CONCEPT: G PROTEIN-COUPLED RECEPTORS

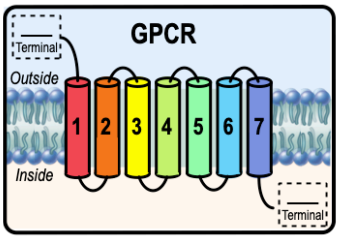
●**G** Protein-**C**oupled **R**eceptor (_____): a _____ that *associates/couples* with a _____ *protein*.

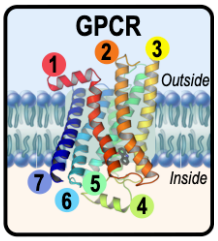
□ *GPCR* is an *integral membrane protein* that consists of _____ transmembrane α-helices (*7-TMS proteins*).

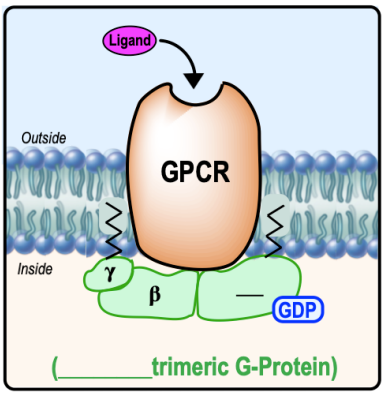
□ GPCRs have an *extra*cellular _____-terminal & an *intra*cellular _____-terminal.

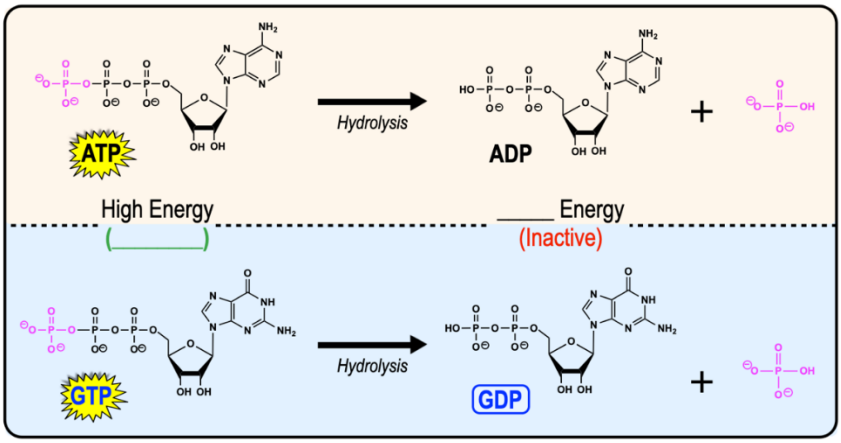
●*G proteins* (*GTP-binding proteins*): intracellular *lipid-linked proteins* that hydrolyze _____ & have 3 subunits (α, β , γ).

□ **G**uanosine-**T**ri-**P**hosphate (_____): *similar* in function to **a**denosine-**tri**phosphate (_____).



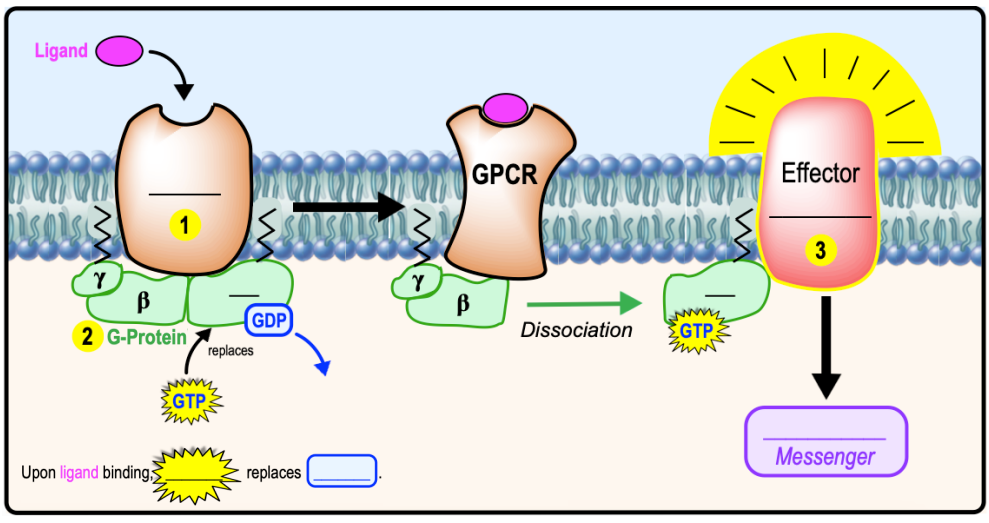






3 Essential Components of GPCR Signal Transduction

1. _____: transmembrane receptor that changes *conformation* upon ligand-binding to activate G protein.
2. ___-*Protein*: intracellular peripheral protein that replaces GDP for GTP when activated & *slowly* hydrolyzes GTP.
   - □ Contains _____ subunits (α, β , and γ) which _____ to α and β-γ subunits *upon GTP binding*.
3. _____ *Enzyme*: membrane protein produces a *secondary messenger* upon activation by α G-protein.
   - □ _____ *messengers* affect downstream targets that lead to *cell response*.



CONCEPT: G PROTEIN-COUPLED RECEPTORS

PRACTICE: A G protein-coupled receptor is comprised of ____ transmembrane α-helix/helices:

a) 7. b) 8. c) 1. d) 10. e) 6. f) 14.

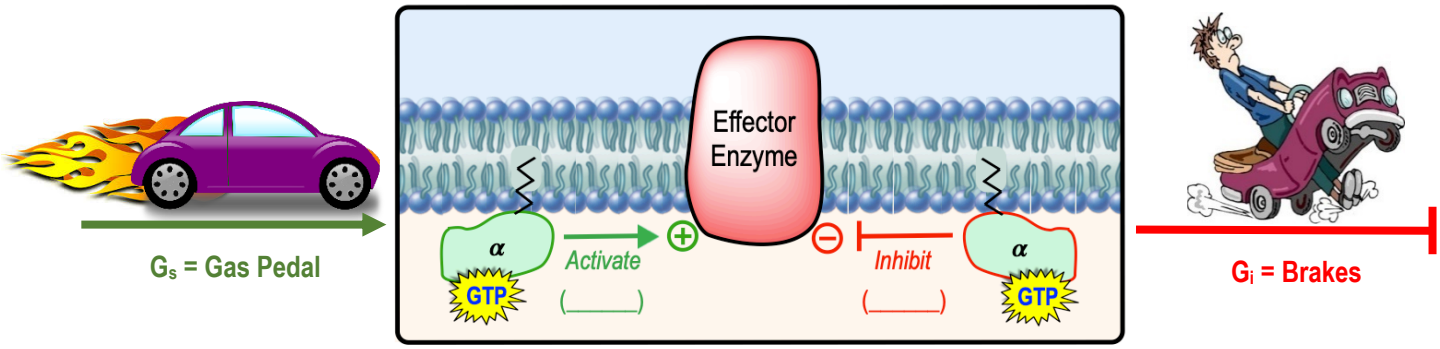
PRACTICE: G protein-coupled receptors (GPCRs) are transmembrane proteins with ligand binding sites on the extracellular side of the membrane (near its N-terminal). What is the role of the G-protein in the GPCR signaling pathway?

a) G proteins phosphorylate GPCRs.
b) G proteins bind extracellular ligands and facilitate the transport into the cell.
c) G proteins activate enzymes that transduce the signal throughout the cell.
d) G proteins activate transcription of genes.
e) G proteins facilitate dimerization of receptor monomers.

Stimulatory vs. Inhibitory G Proteins (G_s vs G_i)

●_____ types of G proteins classified according to their _____ on the *effector enzyme*.

1) _____ *G proteins* (G_s): *stimulate/activate* the effector enzyme to create _____ secondary messenger.
2) _____ *G proteins* (G_i): *inhibit/in*activate the effector enzyme to create _____ secondary messenger.



PRACTICE: G_i is the inhibitory G protein of various effector enzymes. If a toxin released from a bacterial infection enters cells & covalently modifies the α-subunit of G_i so that it can no longer bind GTP, which of the following is a likely result?

a) Increase in the synthesis of the secondary messenger molecule.
b) Decrease in the synthesis of the secondary messenger molecule.
c) The inhibitory G protein α-subunit will not dissociate from the β-γ subunits.
d) Only A and C are true.
e) Only B and C are true.