



## Immortal

Authors: Ezequiel Calvo Roitberg  
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### Abstract:

This is one of the Articles "El Gato y La Caja" (Buenos Aires, Argentina) shares with the JOSHA Journal. This time the English version of the original article. In the field of Life Sciences, the author presents an incredible story about Henrietta Lacks, a woman that changes and improves forever all the labs around the world. Shortly after being diagnosed (and without her consent) a small piece of Henrietta Lacks' tumor was cut out and put it in a glass dish. Surprisingly, her uterine-cervical cancer cells had the ability to grow indefinitely. In this single immoral act, the beginning of a revolution in cell biology had occurred. On October 4, 1951, Henrietta Lacks died without knowing that a little piece of her was going to be found in almost every laboratory in the world that uses cell culture. This is her story.

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# Immortal

BY EZEQUIEL CALVO ROITBERG

EL GATO Y LA CAJA

BUENOS AIRES, ARGENTINA.

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Extract: Can we live forever? Do we want to? Who was Henrietta Lacks and why is she in 75,000 scientific papers?

Link to the original note: <https://elgatoylajaja.com.ar/inmortal/>

## Abstract

**Shortly after being diagnosed (and without her consent) a small piece of Henrietta Lacks' tumor was cut out and put in a glass dish. Surprisingly, her uterine-cervical cancer cells had the ability to grow indefinitely. In this single immoral act, the beginning of a revolution in cell biology had occurred. On October 4, 1951 Henrietta Lacks died without knowing that a little piece of her was going to be found in almost every laboratory in the world that uses cell culture. This is her story.**

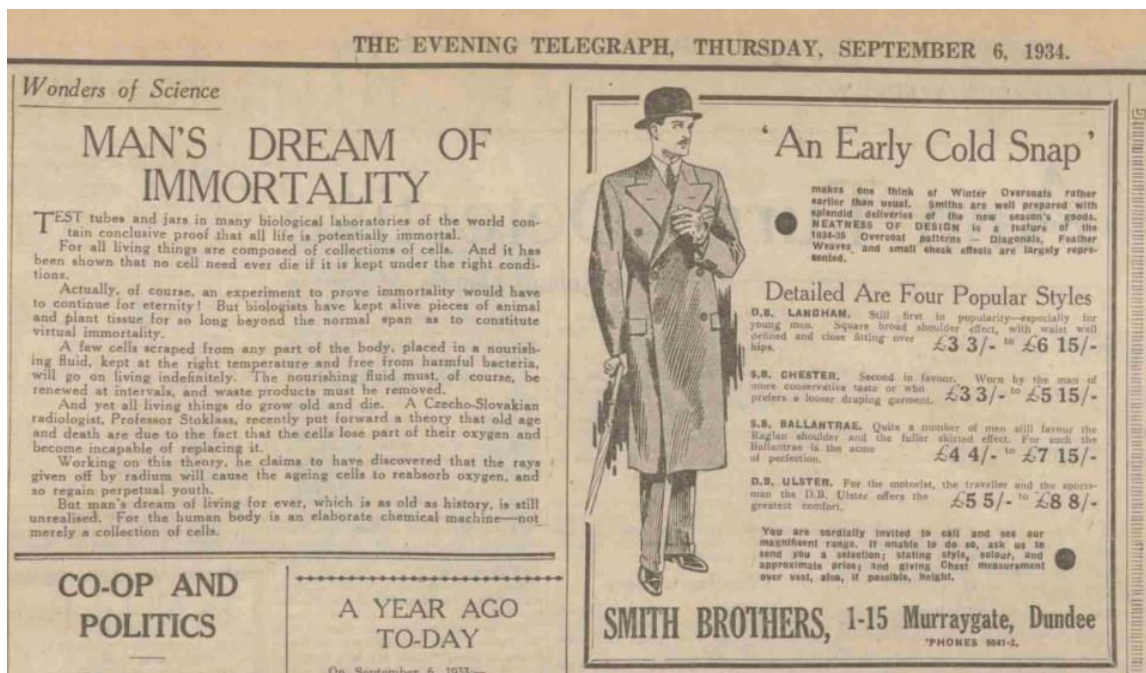
She had been feeling something inside for over a year, but since she was pregnant with her fifth child, she didn't worry too much. Four months after she gave birth, the pain continued and she began to bleed repeatedly. "*This stomach ache is not stopping, the doctor has to take a look at it,*" said Henrietta as she entered Johns Hopkins Hospital, not knowing that it was the beginning of her journey to immortality.

Johns Hopkins Hospital was already prestigious but still a mirror image of its time, perhaps even one of the crudest and cruelest, where a patient's skin color could determine whether one could be considered a valid guinea pig.



Although it was the only free hospital that served black patients in Baltimore, they had a specific wing so they would not be mixed with whites. So the nurse took Henrietta to the office, where the doctor treated her and found a hard, eroded mass on her cervix that was bleeding with the slightest touch. Henrietta had uterine-cervical cancer. This news, as with most black patients with a disease, reached the director of the hospital's tissue culture department, George Gey, who alongside his wife was fanatical about immortalizing cells.

The obsession with cell cultures arose from another obsession, the search for immortality. They dreamed of manipulating cells outside the body and watching them grow without anything stopping them. If that can be done in a glass plate, why not in the bodies of sick patients? What if we could implant cells in humans and renew them as if they were newly born? These ideas became very fashionable and were exposed in mass media, generating a totally wrong idea, very premature and without evidence about the concept. Any resemblance to homeopathy is pure coincidence.

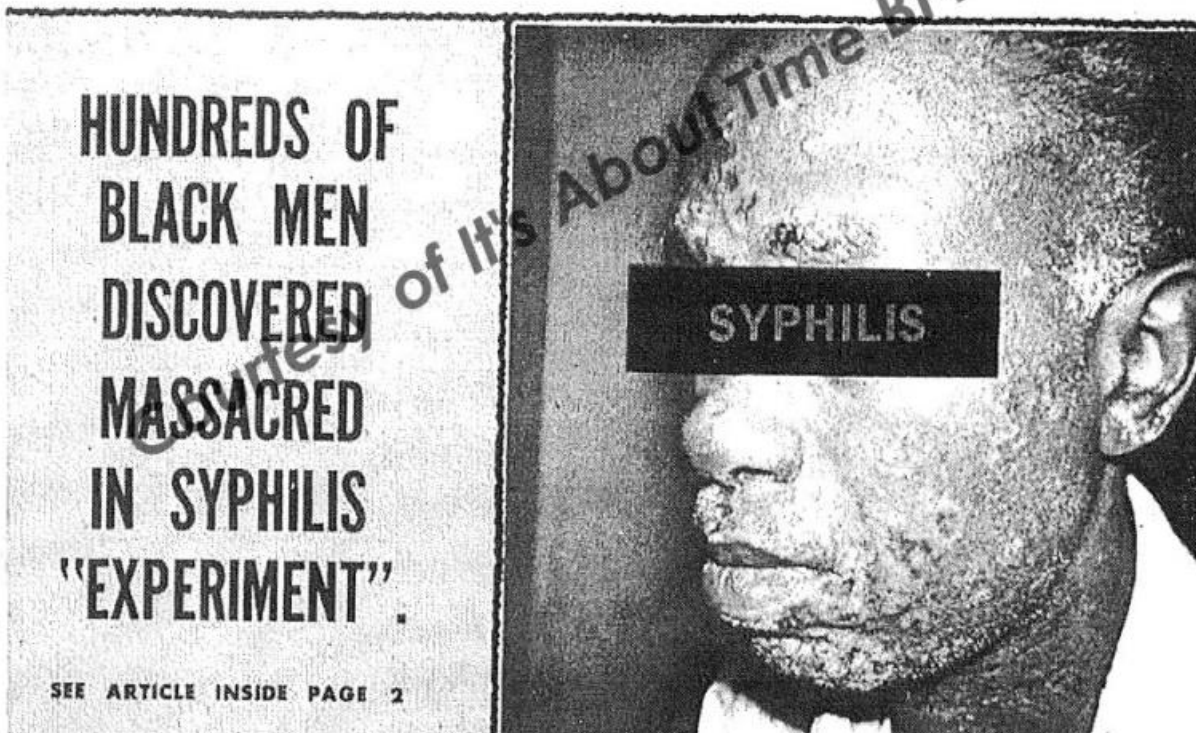


*On the left, the Dundee Evening Telegraph announcing the discovery in 1934, 20 years ahead of Henrietta and more accurate than all the horoscopes in history. On the right, a fantastic moustache and bowler hat.*



Until that time it was possible to study human cells outside the individual to which they belonged but only for a few days, until they died. **What they were looking for was to generate a cell line that would continually divide, having descended from a single original cell.** They saw this as an alternative to test treatments against many diseases, basically because they didn't need patients for the experiments. Having them would have avoided unhappy situations, like the one where they injected the bacteria responsible for generating syphilis into 600 black patients without informing them and not treating them. Just to see what happens, right?

## GERM WARFARE DECLARED AGAINST BLACKS!



*Oh, a population we decided not to treat as people, let's do an experiment on them!*



Gey called himself "the most famous vulture in the world, which feeds on human specimens almost constantly". We are talking about **doctors who believed that since patients were treated for free, it was fair to use them as experimental subjects in return.** The selfsame doctor who treated Henrietta said "*Johns Hopkins Hospital, with its large black homeless population, had no shortage of clinical material*". It was a nice place to arrive with a flu.

Henrietta was informed of her situation and her treatment began. She was sedated and the doctor in charge began to treat her, but first (and **without her consent**, because consent is a white man's thing) he cut out a piece of the tumor and put it in a glass dish.

In a single immoral act, the beginning of a revolution in cell biology was also hiding.

Henrietta's bits and pieces came to Mr. and Mrs. Gey, who had invented their own culture medium with chicken blood plasma, calf foetal extract, special salts and human umbilical cord blood. At this point, I would like to pause for thought: if this is the one that worked, what would have been the ones that did not. They cut pieces of the tumor into even smaller ones and put them into a new plate with culture medium. As they always did, they labelled it with the first letters of the name of the patient to which they corresponded. **From that moment on and forever, Henrietta Lacks would become 'HeLa'.**



*Chicken blood plasma, calf fetal extract, special salts and human umbilical cord blood.  
One unicorn testicle, one fairy wing, and we're all set.*

The vast majority of cells can only grow in culture for a short time. This is because with each cell division some small parts are shortened at the end of the DNA strands, the telomeres, until they reach a limit. This is a signal to the cells that leads to apoptosis, also known as 'programmed cell death'. **The telomeres function as indicators of how long that cell has been alive.** The shorter they are, the more times it is divided, or in other words, the longer it remains alive. Mutations in DNA are generated by the cell system itself and last ALL the time. **The longer a cell has lived, the more chances it has to have accumulated a lot of mutations in its genes and, since its telomeres will be very short, that cell will tend to die.** But not Henrietta's.

After two days the cells were still alive. They were isolated one at a time (by diluting the culture medium in which they were) in separate tubes. They let some time pass and began to notice that in some of the tubes there were many: if they had nutrients and the right temperature, they divided until they filled all the available space in the plate. **That little piece that came out of Henrietta's body was able to grow without much concern for anything.**



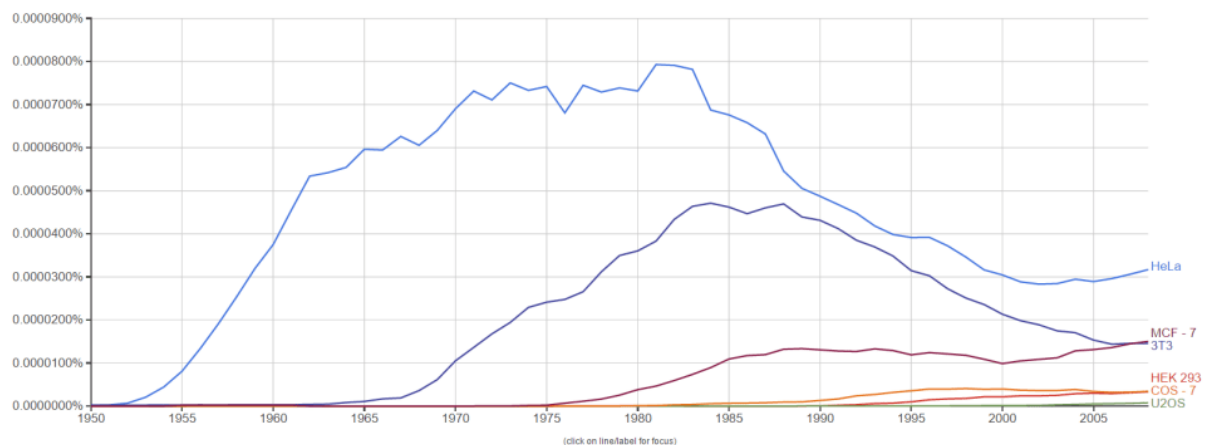
George Gey discussed this with his closest colleagues, was asked if he would lend them some and accepted. He did not know, but Henrietta's tumor cells had a mutation that caused their telomeres to be constantly elongated, never receiving a signal to stop growing. **He had found and begun to distribute the first and most popular immortalized cell line in history.**

Mutations happen all the time. Enzymes that interact with DNA are responsible for translating their information, duplicating it or making small modifications to it. The problem is that, a little by chance and a little by context, they make mistakes. They can, for example, put molecules that were not there before or eliminate things that should remain. It is TOTALLY normal, they are made that way. The good thing is that it is **one of the factors that brings variability to life, making all organisms different and evaluated by natural selection.** A little bit thanks to those mistakes I can be writing a note at this moment and you can be reading it. What is neither good nor bad, that is neutral, is that **the vast majority of mutations do not affect us**, do not change the function of a gene, everything remains as before. The bad thing is that there are **some that can be quite harmful.**

Today we know that there are several types of tumors that could endure being passed into a petri dish and growing forever. Henrietta was the first to whom one of these tumors was found and isolated, but (sadly), it is relevant to remember that it could have been someone else. Or, rather, another little piece of person turned into a tumor. Now it is easier. So much so that, since we know what makes a cell immortal, **we are able to create new immortal cell lines all the time.**



Although it is trivial to us today, it was unthinkable at the time to have something that behaves quite similar to a human organism growing on a plate (and be careful, it is only 'quite', because from the plate to the organism there is a lot). We can manipulate these models to understand processes and **solve problems that go to a very small level with a very large resolution**. The use of Henrietta's cells has exploded since the 1950s, and is one of the major contributors to advances in medicine and biology. There are more than 75 thousand publications that have used them, as in the development of the polio vaccine and the ENCODE project, which aims to build a list



of all the regulatory elements of DNA.

### *Ngram on the use of different immortalized cell lines over the years.*

In recent years, HeLa cells have been used less. This is because research is becoming more specialized and needs models that are much closer to what they are studying: if I work on breast cancer, I would prefer to work with a tumor cell line of this type. And although we can create new cell lines, Henrietta's cells are thought to be so easy to grow that it's difficult to find cultures that aren't contaminated with them.

Henrietta had no idea what happened to the pieces that came out of her body. A few weeks later, an X-ray showed that the tumor was stuck to the pelvic wall, blocking the urethra. **It was already inoperable.** They wanted to take out more cells again, but their situation was so bad that they didn't even survive.





**On October 4, 1951 Henrietta Lacks died without knowing that a little piece that had come out of her was going to be found in almost every laboratory in the world that uses cell culture**, in some freezer in every research institute there is at least one tube with the inscription "HeLa".

His family found out more than 20 years later that his cells were alive and that there were more of them all the time. They understood that she, as a whole, was still alive and since she had more and more cells, they thought they had revived her. Understanding that this was not the case was very difficult for them. Their daughter Deborah, for example, almost suffered a stroke because of this. They probably wouldn't have suffered so much if communication and legislation about where life begins and ends, and about the limits of what it means to be a person, were grounded in evidence.

Today, every lab supply company in the world is selling their cells, and their family received nothing in return. Henrietta's medical history (as well as her entire genome) is publicly available, again without the approval of her family.

The cells that began to grow in Henrietta Lacks' body were distributed throughout the world. They did experiments that totally modified her genome. The enzymes that interact with her DNA continued to generate more and more mutations, to the point that if we compare two HeLa cultures from different laboratories, they are hardly identical. So when did Henrietta end and HeLa begin? Is that still Henrietta's DNA, or did an entirely new species come into existence at some point, generated by passages, plates and replicates? As we expand the frontier of knowledge ever more rapidly, we have to embrace the need to discuss with evidence what we understand it to be, when it begins and when it ends, what we call 'life' and 'person'. We need to design an ethic that progresses at the speed of a science that does not always wait for our concepts of right and wrong to be accommodated before asking whether Henrietta Lacks is truly immortal, or whether she died on October 4, 1951.



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## **About the Author:**



I was born with a pipette in my hands and curiosity in my head. I'm trying to understand the mechanisms of metastasis with popsicle sticks and nails. Culinary Jew.