Printable student packet for LE week 5

Living Earth: Week 5 Assignment → 5/4 - 5/11

Name:_____ **Period:**____ **Teacher:** _____

Past Big Ideas :

1. In the past weeks you have learned about how cells are triggered to differentiate to become specific cell types to support multifunctioning organisms.
2. Specific cells make up organs and you have also learned how those organ systems work to properly support all your body functions, maintaining homeostasis.

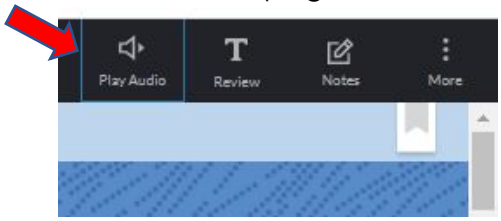
This Week's Big Ideas: Cell Cycle

This week you are going to learn about the life cycle of a cell. Within this life cycle is a time when cells are triggered to divide and make more of themselves. This process is called *Mitosis* (NOT Meiosis). This process is basically cloning, every cells' DNA replicates (now has 2 sets) and those chromosomes separate into 2 new cells. Sounds simple, but it is actually a highly regulated process. You will learn why cells need to replicate and the triggers that keep this process working correctly. You will also learn about what can happen if the triggers don't regulate the process correctly…cancer!

☑ Assignment # 1: How Cell's Reproduce

(If you have your textbook you can read pages 442-450 instead of doing step 1)

1. **Please log into the HMH app via Clever in order to do the Textbook Assignment.**
   There are 2 sections to read this week. (I highly suggest you have the quiz open while you're reading…it will make finishing the assignment much faster)
   Get the text read to you by clicking the PLAY AUDIO icon at the top right corner



   a. **First section:**
      Unit 7: Lesson 1 –Mitosis and the Cell Cycle
      Explore/**Explain 1**: Overview of the Cell Cycle
   b. **Second section:**
      Unit 7: Lesson 1 –Mitosis and the Cell Cycle
      Explore/**Explain 2:** Mitosis and Cytokinesis
      - You DO NOT NEED TO DO THE hands-on-activity of Modeling ☺

2. **Watch** this quick **video 1** "How the Cell Cycle Works" (3:00)
   https://www.youtube.com/watch?v=g7iAVCLZWuM

3. **Watch** this quick **video 2** on check points "Check Points in the Cell Cycle" (1:30)
   https://www.youtube.com/watch?v=DSeZZGxkYzo

4. **Take** the Living Earth Week 5 Textbook **Reading and videos quiz below:**

Living Earth Week #5 Book Reading / Videos 1&2 Quiz #1 (12 Points)

1. All organisms are made up of living cells. As organisms have a limited life, so do the cells that make them up. Most cells are constantly being generated to help with the growth and healing of the organism. The process within the cell cycle where a cell's duplicated DNA is divided into two new nucleui which will form into two identical cells through cytokinesis is called: (1 Point)

- meiosis
- Interphase
- Mitosis
- Cell Cycle

2.During the cell cycle, the stages where the cell has time to grow, replicate more organelles, and make more proteins to prepare for cell division are called (hint: pick 2 answers here) (2 Points)

- G1 phase
- S phase
- G2 phase
- Mitosis

3.During the cell cycle, the stage where the DNA in the nucleus is duplicated is called the(1 Point)

- G1 phase
- S phase
- G2 phase
- Mitosis

4.The stage of the cell cycle where the cell membranes completely divide the cytoplasm between the two daughter cells is called: (1 Point)

- Mitosis
- Cytokinesis
- Interphase

5.Which answers describe the purpose of checkpoints in the cell cycle? (hint: pick 3 here) (3 Points)

- Check points are necessary to monitor that the structures and functions of the cell are working properly
- Check points are necessary to maintain the proper concentration of certain cells.
- Check points are necessary so a cell with mutations does not continue along the cell cycle process and duplicate.
- Only certain types of cells have checkpoints within their cell cycle.

6.Mitosis is a way in which many simple Prokaryotes (Bacteria) and Eukaryotes can reproduce to generate identical organisms, "clones" For example in Bacteria this process is called _____, and in starfish this is called _____ (1 Point)

- Binary Fission or budding, Fragmentation
- Coupling, Sexual reproduction
- Meiosis, vegetative reproduction

7.Overall Mitosis produces_____ and Meiosis produces_____ (1 Point)

- 4 genetically different haploid cells, 2 identical diploid cells
- 2 identical diploid cells, 4 genetically different haploid cells

8.As cells grow and get larger, their surface area : volume ratios change. Nutrients must be able to be transported easily throughout the cell and cells that are very large have a difficult time of efficient transport. Which cell below has a surface area:volume ratio that would indicate that the cell should divide? (1 Point)

- Cell with a surface area : volume ratio of 4:1
- Cell with a surface area : volume ration of 2:1
- Cell with a surface area : volume ratio of 3:1

9.This term describes the process by which signals within and outside cells activate genes that trigger the production of self-destructive enzymes. At times, there is a need for cells to undergo programmed cell death. This is a critical process and especially so during the growth of the embryo. (1 Point)

- Cell killing
- Apoptosis
- Regeneration
- Cytokinesis

☑ Assignment #2 : Cancer (when the cell cycle messes up)

What you have **read about** in the text book and **have heard** in the videos is the **normal cell cycle**. At times, this cycle does not function properly. Sometimes the checkpoints are over ridden (or blocked) by proteins and the proper checks are not made, this results in mutated cells (cells with damaged DNA) multiplying. There are a number of factors that contribute to this. Please watch these next two videos and read the information about the *P53 gene*.

1. **Watch** this **video #3**: The Cell Cycle and Cancer (9:19)
   https://www.youtube.com/watch?v=QVCjdNxJreE&t=460s

2. **Watch** this **video #4:** How are Cancer cells different from Normal cells (3:50)
   https://www.youtube.com/watch?v=BmFEoCFDi-w

3. **Read this: *Cancer and the p53 Gene***

You have previously learned about genes and have also heard that mutated genes can lead to problems with the cell cycle, leading to cancer. There are many genes that control the regulation of the cell cycle. One very important gene is the **P53 gene**. Please read the following information about this and highlight important information as you are reading to help you on the quiz at the end.

"p53 protein has been voted molecule of the year"

The **p53** gene, found on chromosome 17 in humans, produces a protein called the **P53** or **tumor protein. This protein** regulates the cell cycle and so functions as a **tumor suppressor. (It slows or fights down problems that lead to tumors growing).** It is very important for cells in multicellular organisms to ***suppress tumors and cancer.*** P53 has been described as "the guardian of the genome", referring to the facts that this protein carries out three major functions :

1. Slows/stops the cell cycle from advancing through the cell cycle if DNA is damaged
2. Helps in repairing damaged DNA
3. Triggers Apoptosis (cell death) in cells with mutated DNA

Defective p53 (due to mutation) could allow abnormal cells to grow uncontrollably resulting in cancer. If the p53 gene is damaged, tumor suppression is severely reduced. People who inherit only one functional copy of p53 will most likely develop tumors in early adulthood, a disease known as Li-Fraumeni syndrome. p53 can also be damaged in cells by mutagens (chemicals, radiation, or viruses), increasing the likelihood that the cell will begin uncontrolled division. More than 50 percent of human tumors contain a mutation in or a deletion of the p53 gene!

4. **Take** the Video 3&4 and p53 info Quiz #2 below:

Living Earth Week #5 Videos 3 &4, p53 info Quiz #2 (11 Points)

1.All cells in organisms grow and divide at the same rate. (1 Point)

- True
- False

2.Diseases that are characterized by uncontrolled cell growth are called: (1 Point)

- Pneumonia
- COVID-19
- Cancer
- Genetic Mutation

3.Which are risk factors that might lead cells to become cancerous? (1 Point)

- genetic factors
- cell cycle control problems
- exposure to hazardous chemicals/radiation
- all of the above

4.Which below is NOT true about cancerous cells? (1 Point)

- They have lost contact inhibition and can detach from each other more easily than normal cells
- They secrete chemicals that encourage blood vessel growth near them so they can "steal" nutrients from other cells
- They secrete growth hormone
- Cancer cells carry out normal cell functions

5.Normal functioning of the cell cycle depends on proteins that act as positive regulators that keep the cycle going and some are negative regulators that stop the cycle if there are problems. Proteins knows as _____are positive regulators and a specific protein known as _____is negative regulators. (1 Point)

- cyclins and kinases, p53
- p53, cyclins and kinases

6.Which statement below does NOT represent what can happen in the stage of G "0" in the cell cycle? (1 Point)

- Cells are in a holding pattern of growth due to lack of resources for growth
- Cells in this phase skip the cycle and replicate frequently
- Cells are in a resting phase
- Cells in this phase can stay in this phase permanently, like neurons that do not replicate.

7.There are many procedures to rid an organism of cancer, chemotherapy is one possible therapy. Chemotherapy targets: (1 Point)

- quickly dividing cells
- slowly dividing cells
- all dividing cells

8.Chemotherapy kills many healthy cells as well as cancerous cells, but it is very hard on the whole body. Today there are many new and very effective treatments in trials that target just specifically the cancerous cells and not any healthy cells. This involves using your own immune system cells. What do you think this therapy is called? (1 Point)

- immunotherapy
- chemotherapy
- radiation therapy

9.The p53 gene is found on which human chromosome? (1 Point)

- Chromosome 15
- Chromosome 17
- Chromosome 19

10.Which statement is NOT true of the p53 protein in the function of the cell cycle? (1 Point)

- Stops the cell cycle progression if DNA damage is found
- Increases the quickness of the cell cycle to produce more cells quickly
- Assists in DNA repair
- Triggers apoptosis if DNA repair can't be fixed

11.If the p53 gene is mutated, then tumor suppression is severely diminished and cancer is likely. Which below is true? (1 Point)

- A mutation in the p53 gene is found in over 50% of all cancers
- Mutations in the p53 gene are not harmful
- P53 mutations CAN NOT be inherited

You have completed week 5! Please hand this in to the office staff between 12pm-2pm on Monday or email/text me the completed packet.

Mrs. Horton