Bio121
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Review Questions
Lecture 19

1. What are GPCRs? How many transmembrane domains do they have? Why are they called GPCRs?

2. What are trimeric G proteins? How are they activated and inactivated? What exactly happens after a ligand binds the GPCR?

3. What happens to the G protein when the GTP bound to a G Protein is hydrolyzed to GDP? (How does it affect activity and protein structure?)

4. What is a GEF? Why are GPCRs considered GEFs? Could G proteins function in the absence of GEFs?

5. What is a GAP? If you increased the amount of a GAP, how could that affect GPCR signaling?

6. Describe all of the steps of the cyclic AMP pathway. (Be sure to understand the mechanism of all steps; note the enzyme that is activated by the G protein and what the second messenger is in this pathway.)

7. Is the cyclic AMP pathway only activated in response to a single specific ligand and GPCR to cause one specific response? Explain.

8. What reaction does PLC catalyze?

9. Describe all of the steps of the PLC pathway. (Be sure to understand the mechanisms of all steps and note the enzyme that is activated by the G protein and what second messengers are used in this pathway.)

10. Where do the second messengers come from in the PLC pathway?

11. How is calcium important in the PLC pathway? In lecture 17/18 you learned about calmodulin. What do you think would happen to the PLC pathway in a cell in which calmodulin was overexpressed?

12. What type of receptors are RTKs?

13. What domain do all RTK subfamilies share?

14. What does RTK stand for and why are they called that? What happens when a ligand binds to RTKs?

15. How does RTK cross-phosphorylation activate the receptor?

16. What proteins bind to the phosphorylated tyrosines on the intracellular side of the RTK receptor? What determines the target mechanism following RTK activation?

17. What type of protein is Ras?

18. What kind of protein is MAPK?

19. Describe the steps of the RTK-MAPK pathway (again, know the steps and understand the mechanisms).

20. What do you think would happen to this pathway if a GAP targeting Ras was present?

21. What is the basic mechanism of signaling dependent on regulated proteolysis?

22. Describe the Wnt signal transduction pathway (in the “off” state and “on” state).

23. Lithium chloride (LiCL) is a drug that is commonly prescribed for a number of neuropsychiatric disorder. LiCl inhibits GSK3. How does Lithium chloride affect the Wnt signaling pathway? What does this tell you about the etiology (cause) of the neuropsychiatric disorders in which LiCl effectively treats?

24. What kind of cellular activities are controlled by the Wnt pathway?