

Cell Communication Review
Chapter 11

1. Explain how yeast cells use cell signaling to identify a mate of the opposite sex.
2. Use a neurotransmitter and a hormone as examples to describe the difference between local and long-distance signaling between cells.
3. Describe the three stages of cell signaling (reception, transduction and response).
4. Nerve growth factor (NGF) is a water-soluble signaling molecule. Predict whether the receptor for NGF would be intracellular or in the plasma membrane. Justify your answer.
5. a) Describe the role of protein kinases in signal cascades.
b) Describe the importance of protein phosphatases in signal cascades.
6. Explain the importance of the cellular response being switched off quickly in the absence of a signal.
7. Explain why second messengers are important in some signal transduction pathways.
8. a) Identify the actual “signal” being transduced in a signal transduction pathway.
b) Describe how this “signal” is passed from outside to inside the cell.
9. Epinephrine stimulates the breakdown of glycogen into glucose-1-phosphate by glycogen phosphorylase. If epinephrine were mixed with glycogen phosphorylase and glycogen in a cell-free mixture in a test tube, predict whether glucose 1-phosphate would be produced. Justify your prediction.
10. Epinephrine initiates a signal transduction pathway that produces cAMP and leads to the breakdown of glycogen to glucose, a major energy source for cells. Other effects of the fight-or-flight response include an increase in heart rate and alertness, as well as a burst of energy. Given that caffeine blocks the activity of cAMP phosphodiesterase, propose a mechanism by which caffeine ingestion leads to heightened alertness and sleeplessness.
11. Explain how a signal molecule might result in a gene being activated.
12. Describe how a phosphorylation cascade can allow a single signal molecule to evoke a large response from a cell.
13. Some diseases are caused by defective protein phosphatases. Explain how such a defective protein would affect a signal transduction pathway.
14. a) Identify the structure that allows a cell to detect a specific signaling molecule.
b) Explain how two cells can respond differently to the same signaling molecule.
15. Describe the importance of signaling for cells.