

Course: **Biology I**

April 13th – April 17th

<p>Main Idea/Focus: Communicating Information</p> <p>A drug, or a poison...or both?</p>	<p>Aligned resource (Pearson <i>Biology</i>)</p> <p>Chapter 11 (pg. 366)</p>
<p>Standard(s): <i>How does this align with your state standards?</i></p>	
<p>BIO1.ETS2.3 – Analyze scientific and ethical arguments to support the pros and cons of application of specific biotechnology technique(s). BIO1.LS1.6 – Compare and contrast the rates of cell division in various cell types in multicellular organisms.</p>	
<p>Resource(s): <i>What do you need? Text, data sets, tools, etc.</i></p>	
<p>Textbook: Miller & Levine, <i>Biology</i> – access through Clever In addition to the textbook, the following links may prove useful or of interest:</p> <ul style="list-style-type: none"> • http://www1.biologie.uni-hamburg.de/b-online/library/newton/Chy251_253/Lectures/NaturalProducts/Taxol.html 	
<p>Task(s): <i>What will you do? What will you investigate?</i></p>	
<p>Generally, cell division is a tightly controlled and regulated process. But sometimes, something goes wrong and that control is lost. The result may be cancer, a disease in which rapidly dividing cells form clusters known as tumors and invade throughout the body.</p> <p>The drug taxol has become widely used to treat many kinds of cancer, especially breast cancer. The drug works by acting on microtubules. During prophase and metaphase of mitosis, microtubules attach to the chromosomes and move them to the center of the cell. Then, during anaphase, the microtubules disassemble, separating the chromosomes into two daughter cells.</p> <p>Taxol works by binding to microtubule proteins and preventing their disassembly. The result is that the cell is “stuck” in metaphase, cannot complete mitosis, and may undergo spontaneous cell death (i.e., apoptosis). Cancer cells divide especially rapidly, so taxol harms them more than it harms normal cells.</p> <p>If you think that a drug that stops mitosis is acting like a poison, you may be correct. Taxol acts on normal cells and cancer cells alike. As a result, it has many side effects, including hair loss and reduced blood cell counts. Doctors try to prescribe taxol in just the right dosages to fight cancerous tumors while minimizing the damage it causes.</p>	

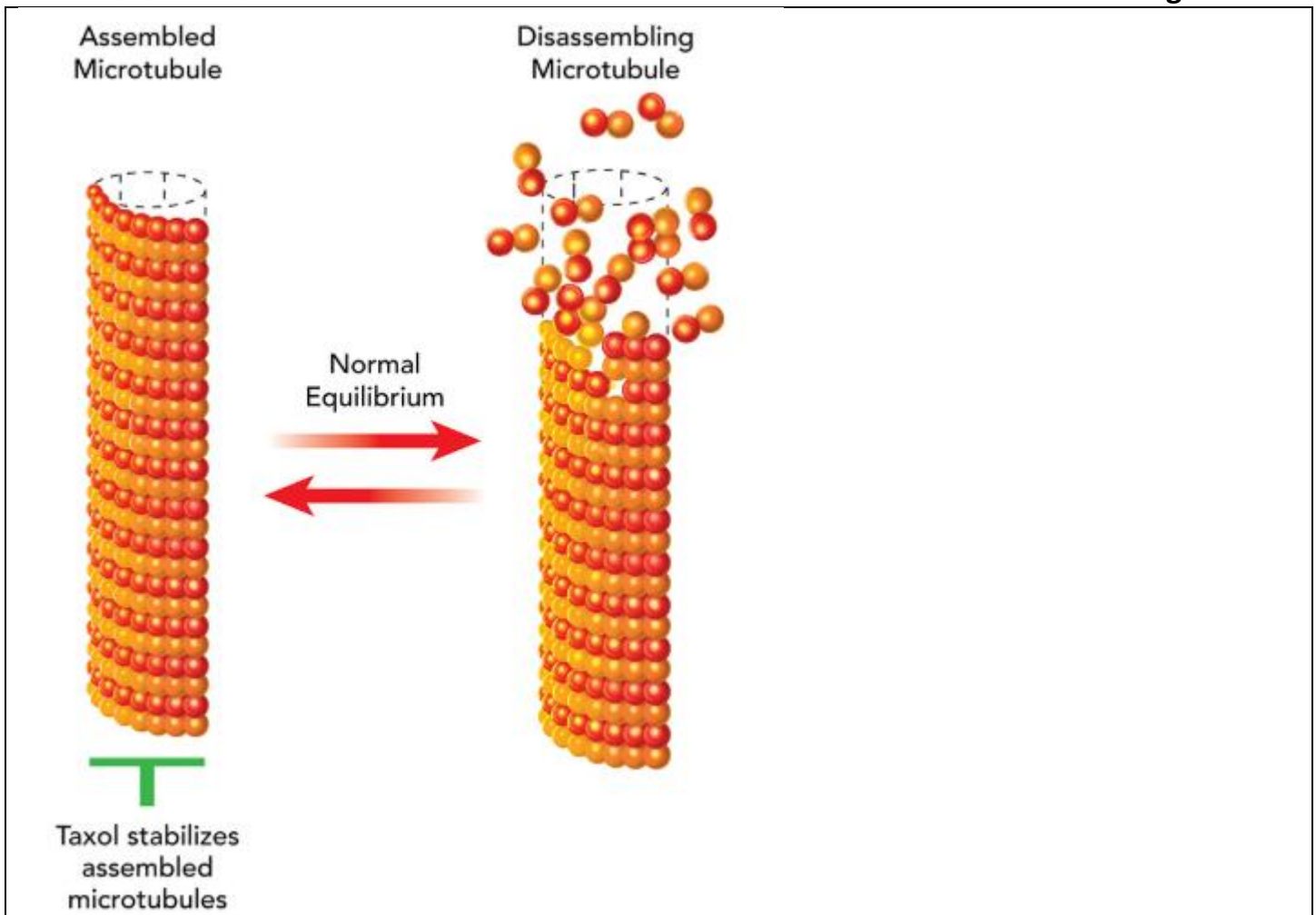


Image 1. Model of taxol mechanism of action. (Source: *Miller & Levine Biology – TN*, Performance Based Assessment, Pearson)

Final Product(s):

What will you answer? What will you create? What will you communicate?

1. Interpret Visuals – Use the diagram to explain, in your own words, how taxol acts on microtubules.
2. Defend Your Claim – Is it accurate to describe taxol as both a drug and a poison? Use logical reasoning to defend or support your answer.
3. Construct an Explanation – Why is taxol useful for fighting cancer?
4. Conduct Research – What additional questions do you have about cancer and the drugs that fight the disease? Record your questions, and then conduct research to learn the answers or to find more information.
5. Develop a Model – Choose one of the cancer drugs that you have researched. Draw a diagram or make a flowchart to show how the drug works and why it is useful. Share your model with your teacher, classmates, and/or others in your family.

[PLEASE SEE NEXT PAGE/ACTIVITY]

ACT Skill Building: Analyzing Data

Aligned resource (Pearson *Biology*)

The Rise and Fall of Cyclins

11.3 Regulating the Cell Cycle
(Page 353)

Scenario/Context:

Scientists measured cyclin levels in clam embryonic cells as the cells went through their first mitotic division after fertilization. The data are shown below:

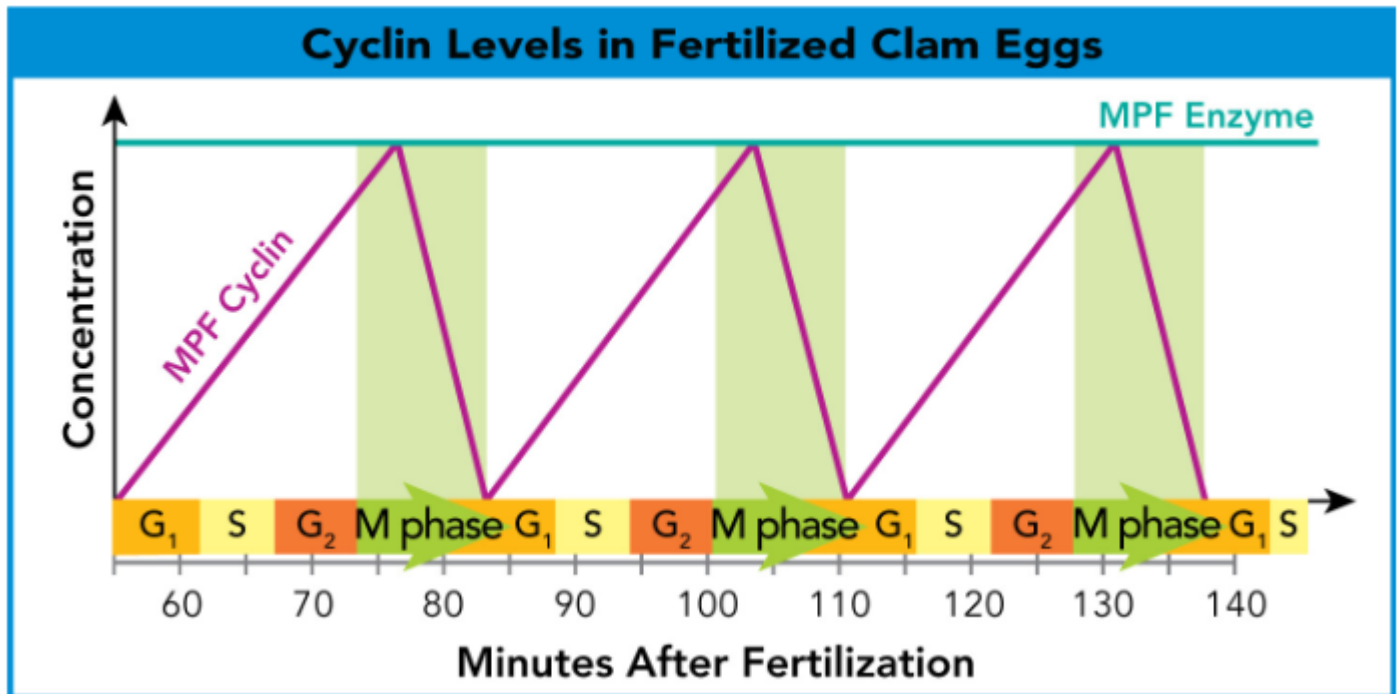


Image 1. Cyclin binds with an enzyme to produce mitosis-promoting factor (MPF). The levels of MPF Cyclin rise and fall to control the cell cycle. (Source: *Miller & Levine Biology – Tennessee*, 11.3, Pearson)

Cyclins are continually produced and destroyed within cells. Cyclin production signals cells to enter mitosis, whereas cyclin destruction signals cells to stop dividing and enter interphase.

Analysis and Conclusion:

1. Analyze Graphs – How long does cyclin production last during a typical cell cycle in embryonic clam cells?
2. Apply Scientific Reasoning – During which part of the cell cycle does cyclin production begin? How quickly is cyclin destroyed?
3. Form a Hypothesis – Suppose that the regulators that control cyclin production are no longer produced. Hypothesize two possible outcomes.