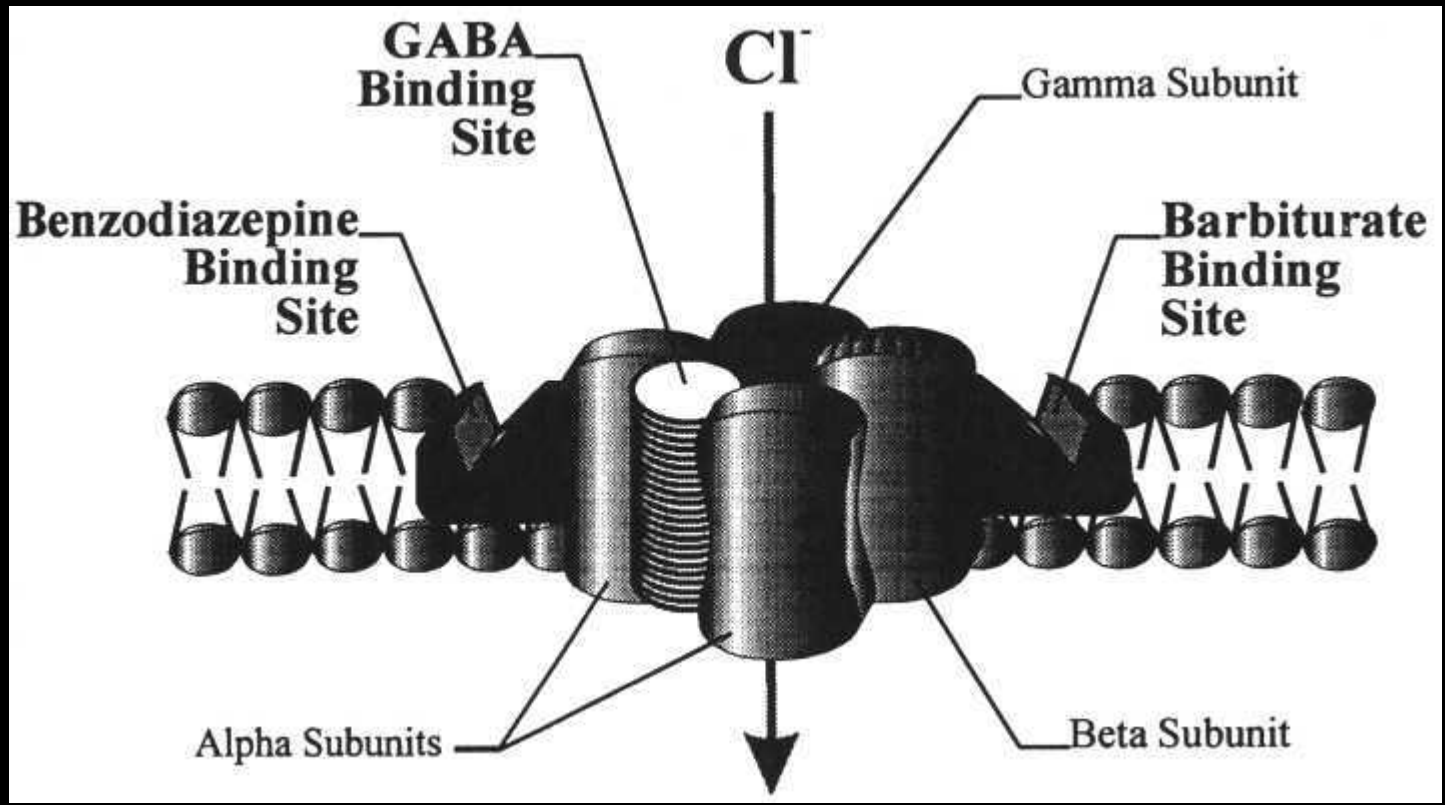
GLYCINE RECEPTORS

- Type of ligand-gated ion channel

- They are inhibitory neurotransmitter receptors in brain and in spinal cord.



Composed of three alpha and two beta and gamma subunits each containing four transmembrane spanning domains.



•The stabilization of RGly is mediated by a cytoplasmic anchor protein :**the gephyrin** who interacts both with the beta subunit of the receptor and with molecules of the cytoskeleton microtubules.

•The RGLy are concentrated in functional microdomains in front of active presynaptic area,
the formation of such microdomains is made by a high density of proteins constituing the subsynaptic scaffold.

Glycine Receptors

•They cause opening of chloride channels

•This in turn results in hyperpolarization of the adjacent neuron and thus switching off.

- Essential in control of skeletal muscle by spinal cord

Regulation

- The GlyR beta subunit contains a putative tyrosine phosphorylation site

- Protein tyrosine kinases (PTKs) regulate the function of GlyRs on the tyrosine-413 residue of the beta subunit.

Other Important Aspects

- They are involved in enhancing glutamate interactions with its NMDA receptors

- Strychnine: blocks glycine receptors inhibitory neurons in brainstem & spinal cord causing uncontrolled convulsions & respiratory arrest

Hyperekplexia (Startle disease)

- α-1 subunit (strychnine binding) ;
- Chromosome 5q33-q35; Dominant or Recessive

Clinical features

- Stiffness, myoclonus & after sudden stimulus
- Onset: as early as infancy with hypertonia or myocl
- Onset & severity vary within families

Treatment: Clonazepam

Mouse models: *Spasmodic* & *Oscillator*

Mouse Models

- *Spasmodic*

The phenotype is caused by a missense mutation in the α1-subunit at position 52

- *Oscillator*

The startle reflex of the oscillator mouse is more severe than that of the spasmodic mouse. This can be explained by an almost total loss of glycine receptor function. A microdeletion in the α1-subunit gene creates a frameshift, truncating the subunit at the end of TM3 . Like in the spasmodic mouse, the phenotype develops between the second and third postnatal week.