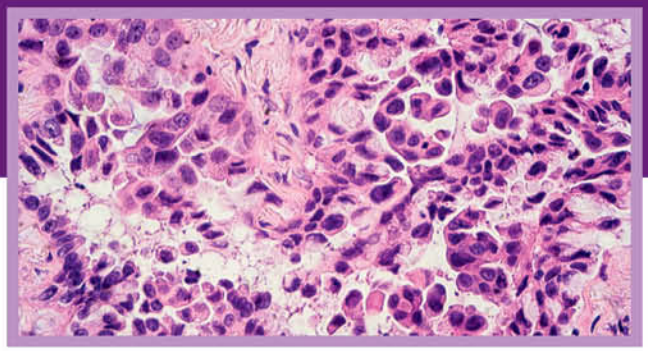
Wars Waged Under the Microscope



# The War Against Cancer

Sarah Eason

Wars Waged Under the Microscope

# The War Against Cancer



Sarah Eason

CRABTREE
PUBLISHING COMPANY
WWW.CRABTREEBOOKS.COM

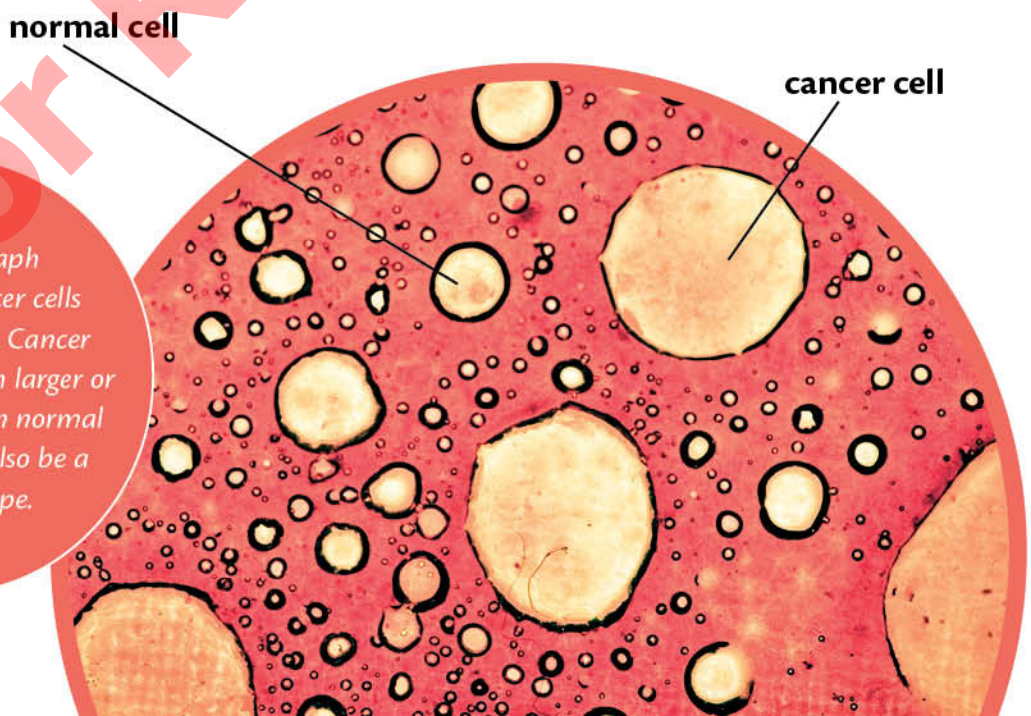
# Contents

# The Enemy

**Cancer is often feared as a deadly disease. However, medical science is constantly searching for solutions in its fight against this tiny enemy. Many breakthroughs in recent years have meant the disease—once always a killer—can now be treated and often cured. None of these breakthroughs would have been possible were it not for powerful microscopes. These tools have allowed scientists to identify and study what would otherwise be impossible to see with the naked eye.**

## What Is Cancer?

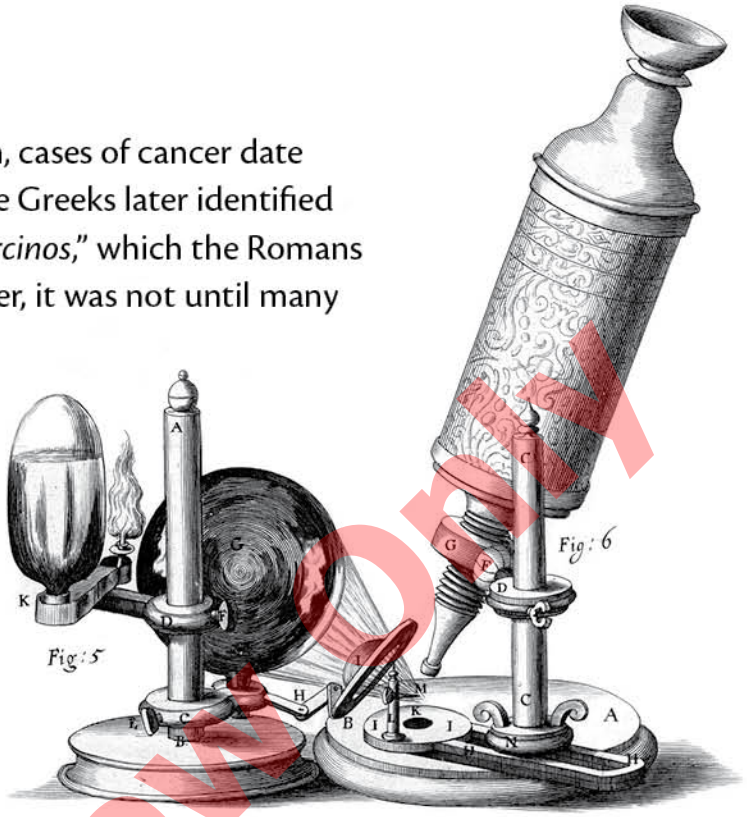
All living things are made up of tiny cells that can be seen only under a microscope. The human body has about 30 trillion cells. "Cancer" is a word given to more than 200 different diseases that are caused when cells in the body start to grow abnormally. Some of the many types of cancer include skin cancer, breast cancer, **bowel** cancer, and lung cancer.




*This photograph shows both cancer cells and normal cells. Cancer cells are often much larger or much smaller than normal cells. They may also be a different shape.*

## The Story of Cancer

The first recorded, or written down, cases of cancer date back to ancient Egyptian times. The Greeks later identified and gave the disease the name "*carcinos*," which the Romans then translated to "cancer." However, it was not until many centuries after the Romans that people discovered cancer takes place inside the body at a **cellular** level, hidden from the naked eye.



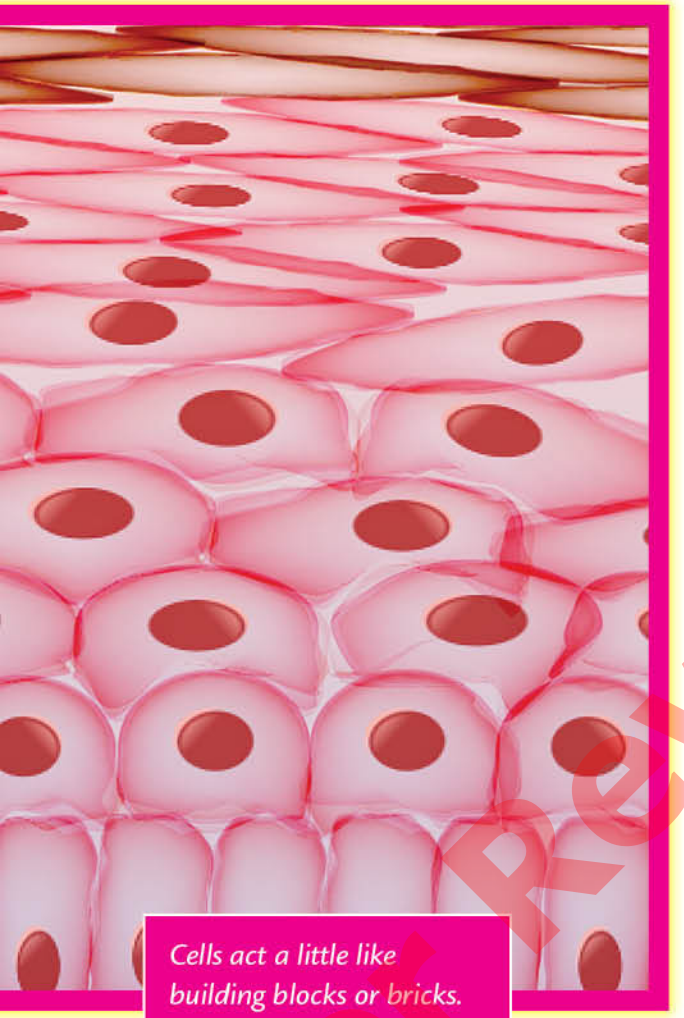

The journey to discovering cells and cancer cells began in the 1590s in Holland, when a man named Hans Janssen and his son Zacharias built a device that could magnify objects, or make them bigger. The Janssen discovery then led to the invention of the microscope, which allowed scientists to study blood and **tissue**, and figure out how they worked. In 1665, English **physicist** Robert Hooke used the microscope to identify curved structures in human tissue. To Hooke, they looked like the rooms monks lived in, known as cells, and he named the structures "cells."

*Hooke studied cells using an early microscope like this one. Modern-day microscopes are so advanced that some can cut tissue with a* ***laser****, to reveal cancer cells within it.*

*"By the help of microscopes, there is nothing so small, as to escape our inquiry; hence there is a new visible world discovered to the understanding."*

***Robert Hooke***

# The Battle Begins



*Cells act a little like building blocks or bricks. They group together to build up body tissues, bones, teeth, nails, blood, **organs**, skin, and every other part of the body. This image shows a block of skin cells.*

**In 1839, almost 200 years after Hooke discovered cells, the German scientists Matthias Schleiden and Theodor Schwann came up with the theory that all living things are made up of cells, and that they act as the "building blocks" for all life. This became known as cell theory.**

## Cells and Cancer

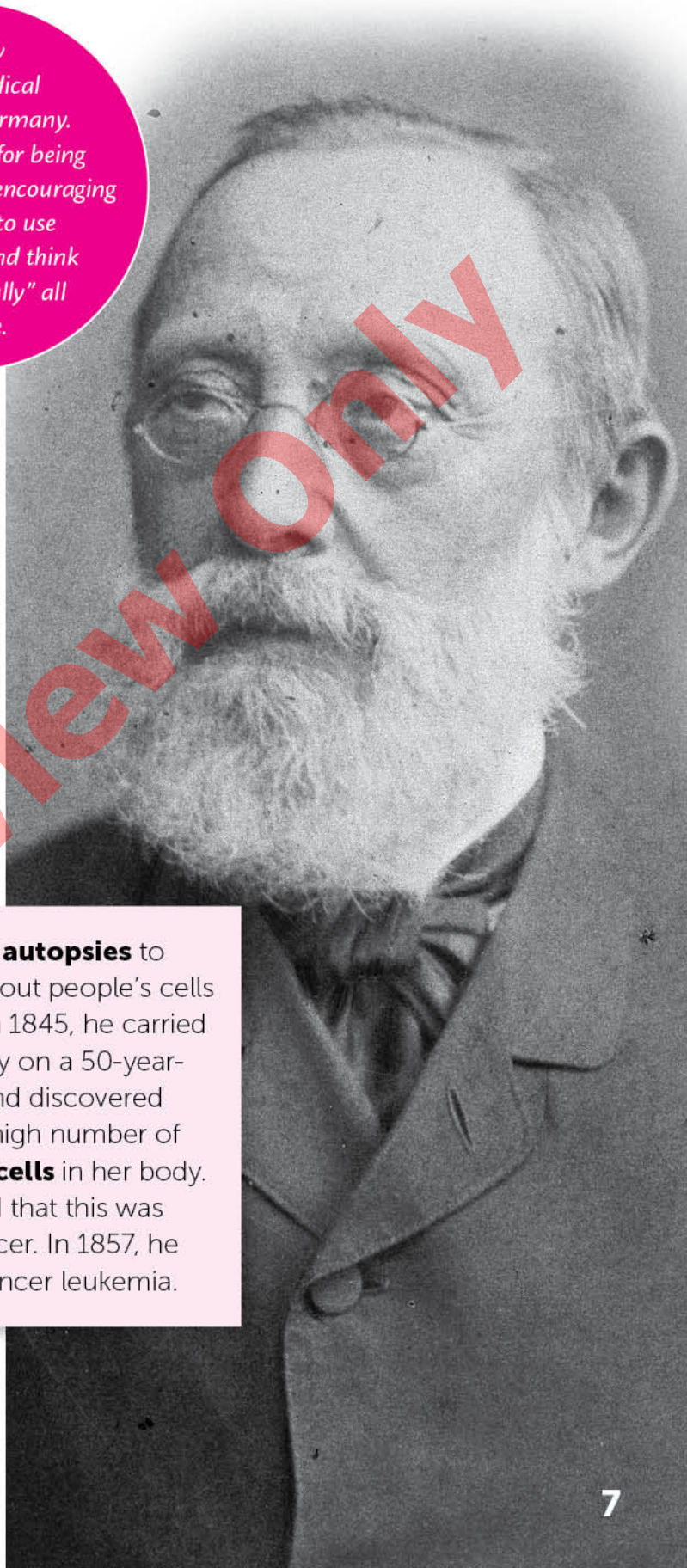
In 1858, the Polish scientist Rudolf Virchow developed cell theory further. He studied cells under the microscope, too, and concluded that all diseases can be traced back to cells. Virchow was the first person to suggest that cancer cells began as healthy cells that then became unhealthy.

Virchow's discoveries forever changed how people investigate and understand cancer. With his realization that all diseases can be traced back to cells, from the late 1800s, scientists began to seriously study diseases and what causes them. This study of diseases and their causes is known as pathology.

## Identifying Cancer

As microscopes became more powerful in the 1900s, scientists were able to use them to study cancer cells in far more detail. Since then, scientists and doctors have discovered more and more about how cells work, and what causes cells to become abnormal in different parts of the body. This has enabled them to identify different types of cancer.

*Virchow taught medical students in Germany. He was known for being passionate about encouraging his students to use microscopes and think "microscopically" all the time.*



### UNDER THE MICROSCOPE

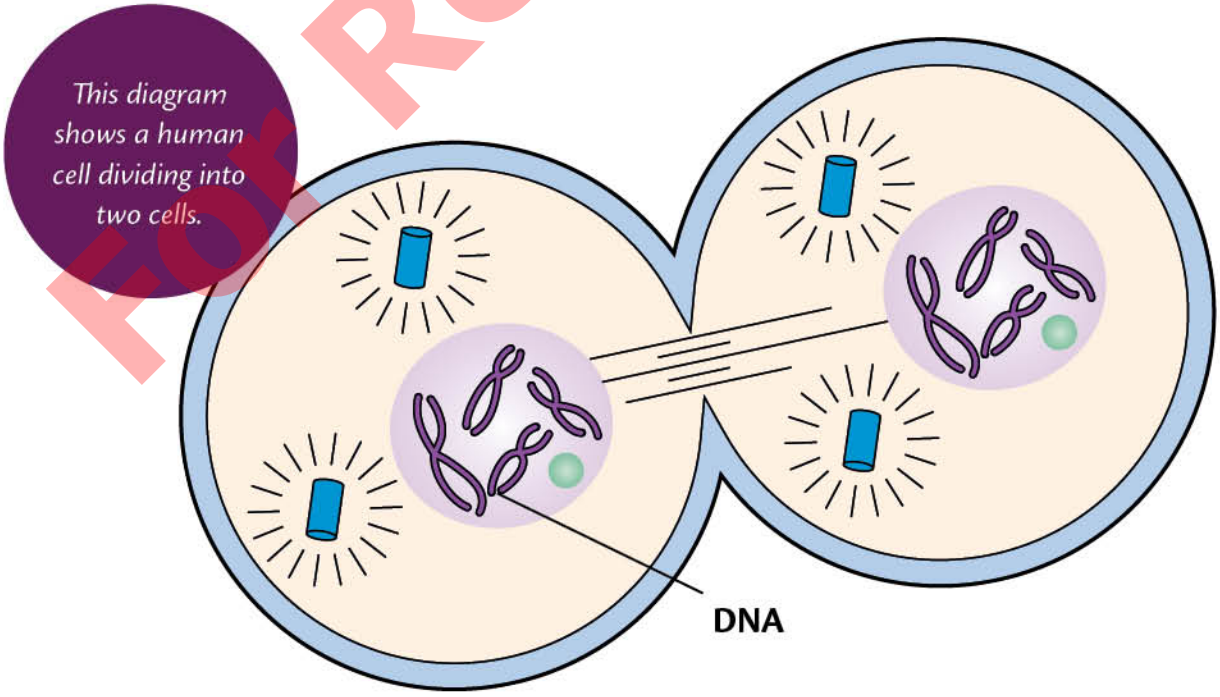
Virchow used **autopsies** to learn more about people's cells and cancer. In 1845, he carried out an autopsy on a 50-year-old woman and discovered an unusually high number of **white blood cells** in her body. He concluded that this was a form of cancer. In 1857, he named the cancer leukemia.

# An Invisible Threat

**With many cancers, the disease is there before the person realizes they are sick. Unlike some illnesses that have more obvious symptoms, or signs of illness, cancer sometimes shows no signs at all.**

## Dividing Cells

When a cell is damaged or dies, the body produces new cells by dividing them into two. Some cells, such as skin cells, are dividing all the time, while others, such as brain cells, hardly ever divide. Each cell has a "control center" called the nucleus. Inside the nucleus are **genes** that contain coded messages in the form of **deoxyribonucleic acid (DNA)**. The genes make sure the cells divide and grow normally and perform the job they are supposed to do to keep a body healthy.



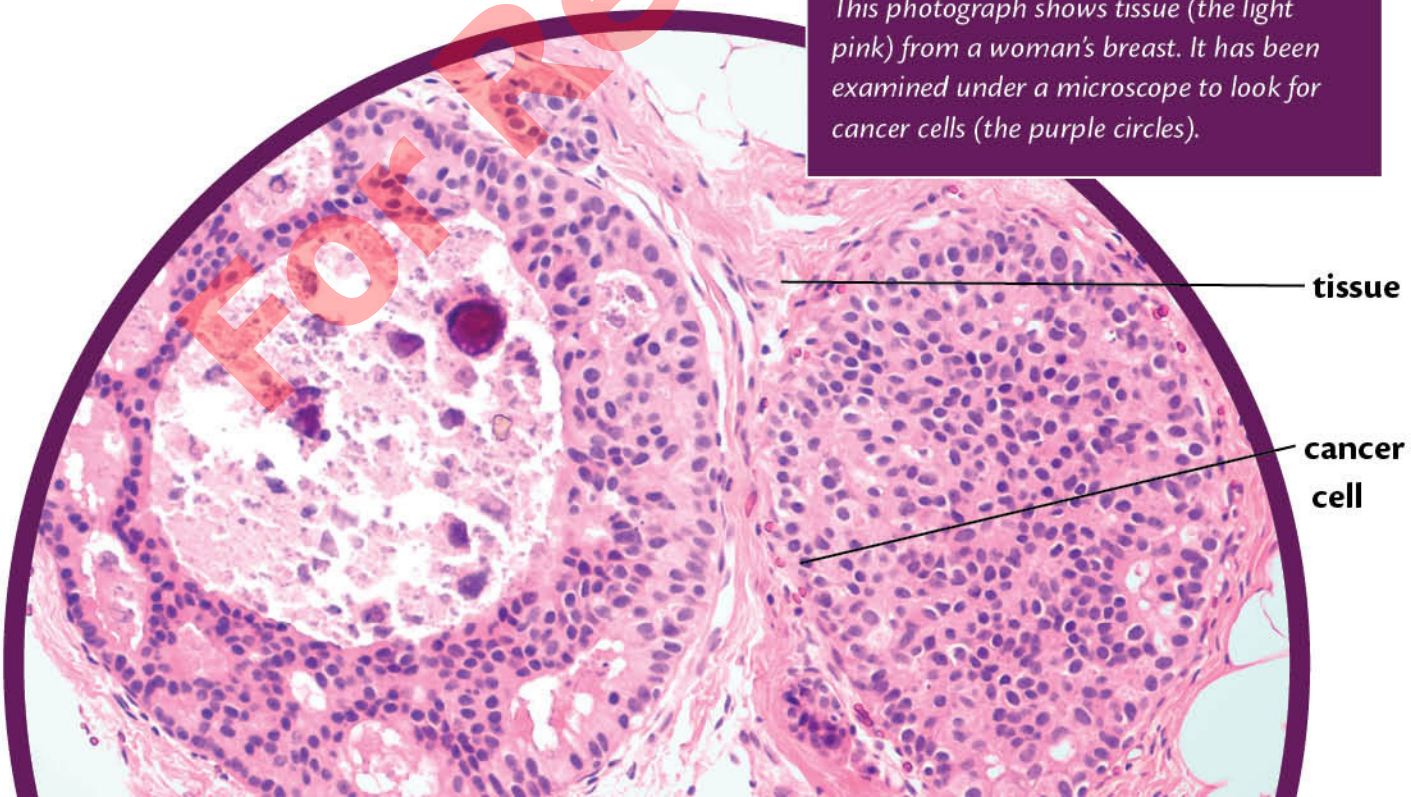

*This diagram shows a human cell dividing into two cells.*

## Hidden Changes

Through microscopy, or studying things under a microscope, scientists have learned a lot about how cells work. When cells divide into two, signals within the cells make sure that a body always has the right type and number of cells. If the signals go wrong because a cell is damaged, it does not divide as it should. The type and number of cells in the body then becomes unbalanced, paving the way for cancer.

## Laboratory Checks

Damaged cells multiply too fast and grow too quickly. In some instances, this can cause a **tumor**. However, not all cancers form tumors. A doctor will carry out a biopsy on the tumor to see if it has cancer cells. In a biopsy, the doctor takes a small slice of tissue, known as a sample, from the tumor. The sample is then sent to a laboratory where it is examined under a microscope for cancer cells. This will show whether the tumor is benign or malignant. Benign means it is not cancerous and the cells will not divide and spread to other parts of the body. Malignant means it is cancerous and the cells can divide and spread to other parts of the body.




*This photograph shows tissue (the light pink) from a woman's breast. It has been examined under a microscope to look for cancer cells (the purple circles).*