G-Protein Coupled Receptor Signaling

1. **In paracrine signaling, the signaling molecule**

   A. acts on cells in close proximity to the secreting cell.
   B. acts on target cells far away from the secreting cell.
   C. acts on the same cells that secreted the signaling molecule.
   D. is carried to the target cells by the blood.

2. **In trimeric G proteins, GTP is bound to**

   A. the □ subunit.
   B. the □ subunit.
   C. the □ subunit.
   D. the activated trimer.

3. **Which of the following is not a common intracellular second messenger**

   A. inositol 1,4,5-trisphosphate (IP_3)
   B. 1,2 diacylglycerol (DAG)
   C. adenosine triphosphate (ATP)
   D. 3′-5′ cyclic guanine monophosphate (cGMP)

4. **Protein kinase C is activated by**

   A. cAMP
   B. cCMP
   C. DAG
   D. NO synthase
   E. G□i

5. **All the following statement(s) about cholera toxin are true except**

   A. It chemically modifies the $G_{□s}$ protein.
   B. It is a G protein-coupled receptor.
   C. It prevents hydrolysis of bound GTP to GDP.
   D. It leads to continuous activation of adenylyl cyclase.

6. Calmodulin

A. is a ubiquitous protein in eukaryotic cells.
B. binds Ca^{2-} in a cooperative fashion.
C. is a membrane-bounded protein.
D. a and b
E. all of the above

7. Explain the differences between endocrine, paracrine, and autocrine signaling.

8. Describe the proposed mechanism for the opening of K^{-} channels by cardiac muscarinic acetylcholine receptors.

Single Pass Receptor Signaling

9. Which of the following receptors binds TGFβ?

A. type I
B. type II
C. type III
D. types I and II
E. types II and III

10. Which of the following contain(s) an SH2 domain?

A. SHP1
B. SOCS
C. STAT5
D. all of the above
E. none of the above

11. Binding of erythropoietin to its extracellular receptor engages which of the following signaling pathways?

A. JAK/STAT
B. Ras/MAP kinase
C. PI-3 kinase
D. all of the above
E. none of the above

12. The EGF receptor is a(n)

A. adapter protein
B. guanine nucleotide exchange protein
C. kinase
D. protease
E. none of the above

13. Describe the mechanism by which Ras is cycled from its active to inactive form.

Nuclear Receptor Signaling

14. Lipid soluble hormones activate transcription by

A. binding to specific cell-surface receptors.
B. phosphorylating a protein kinase.
C. binding to a nuclear receptor.
D. stimulating a histone deacetylase.