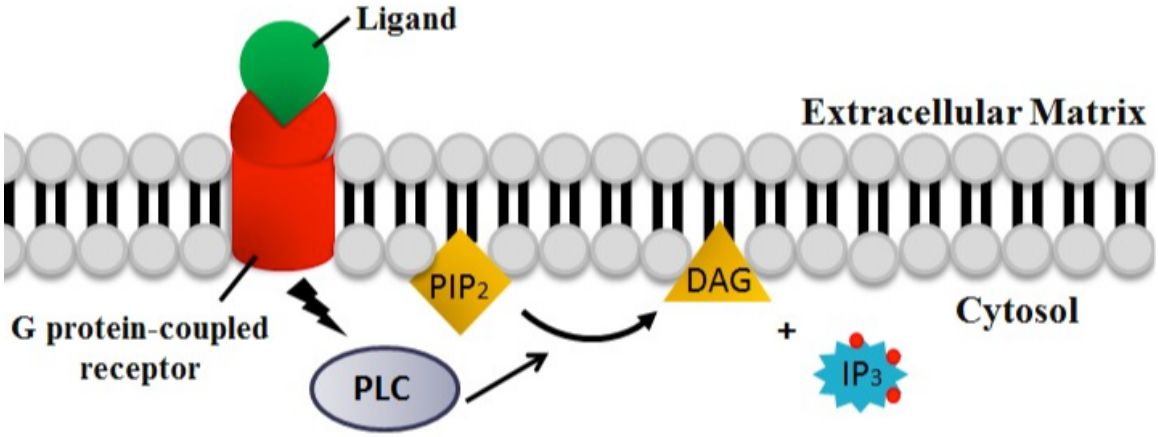
**CONCEPT:** BIOSIGNALING

- G protein with GTP also activates phospholipase C, an enzyme that cleaves lipids
  - □ Phospholipase C cleaves the bond between the inositol phosphate and glycerol of phosphatidylinositol ($PIP_2$)
  - □ Inositol trisphosphate ($IP_3$) opens $Ca^{2+}$ channel inside of cell
  - □ Diacylglycerol and $Ca^{2+}$ activate PKC
  - □ $IP_3$ and $Ca^{2+}$ are also secondary messengers in many other signaling pathways




- Receptor tyrosine kinases (RTKs) – receptors capable of autophosphorylating at Y residues in response to ligand binding
  - □ Insulin receptor is an RTK that works best as a dimer, and initiates a phosphorylation cascade when insulin binds
  - □ Phosphorylates IRS-1, IRS-1 turns on Ras protein complex
  - □ Ras complex phosphorylates MEK, MEK phosphorylates ERK, ERK enters nucleus and activates gene
  - □ IRS-1 also activates PKB, which leads to more glucose transporters (GLUT4) in the membrane
  - □ PKB inactivates GSK3, leading to glycogen synthesis by glycogen synthase
    - GSK3 inactivates glycogen synthase by phosphorylating it