Our Shero HeLa and Her Immortal Life*
The Story Behind the Famous HeLa Cells

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This article narrates the story behind the world-famous HeLa cancer cells. Almost all cancer researchers may be familiar with this beautiful name—HeLa. Who was she? What did she do? These questions may look very peculiar! 01 August 2022 marked the 102nd birth anniversary of Henrietta Lacks. Her indirect contribution to our understanding of cancer biology is immeasurable and remarkable. Through this article, we unravel the importance of HeLa cell lines in modern cell biology and shed light on the life history of honoured Henrietta Lacks.

Our shero Henrietta Lacks was an African origin American, poor peasant woman born on 01 August 1920 in a small town in Roanoke, Virginia, USA. Over the years, she became famous in cancer biology because of her immortalized cervical cancer cell line called HeLa. HeLa is a code name named after her (by taking the first two letters from her first and last name). Her birth name was Loretta Pleasant, her mother’s name was Eliza, and her father was Johnny Pleasant. She was just 31 years old when she died due to cervical cancer and side effects of chemotherapy and radiotherapy on 04 October 1951 at Johns Hopkins Hospital, Baltimore, Maryland, USA. Cancer cells that were collected from her cervical cancer tumor tissue (from tumor biopsy) became the original source of the HeLa cell line (The first reported immortal human cell line), which aided in many of the modern medical advancements and discoveries in the 20th century as well as in the 21st century.

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GENERAL ARTICLE

What Are Immortalized Cell Lines?

An immortalized cell line has unique properties compared to normal cells (which are mortal) as these cells reproduce indefinitely (continuously) under specific essential nutrition and environmental conditions. The HeLa cell line, collected in 1951 in Baltimore, is still growing in many labs across the globe and continues to be a major resource and an invaluable medical asset to present-day research.

When Henrietta was just four years old, her mother, Eliza, died of pregnancy-related complications. Afterward, she moved to Clover, a small village in southern Virginia, with her father into a log cabin that had been the slave’s headquarters on a tobacco plantation. In 1941, Henrietta married her cousin David Lacks. Due to the Second World War associated financial crisis, the tobacco industry fell, and tobacco farmers were under a huge financial burden. Therefore, they moved to Baltimore, Maryland, to seek a better future. After 10 years of stay in Baltimore, she was diagnosed with cancer. In January 1951, when she was just 30 years old and a mother of five kids, she experienced unusual bleeding and tremendous pain in her uterus. Later, Henrietta was diagnosed with cervical cancer at Johns Hopkins Hospital, where she was admitted and administered chemo and radiotherapy.

During her stay at Johns Hopkins Hospital, her physician Howard W. Jones took a cervical biopsy without her consent and sent a sample of the tissue to Dr. George Otto Gey’s tissue and cell culture lab to study the behavior of these cells and response to radiation therapy. Dr. Gey isolated the cells from her tumor tissue and cultured them in a nutrient media. These cells multiplied quickly and grew rapidly. As it turned out, the cells did not die for many cell division cycles. In fact, they were doubling at a phenomenal rate. They were undergoing continuous division without stopping or undergoing any senescence or death. Although these weren’t the first known and reported human cells to be scientifically grown in a cell culture lab, this was the first time they survived more than a few weeks. Commonly, normal healthy human
cells would divide a few times and stop dividing after some time and die off quickly before any decent scientific and experimental studies could be done using them for quite a long time. But these cells from Henrietta Lacks, due to their unique properties, just kept on dividing for a long time and many generations without dying, just so long as they were fed the right mix of essential nutrients in cell culture media for them to grow. Unlike most normal human cells, HeLa cells possessed a special property: their cancer-specific immortal nature. Now, we have many immortal cancer cell lines and even artificially generated normal immortal cell lines. However, back then, the HeLa cell line was the only available immortal human cell line. Due to their immortal nature, these cells helped in many major medical breakthroughs and landmark discoveries and allowed researchers to conduct innumerable experiments on these immortal human cells (in vitro) outside the human body. Later, Dr. George Otto Gey provided these cells to many researchers and started culturing them to perform many sorts of cell culture studies using these cells.

In recent years, the usage of HeLa cells has sparked debate over bioethics and consent practices. Henrietta had not given permission for the cells to be harvested, and her family had no idea that it had happened or that scientists were still using the cells. Henrietta’s family was never compensated for the patents or profits that resulted from the HeLa cell line’s widespread distribution and use worldwide. The genome of a HeLa cell line was sequenced and published by German scientists, which could reveal sensitive information about Henrietta Lacks’ successors, such as their disease risks. After protests from the Lacks family, scientists, bioethicists, and others, the HeLa genome sequence was removed from the public database. Henrietta’s legacy is becoming more widely recognized, and two Lacks family members are now on a committee that decides which scientists can use HeLa cells. For the first time, any NIH-funded HeLa cell research must be approved by a board that includes members of the Lacks family before being published.

Until now, HeLa cells were the most widely used human cell line
in modern biological research as well as in cell biology, and they played a critical and pivotal role in many landmark biomedical breakthroughs, including the current generation—'omics' gene revolution—from genes to genomics and transcriptomics, from proteomics to now metabolomics. Over the past several decades, the HeLa cell line has been used in various research studies, and they have also been used in the development of polio vaccines by Jonas Salk. Poliovirus could be grown in HeLa cells in large numbers to help researchers better understand how poliovirus affects cells. This data paved the way for the eventual development of a polio vaccine. They have also been used to study various cancers and viral diseases, including human immunodeficiency virus (HIV) and human papillomavirus (HPV). Scientists discovered that HeLa cells are resistant to HIV infection in the early stages of the AIDS epidemic. Researchers learned the details of how HIV infection works using this data. This knowledge was then used to aid drug development to limit HIV’s spread. These cells were also highly used across the globe to study the effects of different types of radiation. They were also used in various drug screening, design, and developmental studies, and therapeutics.

More than 75,500 research studies have been reported and articles published experimentally involving the HeLa cells. At least two prestigious Noble Prizes have been awarded for major biological research involving these cells. This includes the landmark discovery of the human papillomavirus (HPV) and its role in cervical cancer initiation, development, and progression by Harald Zur Hausen in 2008, and other landmark discoveries elucidating the role of telomerase enzyme in the prevention of chromosomal degradation by veteran scientists Elizabeth Blackburn, Carol Greider, and Jack Szostak in 2009.

After the release of a very famous science-based biography book entitled *The Immortal Life of Henrietta Lacks* in 2010 by an American professional science writer named Rebecca Skloot, Henrietta Lacks and her immortal cells gained huge popularity. Due to ethical issues (despite after several years of Henrietta’s death), Johns Hopkins and other institutes finally publicly recognized Henrietta
Lacks’s contribution to science and research and acknowledged her great contribution to the welfare of mankind. There was a documentary film (2017) entitled *The Immortal Life of Henrietta Lacks*, which was made into a television movie directed by American playwright and director of theatre and film George C. Wolfe and starring Oprah Winfrey and Rose Byrne. It is known to be loosely based on Rebecca Skloot’s book.

On 01 August 2020, Henrietta Lacks’s family (the Lacks family), their well-wishers, relatives, and friends hosted a virtual symposium in Baltimore to launch a yearlong awareness program ‘Henrietta Lacks Centennial CELLebration – HELA100’ to honor her legacy on the occasion of Henrietta’s 100th birthday. They invited the whole globe to support their humanitarian mission to preserve Henrietta Lacks’ legacy by educating future generation scientists, physicians, and common people about the impact of her great contribution while promoting health integrity, rightness, and social fairness.

On 24 October 2020, the Institute for Clinical and Translational Research (ICTR), a constituent institute of Johns Hopkins University, Baltimore, Maryland, screened a video lecture honoring Henrietta Lacks. The title of the talk was “Henrietta Lacks Memorial Lecture: To Celebrate the Birth Centenary that is 100 years of Henrietta Lacks Life and Legacy”. This symposium was attended by many people, including Lack’s family members, many students, researchers, and academicians. In this honorary symposium, Dr. Daniel Ford, Director of ICTR, gave a speech and explained the importance of HeLa cells during the Covid-19 pandemic.

**Summary**

Even after 69 years of Henrietta’s death and isolation of HeLa cells, many researchers across the globe are continuously using these cells for various research purposes, including Covid-19 research. Therefore, Henrietta Lacks’s contribution to science and biomedical research stays forever with her immortal cells. We

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know that Henrietta Lacks died due to her cervical cancer with great pain, but her immortal cells are serving humanity and saving billions of lives all over the globe, including millions of women who suffer from similar ailments (cervical cancer) that killed her.

Suggested Reading


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