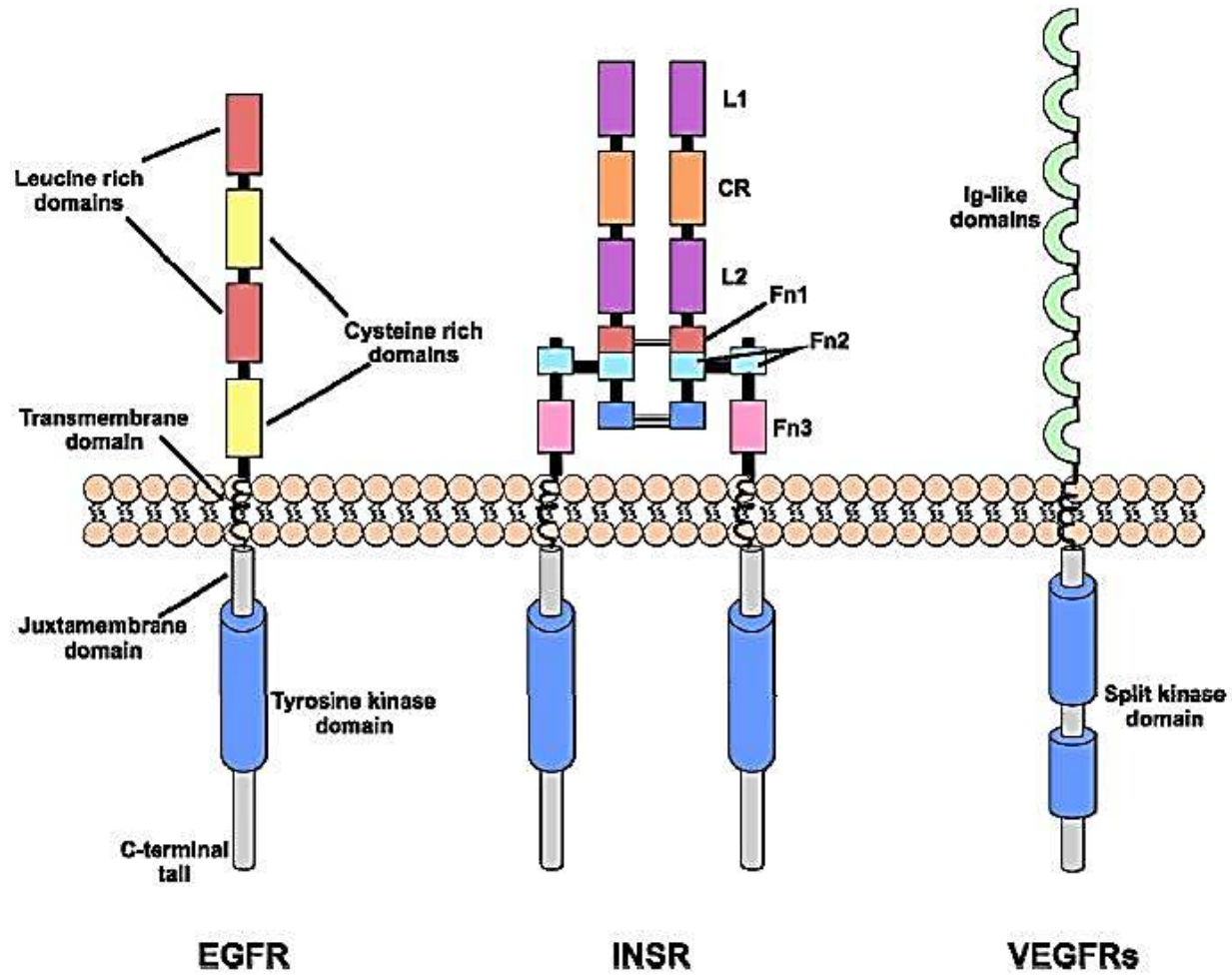


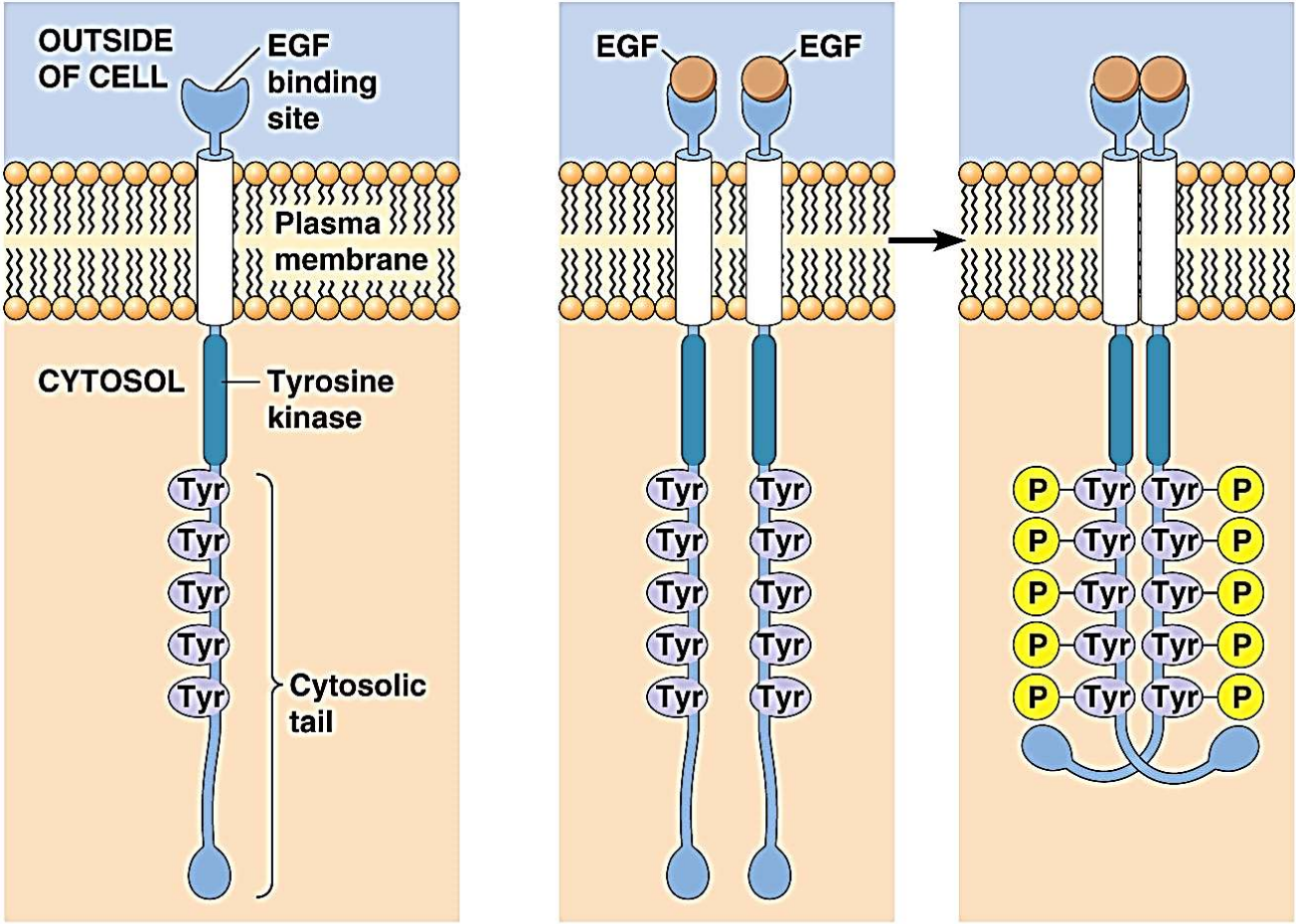
# Receptor tyrosin kinase

- **Second major class** of cell surface receptor.
- **Ligands:** Soluble or membrane bound proteins/peptides (**NGF, FGF, PDGF, EGF and insulin**).
- **Functions:** Regulation of cell proliferation, differentiation, cell survival, modulation of cellular metabolism.

# RTK: Structure

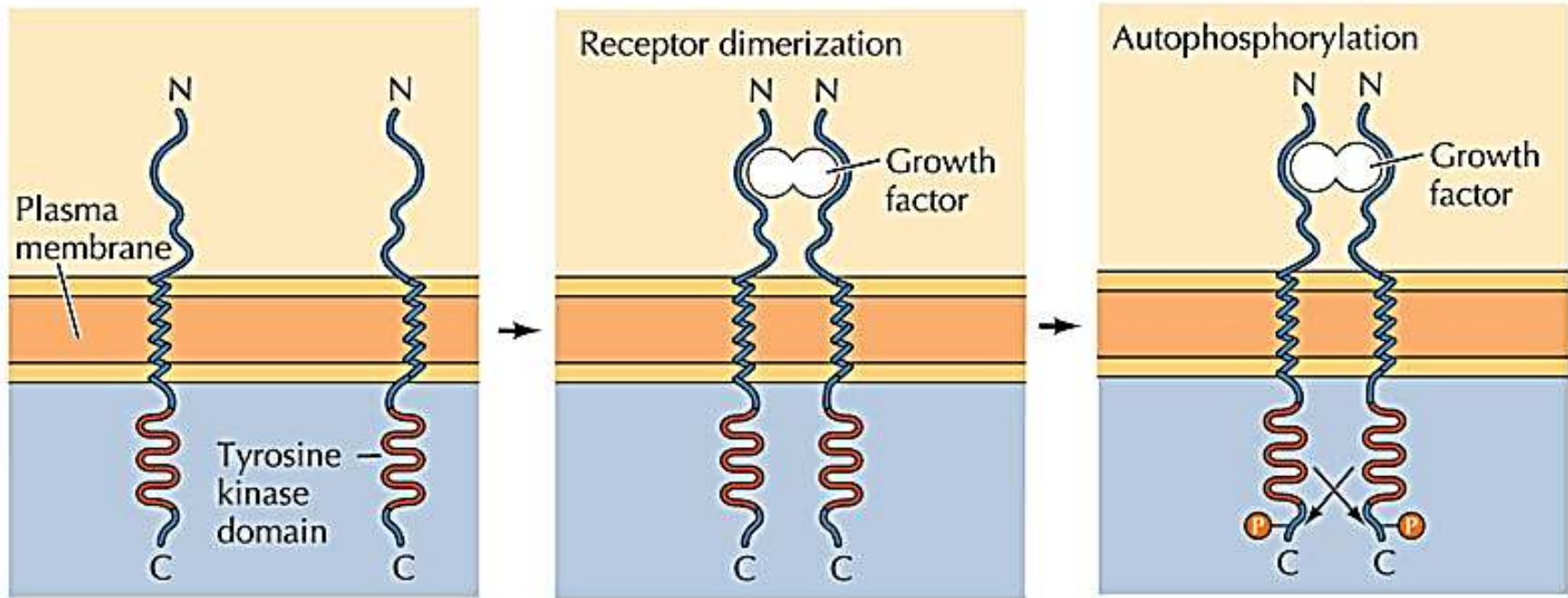


# Receptor Dimerization and Autophosphorylation



**(a)** Structure of the epidermal growth factor (EGF) receptor

**(b)** Activation of the EGF receptor



# RTK: Function

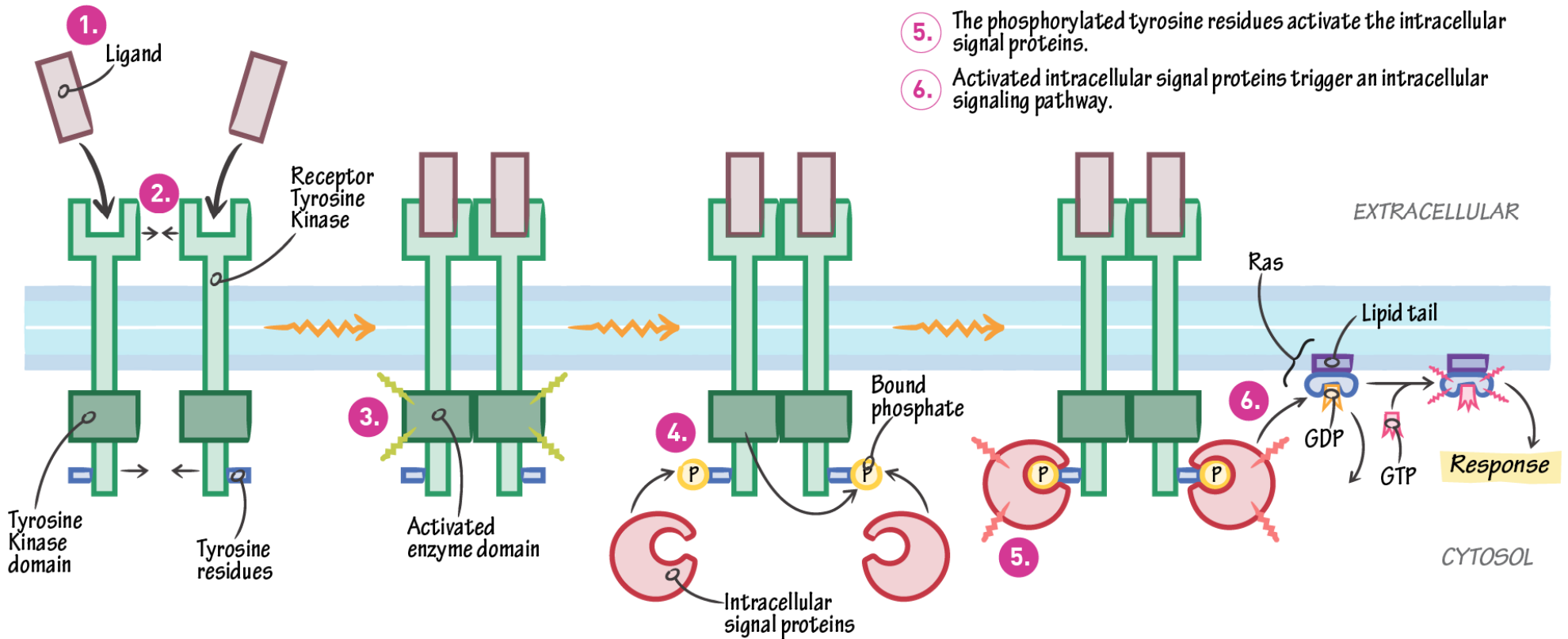
Subhadipa 2020


**RECEPTOR TYROSINE KINASES**

**+ Key Concepts**

- ✓ Enzymes that add phosphate to tyrosine residues
- ✓ Largest of the enzyme-coupled receptor class of cellular receptors

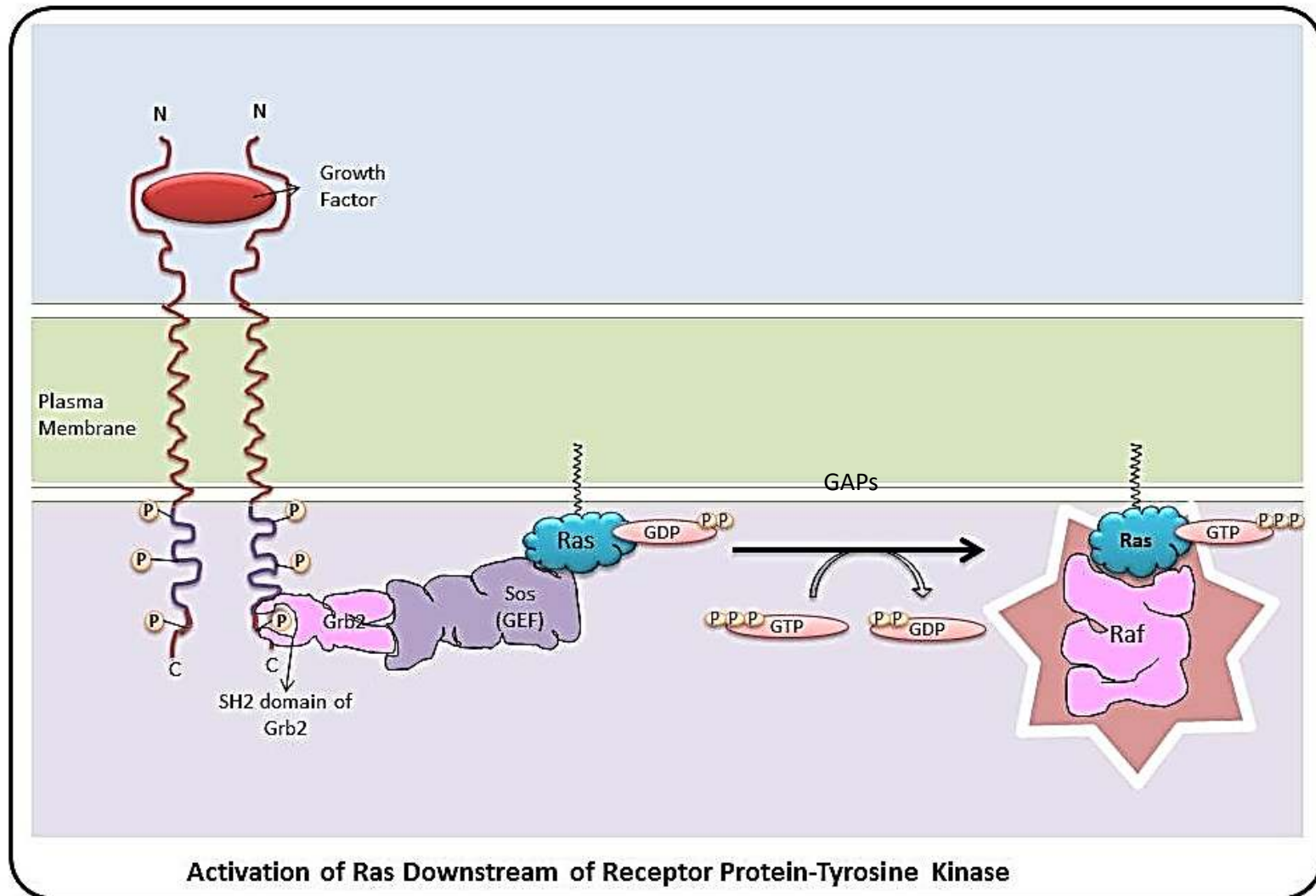
- ✓ One transmembrane segment
- ✓ Can activate multiple signal pathways



1. Ligands bind the receptor.
2. Receptors join and dimerize.
3. Dimerization causes the tyrosine kinase domains to become activated.
4. Receptor phosphorylates the opposite tyrosine residue.
5. The phosphorylated tyrosine residues activate the intracellular signal proteins.
6. Activated intracellular signal proteins trigger an intracellular signaling pathway.

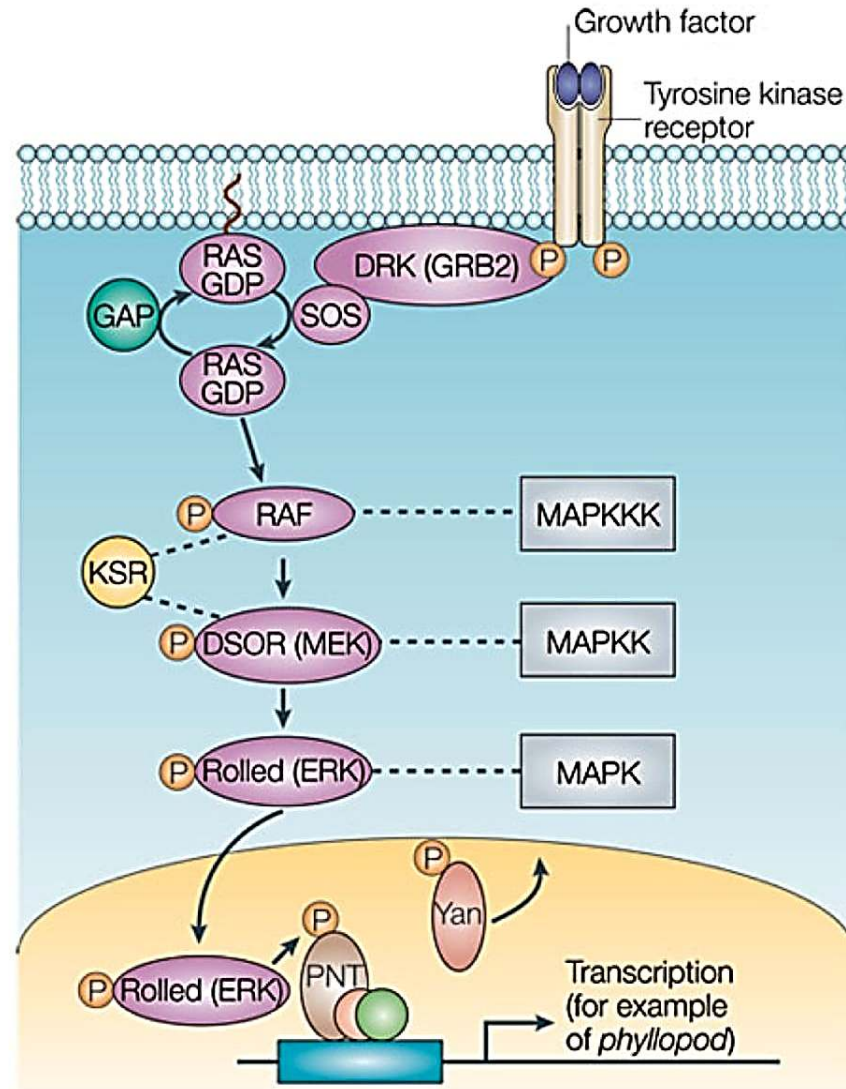
# Adaptor proteins: Grb2 and Sos and SH2 domain

Subhadipa 2020

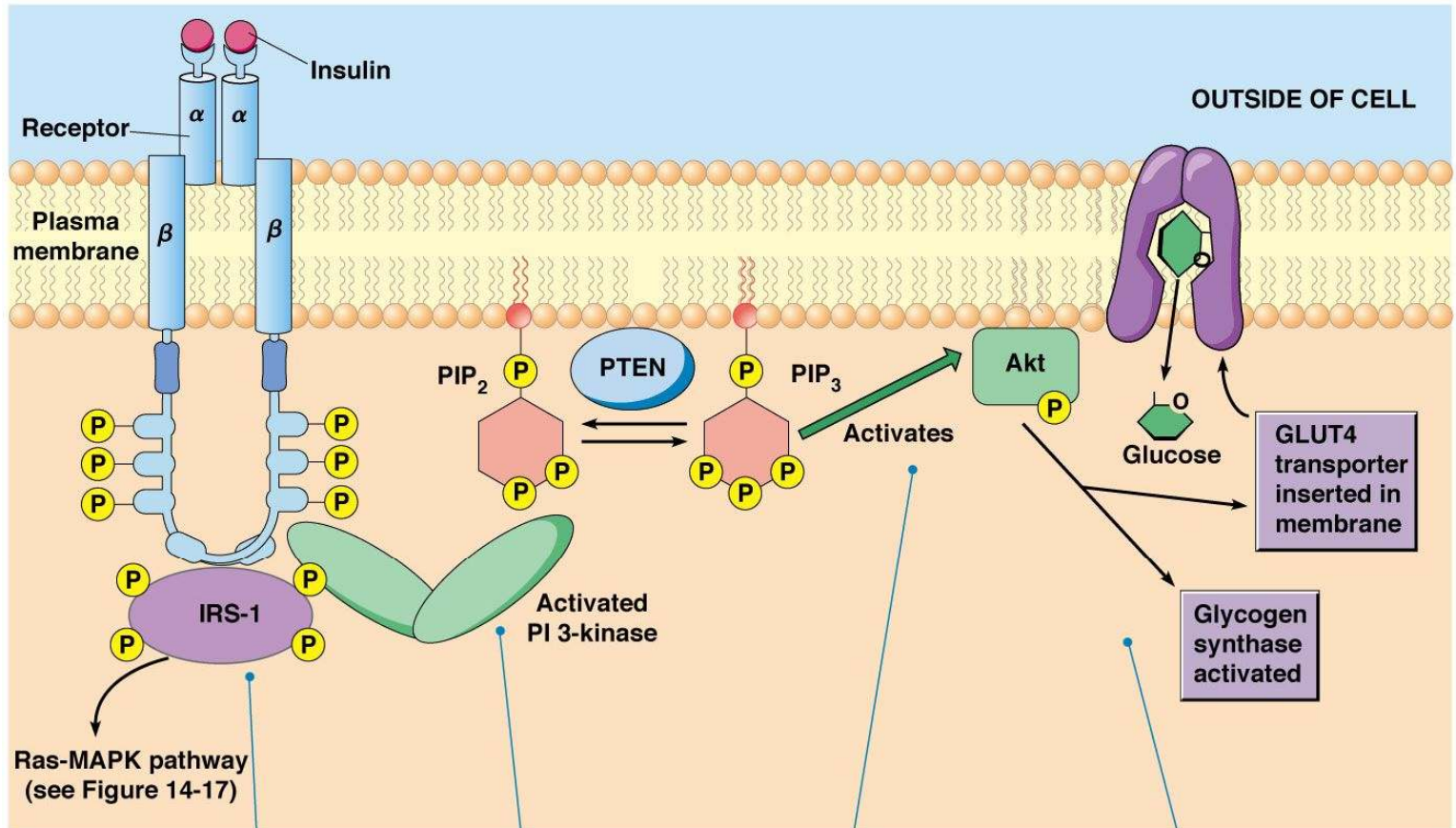


# RTK and MAPK pathway

Subhadipa 2020



# Insulin Receptor And Function



1 When the insulin receptor binds insulin, the activated receptor phosphorylates the IRS-1 protein. IRS-1 can lead to recruitment of GRB2, activating the Ras pathway.

2 IRS-1 activates PI 3-kinase, which catalyzes the addition of a phosphate group to the membrane lipid PIP<sub>2</sub>, thereby converting it to PIP<sub>3</sub>. PTEN can convert PIP<sub>3</sub> back to PIP<sub>2</sub>.

3 PIP<sub>3</sub> binds a protein kinase called Akt, which is activated by other protein kinases.

4 Akt catalyzes phosphorylation of key proteins, leading to an increase in glycogen synthase activity and recruitment of the glucose transporter, GLUT4, to the membrane