## **Termination of Cellular Response**

- Cellular responses can be regulated:
  - At reception, where the signal molecule can be degraded by extracellular enzymes OR endocytosis of the ligand-receptor complex occurs to prevent signal transduction from continuing
  - During signal transduction, in which phosphatase activity can be increased to desphosphorylate and inactivate signal molecules to inhibit the signal OR production of inhibitors that bind to the ligand-receptor complex/any signal proteins to prevent further transduction of the signal
- It is important to remove a bound ligand after a cellular response has been triggered so that no inappropriate/excessive cellular responses will occur (EG. If growth factors are not removed, excessive cell proliferation will take place, resulting in the formation of a tumour)

## CS2. Advantages of having a signal transduction pathway

Advantage	Reason
Facilitates signal amplification	A small number of signal molecules can solicit a large cellular response
Multiple responses to 1 ligand	1 ligand can trigger multiple signal transduction pathways to elicit different responses
Provides multiple checkpoints for regulation	Several steps in the signalling pathway can be regulated and controlled via ways like activation/inactivation of relay proteins
Ensures specificity	Specific i'gal d binds to a specific receptor containing a ligal o binding site comore nentary to the ligand in shape and charge
Ligand can coordinate activation of many different cells simultaneously	
Ability of signal molecule to activate genes in nucleus upon binding to cell surface	

## CS3. Types of Receptors

## **G-Protein Coupled Receptor (GPCR)**

receptor without the need to move into nucleus

- Transmembrane protein consisting of 7 a-helices connected by 3 intracellular and 3 extracellular peptide loops
- Has an extracellular ligand-binding site that binds to specific hydrophilic ligands (eg. glucagon, adrenaline, etc.)
- Intracellular domain has a G protein binding site that allows the binding of a G protein complex
- G proteins have intrinsic GTPase activity and are capable for hydrolysing GTP to GDP (inactive when GDP is bound to it, active when bounded to GTP). GTPase activity ensures that GTP bound to the G protein is quickly hydrolysed to inactivate the G protein and terminate the cellular response. The continued activation could render the cell unable to respond to other signals or to respond inappropriately to a signal that is no longer relevant