

Activity 3.3.3: The Immortal Cells

Introduction

The tumor cell line you used for your chromosome spread was the first human cell line successfully grown in a laboratory. The cell line is now over 50 years old. These cells have been growing and reproducing outside a body for over 50 years! So where did these cells come from? Who did they originally belong to? How did they become the most famous and oldest human cell line?

In this activity you will read the story of Henrietta Lacks, her family, and the doctors who created the cell line. You will also investigate the various medical breakthroughs for which the HeLa cell line has been responsible. Finally, you will investigate the debate surrounding the commodification, or commercialization, of human body parts. You will discuss ownership of body parts and debate what you should or should not be able to sell for profit.

Equipment

- Computer with Internet access
- Laboratory journal
- Activity 3.3.3 Student Resource Sheet

Procedure

Part I: The Story Behind HeLa

1. Obtain an Activity 3.3.3 Student Resource Sheet.
2. Access the article titled “Henrietta’s Dance” written by Rebecca Skloot and published in the April 2000 issue of the Johns Hopkins Magazine. It is accessible on the Internet at <http://www.jhu.edu/~jhumag/0400web/01.html>.
3. Read the article and record your initial reactions and any questions you have under the *Henrietta’s Dance* section in the data table on your Resource Sheet.
4. Reflect whether your opinions surrounding the story of Henrietta Lacks and the story behind her cells line have changed now that you have read this article. Record your ideas on your Resource Sheet data table. If your opinion has changed, describe how it has changed and why.
5. Discuss your ideas and feelings about the segment with your classmates for two minutes.
6. Access the Article titled “An Obsession with Culture” written by Rebecca Skloot and published in the March 2001 issue of the University of Pittsburgh’s Pitt Magazine. It is accessible on the Internet at: <http://www.pittmag.pitt.edu/mar2001/culture.html>.

7. Read the article and record your initial reactions and any questions you have under the *An Obsession with Culture* section in the data table on your Resource Sheet.
8. Reflect whether your opinions surrounding the story of Henrietta Lacks and the story behind her cells have changed now that you have read this article. Record your ideas on your data table on your Resource Sheet. If your opinion has changed, describe how it has changed and why.
9. Answer Conclusion question 1 on your 3.3.3 Student Resource Sheet.
10. Read the following bullets chronicling how the HeLa cell line has affected modern medicine.
 - George Gey successfully cultures the first immortal human cell line using cells from Henrietta's cervix. It is given the name HeLa after the first two initials of Henrietta's first and last names. (1951)
 - HeLa cells become the first living cells shipped via postal mail. (1952)
 - HeLa cells were the first human cells frozen; this allowed for the close examination of cell division.
 - The Tuskegee Institute opens the first "HeLa factory," supplying cells to laboratories and researchers and operating as a nonprofit. Within a few years, HeLa was sold for profit. (1952)
 - Scientists use HeLa cells to help develop the polio vaccine. (1952)
 - Scientists infected HeLa cells with many diseases such as mumps and measles, which led to the creation of the modern field of virology.
 - A geneticist in Texas was able to accurately calculate the number of chromosomes in a human cell using HeLa. This eventually made it possible for doctors to diagnose chromosomal disorders such as Down's syndrome. (1953)
 - HeLa cells become the first cells ever cloned. (1953)
 - Chester Southam conducts experiments to see whether or not injections of HeLa cells could cause cancer. (1954)
 - HeLa cells were sent into space prior to any astronauts and then were included on the first manned mission. (1960)
 - HeLa cells are fused with mouse cells, creating the first animal-human hybrid cells. (1965)
 - HeLa cells allowed for advances in the field of medical ethics. After scientists injected patients without their consent with cancer cells to discover how cancer spreads, medical review boards and informed consent by patients were institutionalized. (1965 and 1966)
 - Scientists exposed HeLa cells to radiation to better understand the effects of nuclear radiation on human cells.
 - Scientists used HeLa cells to better understand the invasiveness and infectiousness of salmonella. (1973)
 - HeLa cells were used to help uncover that the sexually transmitted virus called Human Papilloma Virus causes cervical cancer. (1984)
 - A scientist discovered the presence of an enzyme called a telomerase that is used in a cell to rebuild a cell's telomeres. The presence of this enzyme in a cell causes cancer. (1989)

- The early cloning technology started because of HeLa cells led to isolating stem cells, cloning entire animals, and *in vitro* fertilization.
 - Scientists exposed HeLa cells to *M. tuberculosis* to learn how the disease attacks human cells. (1993)
 - Researchers used HeLa cells to test nanotechnology by injecting the cells with iron nanowire and silica-coated nanoparticles. (2005)
 - HeLa cells are used to test potential cancer drugs, such as those used to treat breast cancer and leukemia.
 - HeLa cells are used to test various products such as cosmetics, drugs, household chemicals, viruses, and biological weapons.
11. Record your initial reactions and any questions you have under the *Medical Breakthroughs Involving HeLa* section in the data table on your Resource Sheet.
 12. Reflect whether your opinions surrounding the story of Henrietta Lacks and the story behind her cell line has changed now that you have read how HeLa cells have advanced the field of medicine. Record your ideas in your data table on your Resource Sheet. If your opinion has changed, describe how it has changed and why.
 13. Answer Conclusion question 2 on your 3.3.3 Student Resource Sheet.

Part II: Medical Ethics

14. Read the position statements on Part II of your Student Resource Sheet. Use reliable Internet websites to research each position statement and create arguments for and against each position statement.
15. Use your research and personal experiences to record arguments for and against each position statement on the data table.
16. Note that your teacher has posted signs around the room. Your teacher will read each position statement aloud.
17. Think about each position statement and then stand under the sign – *Agree, Not Sure, Disagree* – which best reflects your personal opinion of the position statement.
18. Discuss your reasons for taking the position you took on the issue with the classmates who are standing under the same sign. Support your reasoning with insights gained from the research you did in your laboratory journal, as well as any personal experience you may have. You may refer to the data table in your laboratory journal.
19. Elect a spokesperson from your group to summarize three main points made for this position. Each group will have two minutes to present its viewpoint. Quietly and respectfully listen as each group presents. Your spokesperson will then be allowed a one minute rebuttal.
20. Answer the remaining Conclusion question on your 3.3.3 Student Resource Sheet.

Conclusion

1. In your opinion, was Dr. Gey's use of Henrietta Lacks' cells unethical? Support your response with evidence from the Radiolab segment as well as the two articles.
2. If Dr. Gey had not been able to use or to grow the cells that became the HeLa cell line, how might medical research and health care be different now? Support your response with evidence.
3. Do you feel that the Lacks family should be compensated for the use of Henrietta's cancer cells for scientific study? Explain your answer.

Optional: There are many more resources out there surrounding Henrietta Lack's involvement in cell culture. Puruse the following sources listed below and determine if your opinion has changed.

Audiobook from Henrietta Lack's perspective-

<https://www.wnyc.org/radio/#/ondemand/91716>

Podcast surrounding controversy <http://www.radiolab.org/story/91716-henriettas-tumor/> and if you scroll down to bottom of page, live footage of HeLa's cell growth in culture medium from the past.