

Assignment I: The Duality of GPCR-G α Shielding

Course: FOB-II | **Due Date:** October 1, 2025

1. Background

A recent study by Mohanty et al. (2025) has uncovered a novel intracellular regulatory mechanism for G protein-coupled receptors (GPCRs). The research demonstrates that endogenous metabolites, such as sterols, can act as allosteric modulators by binding directly to the GPCR-G α protein interface. This interaction induces a "cohesive effect," which stabilizes the receptor-G protein complex.

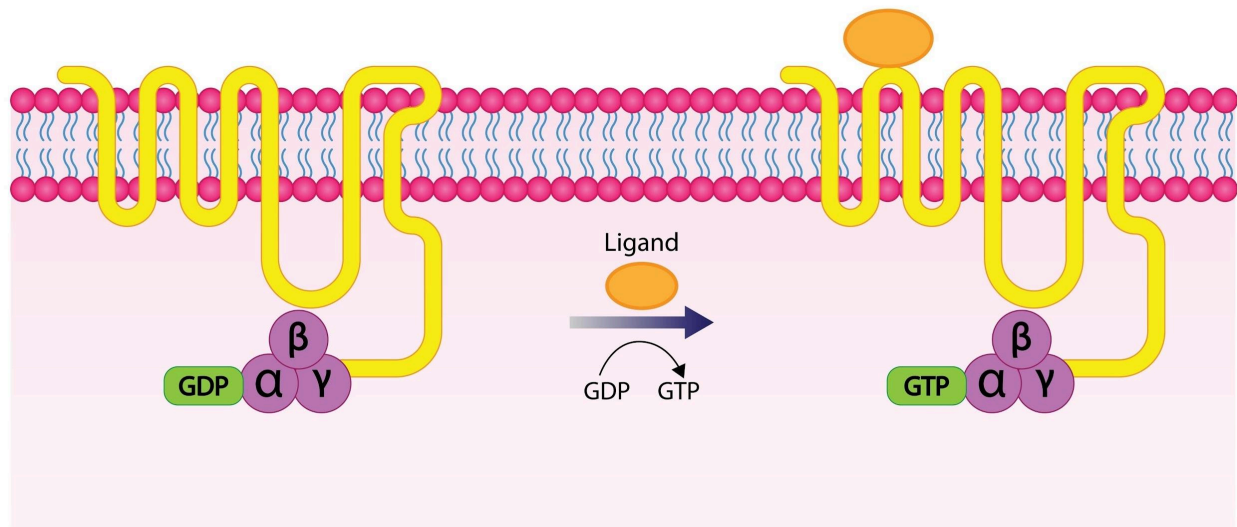
In the context studied, this stabilization **inhibits** downstream signaling pathways. This phenomenon was shown to create an interesting evolutionary trade-off in yeast: while it conferred resistance to pheromone-induced programmed cell death (a survival advantage), it simultaneously reduced the efficiency of the mating response (a reproductive disadvantage).

This assignment challenges you to explore the functional plasticity of this single molecular event.

2. Your Task

A single molecular mechanism can often lead to profoundly different, or even opposite, cellular outcomes depending on the specific biological context. Your task is to design a single, detailed **graphical representation** (such as a concept map, comparative flowchart, or annotated schematic) that illustrates two divergent functional pathways originating from this one core event: **GPCR-G α Shielding**.

G-protein-coupled receptor (GPCR)



3. Diagram Requirements

Your single, comprehensive diagram must clearly illustrate the following:

- **Core Event:** A visual of an intracellular modulator binding to and stabilizing the GPCR-G α complex.
- **Pathway A (Inhibition):** Illustrate the inhibitory outcome from the paper, showing how stabilization attenuates the signal and creates an evolutionary trade-off between survival and reproduction under specific environmental pressures.
- **Pathway B (Hypothetical Potentiation):** Illustrate a plausible scenario where the same stabilization event leads to signal enhancement. Depict the key molecular differences from Pathway A (e.g., blocking β -arrestin).
- **Predictive Biomarkers:** Annotate the diagram with examples of metabolomic or transcriptomic data that could predict whether a cell follows Pathway A or B.

4. Submission Format

- Submit your diagram as a single **PDF, PNG, or JPEG** file.
- It can be hand-drawn (scanned/photographed) or digitally created.
- You will be graded on the clarity, detail, and logical flow of your visual explanation.