

Name: \_\_\_\_\_

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## Mitosis gone wrong

### Part 1:

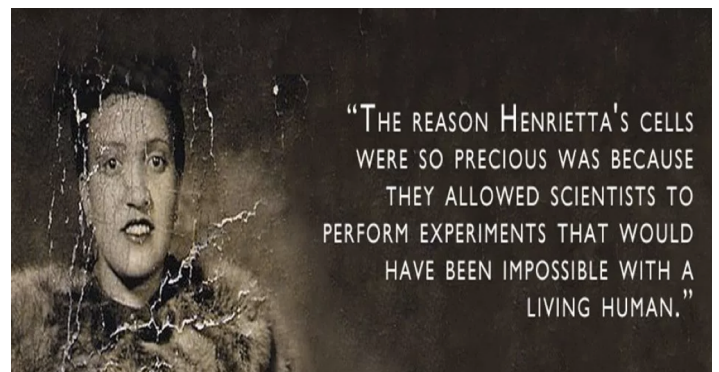
#### The Immortal Cells of Henrietta Lacks – TED-Ed

<https://www.youtube.com/watch?v=22lGbAVWhro>

1. Why do scientists grow human cells in a lab setting?
2. Why was the sample tumor that George Gey received unique?
3. Why are HeLa cells considered immortal?
4. Who was Henrietta Lacks?
5. About how many times can cells divide before they self-destruct?
6. How are cancer cells different from normal cells?
7. Why have HeLa cells been important to research on polio and other medical conditions (*You will need to listen to the entire video before you will learn all of the information needed to completely answer this question*)?

### Note:

“Henrietta's family did not learn of her 'immortality' until more than 20 years after her death, when scientists investigating HeLa began using her husband and children in research without informed consent. And though the cells had launched a multimillion-dollar industry that sells human biological materials, her family never saw any of the profits.”



## **Part 2:**

### **Case Studies: Could Henrietta's story happen again today?**

#### **Case Study 1: The Texas Newborn Bloodspot Drama**

Blood is taken from newborns (by heel stick) as part of mandatory testing for serious medical conditions such as cystic fibrosis, sickle cell anemia, and a number of metabolic disorders. Five drops of blood are placed on a paper card, and often times the cards are destroyed after a short storage period (although this varies). In 2002, Texas began warehousing the cards after de-identifying the samples. 8350 of the over 5 million samples collected were then given to scientists for wide-ranging research projects (from genetics of club feet to the effects of prenatal lead exposure). Parents were not notified since they did not have to consent in the first place for the newborn screening and the samples were anonymous. In 2009, The Texas Civil Rights Project and 5 families filed a lawsuit against the Texas Department of Social and Health Services.

**Were the parents being overly sensitive, or did they have a reason to be upset? What is the "worst case scenario" for their children's blood samples? Explain.**

#### **Case Study 2: Moore v. Regents of University of California**

In 1976, John Moore began treatment for hairy-cell leukemia at the UCLA Medical Center. As part of the treatment, his spleen was removed, and Moore signed a consent form allowing the surgeons to "dispose of any severed tissue or member by cremation". Moore's doctor, David Golde, discovered that Moore's spleen was biologically important and established a cell line (the Mo cell line) from it without notifying Moore. The cell line was patented (trademark was registered) and eventually licensed to a biotech company for commercial development. Golde became a paid consultant for the company and acquired stock, a deal worth more than \$3.5 million dollars. The Mo cell line was thought to be worth billions. Eventually Moore learned about the cell line and filed suit in 1984.

**Should Moore have a received a share of the profits derived from the Mo cell line? Explain.**

#### **Case Study 3: You (and your blood) v. your doctor**

High cholesterol runs in your family, so you decide to be proactive and seek medical advice. The endocrinologist (endocrine system doctor) wants to start by taking a blood sample. Before treatment can begin, you must sign a consent form.

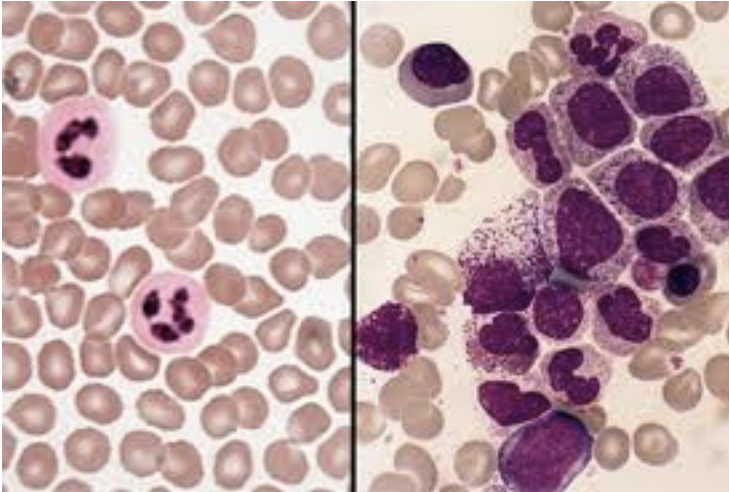
The form is very simple as gives you two options:

- I give permission for my blood to be used in biomedical research. I understand that all personal information will be removed and the sample will be made anonymous.
- My blood may not be used for research purposes.

**Which box do you check and why? How do you feel about the tissue you donated? Has the doctor taken a part of you? Explain.**

**Part 3:**  
**Comparing blood smears CML: Chronic Myeloid Leukemia**

Below is a set of blood smears, one from normal blood and one from blood of a patient with chronic myeloid leukemia (CML). Examine each smear and note the similarities and differences between them (think about the function of each cell and how they would be affected by the abnormal blood smear).



**note: red cells: red blood cells**  
**purple cells: white blood cells**

<b>Similarities</b>	<b>Differences</b>

**Part 4:**  
**HeLa cells karyotype**

A karyotype is a test to identify and evaluate the size, shape, and number of chromosomes in a sample of body cells. It is essentially a picture of a person's chromosomes. In order to get this picture, the chromosomes are isolated, stained, and examined under the microscope.

Examine the two karyotypes below:

Karyotype A: normal human cells (46 chromosomes)

Karyotype B: HeLa cells

1. How many chromosomes do HeLa cells have? \_\_\_\_\_
2. Why is this karyotype extremely abnormal (hint: Henrietta Lacks died from cervical cancer which is caused by the Human papillomavirus)?

