

## THE EUKARYOTIC CELL CYCLE AND CANCER: AN OVERVIEW

### ABOUT THIS HANDOUT

This handout complements the Click and Learn “The Eukaryotic Cell Cycle and Cancer” and is intended as a straightforward introduction to the cell cycle and how it relates to cancer. For a more comprehensive student handout, please see the in depth version.

### PROCEDURE

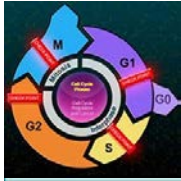
Read through the Click and Learn at <https://www.hhmi.org/biointeractive/eukaryotic-cell-cycle-and-cancer> to learn about the cell cycle. Answer the questions below.

**Click on the “Background” tab on the right side. Read the information and watch the videos.**

1. Why is cell division important for both unicellular and multicellular organisms?
2. Why does cell division remain important to an adult organism even after it is fully developed?
3. Cells divide, differentiate, or die. What is differentiation?
4. What is apoptosis? What is its purpose?
5. What are cell cycle regulators?
6. What happens if cell cycle regulators don't function properly?

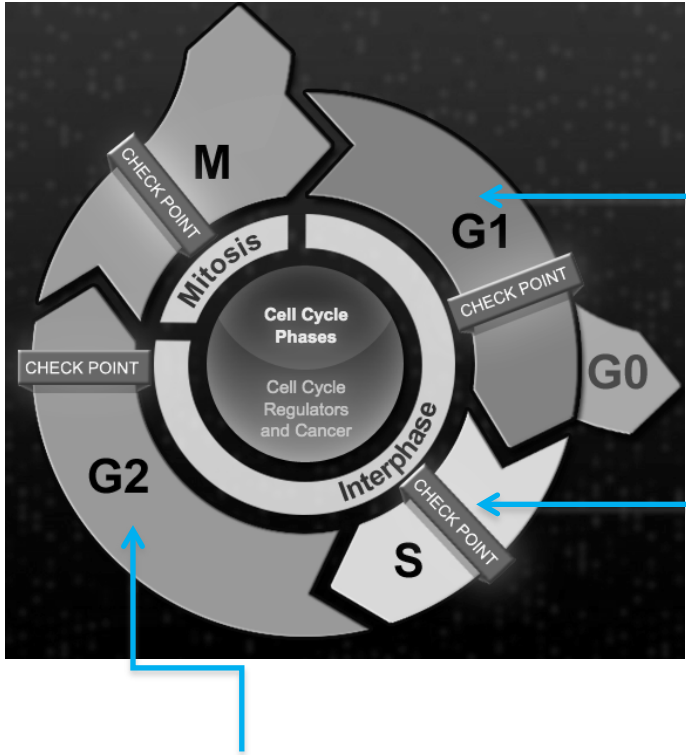
**Click on the purple section labeled “Cell Cycle Phases” as well as the words “Mitosis” and “Interphase” to read an overview of the cell cycle. You can also click on the various phases.**

7. Cells go through periods of growth and division. Cell division occurs during \_\_\_\_\_ .  
The rest of the cell cycle is called interphase, during which (*complete the sentence*)



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8. Fill in the details about what happens during the three phases of interphase labeled in the diagram.



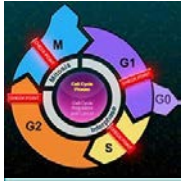
9. In general, what is the purpose of a checkpoint in the cell cycle?

10. What is the G0 phase of the cell cycle?

- a. Which factors determine whether a cell enters G0?
- b. Can cells leave G0?

**Click on “Cell Cycle Regulators and Cancer” in the center purple circle. Read the Regulators Overview and then read through the Cancer Overview and watch the videos.**

11. What are cell cycle regulators?



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- a. Stimulatory proteins are encoded by \_\_\_\_\_ .
  - b. Examples include: \_\_\_\_\_
  - c. Inhibitory proteins are encoded by \_\_\_\_\_ .
  - d. Examples include: \_\_\_\_\_
12. Cancer is the result of an improperly regulated cell cycle. Describe two reasons why cells can form tumors.
13. In some types of colon cancer, stem cells have a mutation in the *APC* gene. What happens if the *APC* gene is mutated?
14. Normally, proto-oncogenes stimulate the cell cycle. What are oncogenes and how do they affect the cell cycle?
- a. To cause cancer, proto-oncogenes require \_\_\_\_\_ allele(s) to be mutated and therefore are considered \_\_\_\_\_. The mutation results in a \_\_\_\_\_ of function.
15. Normally, tumor suppressor genes inhibit the cell cycle. How do mutated tumor suppressor genes affect the cell cycle?
- a. To cause cancer, tumor suppressor genes require \_\_\_\_\_ allele(s) to be mutated and therefore are considered \_\_\_\_\_. The mutation results in a \_\_\_\_\_ of function.