

HENRIETTA LACKS (AUG 1, 1920 – OCT 4, 1951): THE WOMAN AND HER IMMORTAL CELLS

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SUMMARY

The most widely used human cancer cell line was obtained from a young woman, Henrietta Lacks (Aug 01, 1920 – Oct 04, 1951), who was diagnosed with malignant cervical cancer at John's Hopkins. Despite surgery and radiotherapy she died 8 months after the diagnosis was made. Her tissue was harvested during surgery and sent to pathology where they showed unique growth characteristics. They provided, for the first time, human cancer cells that grew successfully outside the body without ageing. The cells became the most widely used cells in human cancer research. These cells were called HeLa cells and their use changed oncology in an unforgettable way. These cells were used in the development of Salk polio vaccines. They have been used in almost every other biomedical specialty where cell cultures are performed, in every country of the World. This is a short history of a poor black woman who died at a young age, unrecognized, but whose cells attained immortality. The benefits of her cells to mankind are unquantifiable, and to date the reason why her cells attained immortality remains unknown.

INTRODUCTION

Cancer is a group of over 100 diseases characterized by uncontrolled growth of abnormal cells that invade and destroy other tissues. Any cell or tissue of the human body has the potential of becoming cancerous. Cancer is the most feared disease known to man and the most puzzling phenomenon known to medical scientists. Over a century of research has gone into trying to understand the mystery posed by cancerous cells but up to now there seems to be no predictable end to the scourge. Many factors (genetic, environmental, diet, and biological) have been associated with risks of developing cancer; however, even the most ideal lifestyle does not offer absolute immunity to cancer. The next victim is as unpredictable as the disease itself.

Cancer is the leading cause of death in Canada and second only to heart disease in the United States. Each year, more than 1.2 million Americans and 132,000 Canadians are diagnosed with cancer, and more than 1,700 people die from the disease each day in the United States and Canada. For reasons not well understood, cancer rates vary by gender, race, and geographic region. For instance, more males have cancer than females, and African Americans are more likely to develop cancer than persons of any other racial and ethnic group in North America. Cancer rates

also vary globally. Alarming, rates are rising rapidly in Nigeria and other African countries.

The last 100 years of cancer research has overshadowed all previous eras. Initially studies were carried out using human and animal models of the disease. Such studies were slow, laborious and cumbersome. Then in 1911 the technique of cell culture was established by Carrel and Burrows. This singular advancement may be considered to rank as the most significant in the history of oncology before the advent of molecular techniques. Using cell cultures it became much easier to study cancer cells; much cheaper and ethically acceptable. These were important steps in the development of oncology as a sub-specialty. The methods of cancer research rapidly diversified and contributed immensely to the growth of other biomedical sub-specialties. However, there was great difficulty in keeping cancer cells from humans alive outside the body, until a young woman with malignant cervical cancer appeared on the scene.

The most important cancer cells used in the in vitro study of cancer were obtained from a young woman who remained anonymous until recently when her contributions to oncology have just started to be recognized. In 1951 a young black woman from

Baltimore, aged 31, presented at John Hopkin's with malignant cervical cancer. Despite radiation and surgery her cancer spread very rapidly and within 8 months (Oct 4, 1951) she was dead. Some of her tissue removed at surgery continued to grow like weed outside her body. The woman's name was Henrietta Lacks, and the cells obtained from her are the famous HeLa cells.

For some unknown reason, Henrietta Lack's cancer cells continued to grow vigorously. The cells did not age; instead, when fed properly, they lived and multiplied indefinitely. Her tissue cell line proved to be immortal. These malignant cells became the first successful human tissue culture cell line in medical history. The cells were grown in a laboratory at Johns Hopkins and distributed widely and freely for scientific research purposes thereafter. The cell lines brought revolutionary changes to cancer research.



Fig 1: Henrietta Lacks

Henrietta Lacks, née **Loretta Pleasant**, was born on August 1, 1920 in Roanoke, Virginia to Eliza (1886–1924) and John Randall Pleasant I (1881–1969). Her family is uncertain how her name changed from Loretta to Henrietta; with Hennie as a nickname. Eliza, her mother, died giving birth to her tenth child in 1924. Henrietta married her first cousin David Lacks (1915 – 2002) on April 10, 1941 and they worked at a tobacco farm. They had five children together.

January 29, 1951 was the first time Henrietta went to Johns Hopkins Hospital. She went there because she felt a lump inside her. It all started when she asked her cousins to feel her belly, asking if they felt the lump

that she did. Her cousins assumed she was pregnant, and they were right. But, after giving birth to her fifth child, Henrietta started bleeding and eventually she was diagnosed with malignant cervical cancer. Howard Jones, her doctor, examined Henrietta and the lump in her cervix. He cut off a small part of the tumor and sent it to the pathology lab. Henrietta had surgery and radiotherapy, but she died 8 months after she was diagnosed with the disease. Henrietta Lacks was buried without a tombstone in a family cemetery in Lackstown. Since then her cells have continued to thrive without aging. The cells from Henrietta's tumor were given to George Gey, he named them HeLa. The reason for HeLa cells' immortality has not been discovered to date, but it is suspected that it may be due to altered telomerase function. There were almost 11,000 patents involving HeLa cells as at 2011. Recognitions for her invaluable contributions to the field of oncology have continued to increase in recent years. In her 2010 book, *The Immortal Life of Henrietta Lacks*, Rebecca Skloot documents the histories of both the HeLa cell line and the Lacks family.

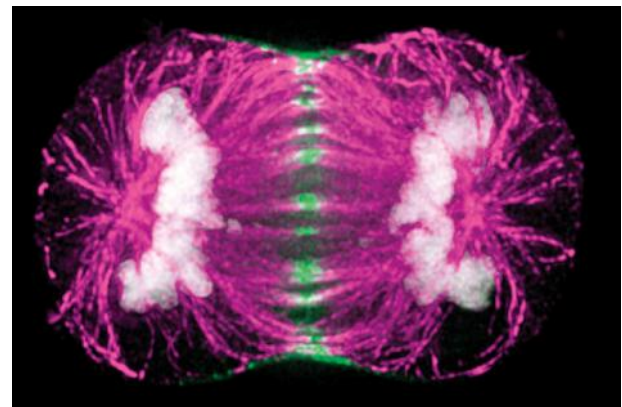


Fig 2: A HeLa Cell dividing into two new cells, central whitish section shows chromosomal alignment.

HeLa cells were used by Jonas Salk to test the first polio vaccine in the 1950s. Since that time, HeLa cells have been used for research into cancer, AIDS, the effects of radiation and toxic substances, gene mapping, evaluation of effects of zero gravity on cells in space, and many other scientific pursuits.

Otto Heinrich Warburg (1883 – 1970) was a German physiological chemist, educated at Berlin and Heidelberg. He was engaged in cancer research and won the Nobel Prize in 1931 for his work on enzymes. Equipment worth billions of dollars has been assembled in the current search for the elusive Higg's Boson. Albert Einstein (1879 – 1955), using pencil and paper, laid the foundation of our current understanding of the universe. Henrietta Lacks cells have revolutionized our understanding of cell biology and

cancer. Nature, created by God, has all the solutions to all problems facing us today; we just have to look closer and harder. The good news is this, Nature's solutions are free.

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