

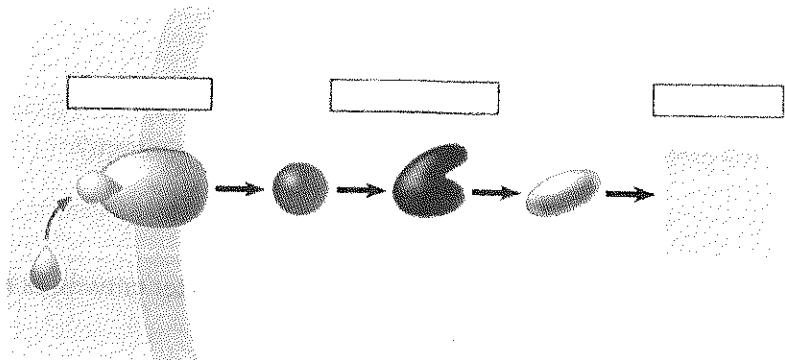
AP Biology Cell Communication Review Questions

1. What is a signal transduction pathway?
2. How does yeast mating serve as an example of a signal transduction pathway?
3. How do immune cells and neurons exhibit local signaling?
4. How does a hormone qualify as a long-distance signaling example?
5. A signal transduction pathway has three stages. Label the following figure, and then explain each step. This is only a generalized preview.

reception

transduction

response

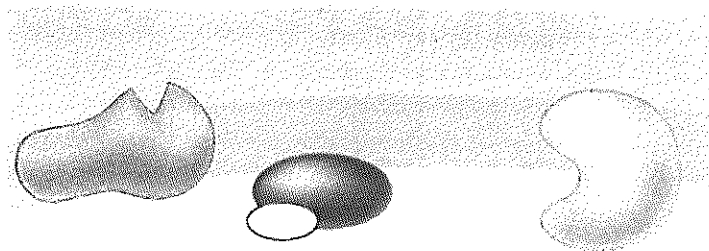


6. Explain the term ligand. This term is not just reserved for cell signaling. You can use this for many different biological situations.
7. There are three major types of membrane receptors. This material is of fundamental importance. The first example is a G protein-coupled receptor. In the first figure, label the components and then describe the role of the three components.

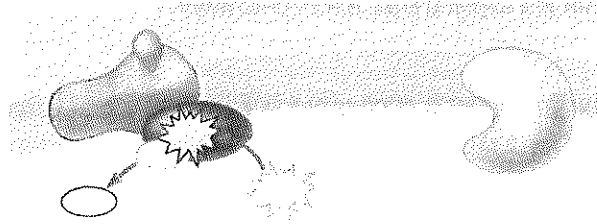
G protein-coupled receptor

G Protein

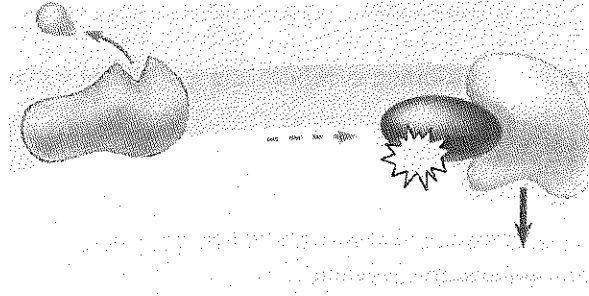
GDP



8. Label and then describe what happens in step 2.



9. Label and then describe what happens in step 3. (The yellow box at the bottom right is important!)

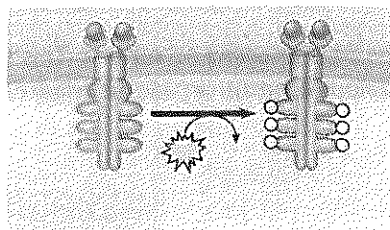
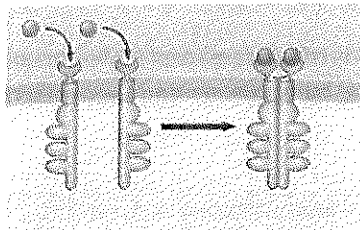


10. What activates a G protein?

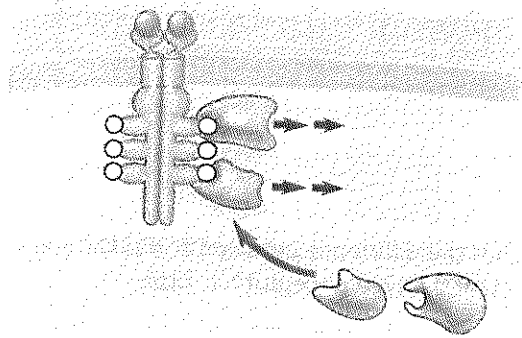
11. A G protein is also a GTPase enzyme. Why is this important?

12. The second type of receptor described is the receptor tyrosine kinase. Explain what a kinase enzyme does.

13. Explain the words dimerization and autophosphorylation. Also, how are these important during activation of a tyrosine kinase receptor protein? Label and use the two diagrams below.



14. Use the diagram below and describe how the activated tyrosine kinase receptor can stimulate multiple cellular response pathways.

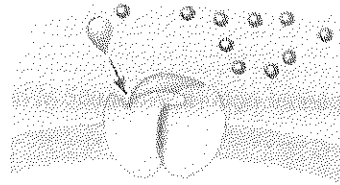


15. Look at the ion channel receptor below. Label the diagram and explain the role of each of the labeled molecules/parts.

ligand

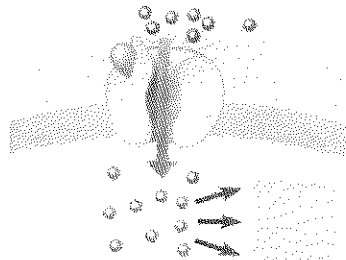
ligand-gated ion channel receptor

ions

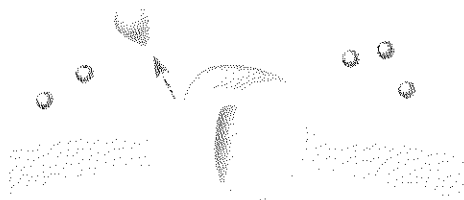


16. What are two examples of cells (one plant/ one animal) that utilize ion channel receptors.

17. Label the following diagram. Explain what is occurring.



18. The ligand attachment to the receptor is brief. Label and explain what happens as the ligand dissociates.

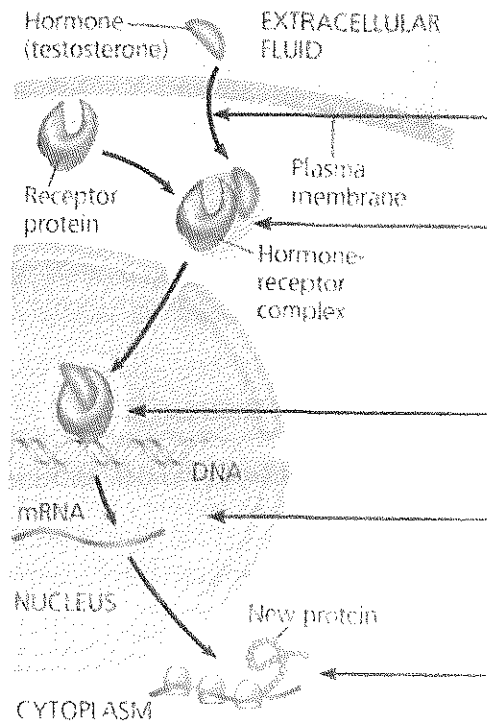


19. What is the difference between a ligand-gated ion channel and a voltage-gated ion channel?

20. What is the difference between an extracellular and an intracellular receptor? Does the polarity of the ligand dictate the type of receptor? Explain.

21. What are two examples of polar hormones? What are two examples of nonpolar hormones?

22. Label and explain the diagram below of testosterone (steroid hormone).



23. An important idea (transcription factors) was introduced during this unit. Explain the function of transcription factors in the cell.

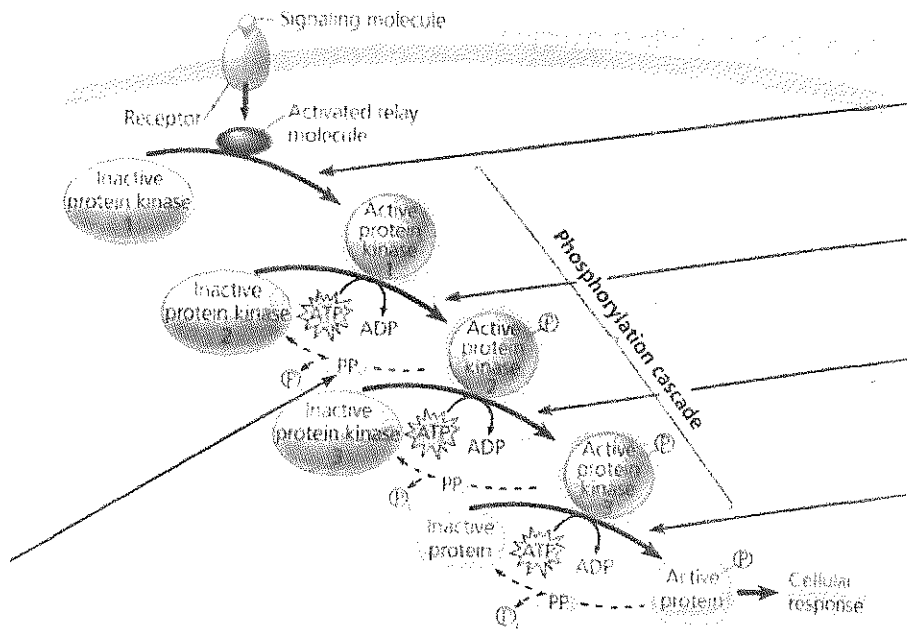
24. What are two benefits of multistep pathways?

25. Explain the role in transduction of these two categories of enzymes.

protein kinase

protein phosphatases

26. Label and explain the diagram below.



27. What is the difference between a first messenger and a second messenger?
28. Two common second messengers are cyclic AMP (cAMP) and calcium ions (Ca^{2+}). Explain the role of the secondary messenger cAMP and why they should be small.
29. Explain the role of Calcium in skeletal muscle contraction. How does the cell control the amount of calcium in the cytoplasm? (so nice to be a eukaryote!)
30. When cell signaling causes a nuclear response, what normally happens?
31. When cell signaling causes a cytoplasmic response, what normally happens?
32. How do scaffolding proteins enhance a cellular response?
33. What does the pancreas produce in response to low glucose levels?
34. One target cell for the hormone produced in 33 is a liver cell. What is the end response of this liver cell?
35. What does the adrenal gland produce in response to a fight/flight situation?
36. Why does it make sense that the hormone produced by the pancreas and the hormone produced by the adrenal gland have a similar shape?

Cell Reproduction

1. Draw and label a chromosome.
2. Draw and label the Cell Cycle. What happens in each phase?
3. If there are 24 chromosomes in a plant cell in G_1 , what is the diploid number? How many chromatids? What is the haploid number? What is the number of centromeres?
4. What are the stages of mitosis? What occurs at each stage?
5. Compare a cell plate to a cleavage furrow. What is the difference? What would be the advantage of each?
6. What are checkpoints? Where are the checkpoints in the cell cycle? Which checkpoint is the most important one?
7. Define cyclins, cyclin-dependent kinases (Cdk) and MPF. How do they regulate the cell cycle?
8. What happens when a cell enters G_0 ? What is the purpose? List some examples of cells that are usually found in G_0 .

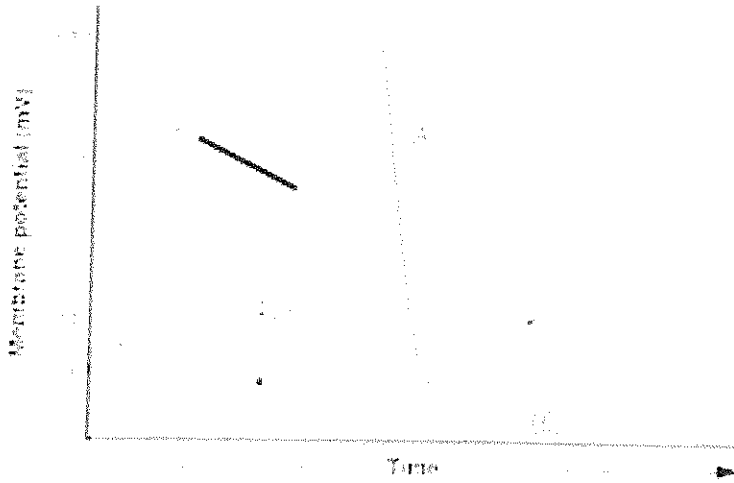
9. Explain the mechanisms of cancer. What causes it? How do cancer cells behave? How can cancer cells be identified?

Endocrine System

1. How is endocrine signaling different from other types of signaling?
2. What are the major differences between peptide and steroid hormones?
3. How can one hormone have different effects throughout the body?
4. Describe a negative feedback pathway. Why are these important for maintaining homeostasis?
5. Describe a positive feedback pathway. In what situations are these important?
6. Describe the process of blood sugar regulation. How does this relate to diabetes?

Neurons, Impulses and Synapses

1. What is happening at each part of the graph?



2. What maintains the resting potential?
3. What role do Na^+ and K^+ channels play?
4. Structure and function of parts of neuron(s) (axon, dendrites, synapse, myelin sheath, cell body)
5. Be able to explain the sodium-potassium pump.
6. Function of neurotransmitters
7. When and how are neurotransmitters released?
8. What do excitatory neurotransmitters do? What do inhibitory neurotransmitters do? How does each affect membrane potential?

