

A woman with blonde hair tied back, wearing a white lab coat and yellow gloves, is working in a laboratory. She is holding two test tubes, one orange and one blue, and looking at them intently. The background shows laboratory cabinets with labels 'A1' and '3A'.

Women Who Revolutionized Medicine

by Rhiannon Minogue

Women Who Revolutionized Medicine



Columbus, OH

Photo Credits: Cover, © Holger Winkler/zefa/Corbis; 3, © Holger Winkler/zefa/Corbis; 4, © Bettmann/CORBIS; 5, © Mediscan/Corbis; 6, © Alfred Pasiaka/Photo Researchers, Inc.; 7, © Rick Friedman/Corbis; 8, © Bettmann/CORBIS; 9, © Tim Tadder/Corbis; 10, © Will & Deni McIntyre / Photo Researchers, Inc.; 11, © David H. Wells/CORBIS; 12, © Bettmann/CORBIS; 13, © Ted Spiegel/CORBIS; 14, © Royalty-Free/Corbis; 15, © F. Carter Smith/Sygma/Corbis; **Back cover**, © Holger Winkler/zefa/Corbis.

SRAonline.com



Copyright © 2008 by SRA/McGraw-Hill.

All rights reserved. No part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written consent of The McGraw-Hill Companies, Inc., including, but not limited to, network storage or transmission, or broadcast for distance learning.

Printed in the United States of America.

Send all inquiries to this address:
SRA/McGraw-Hill
4400 Easton Commons
Columbus, OH 43219

ISBN: 978-0-07-617001-2
MHID: 0-07-617001-2

1 2 3 4 5 6 7 8 9 QST 13 12 11 10 09 08 07

The McGraw-Hill Companies

Women Who Have Saved Lives

Imagine a patient going in to see a doctor. The doctor may prescribe certain medicines. In some cases, the doctor may order certain medical tests. Such tests help the doctor diagnose problems and figure out how best to treat those problems. Sometimes surgery is required.

A patient who is feeling sick wants to feel better. The patient probably will not stop to think about who invented the medicine, tests, or surgical techniques used by the doctor. However, every method doctors use to diagnose problems and treat patients was invented or discovered by someone. Without the hard work of those people, the treatments would not exist.

Many of the people who came up with innovative methods of finding and treating disease were women. Many of these women had to break into areas of science that were previously occupied only by men. Thanks to these women, many lives have been improved or saved.



Women have discovered many medical advances.

Marie Sklodowska Curie (1867–1934)

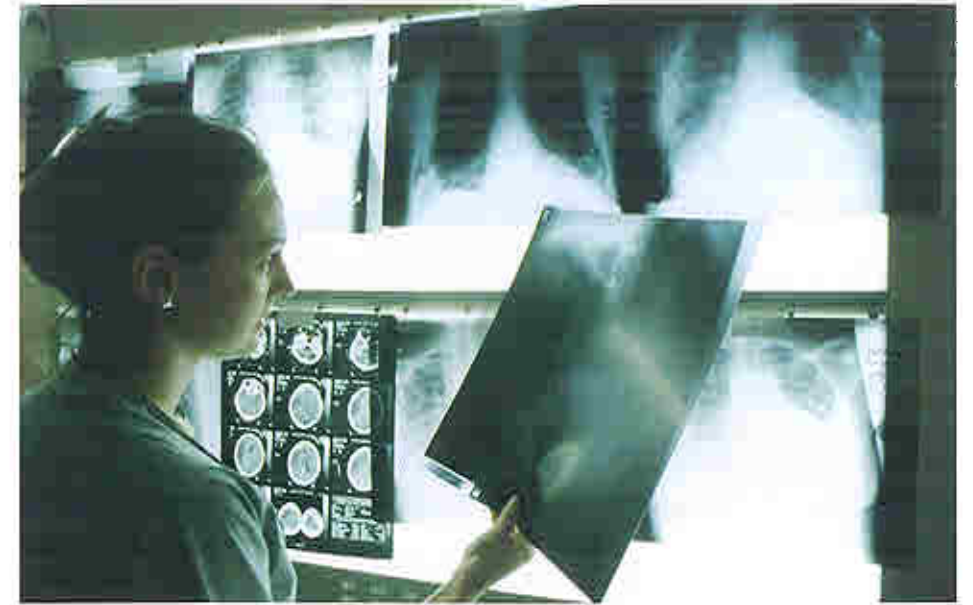
Marie Sklodowska Curie is one of the few women scientists whose name is widely known. There have been many others who are not as well known as Curie. Many people refer to her simply as Marie Curie.

Curie was born in Poland. She was a physicist who worked with her husband, Pierre Curie, in France. Together they studied *radioactivity*, which is the release of certain forms of energy or radiation from matter. The Curies are famous for isolating two metals—radium and polonium—that release this energy. Marie Curie discovered that radioactive matter gives off high-energy radiation because the atoms in the matter change. *Atoms* are the tiny particles that make up all matter.



Before the discovery of radioactivity, scientists did not know that atoms could change in this way. This discovery made it possible for scientists to use this type of radiation for many purposes.

Marie Sklodowska Curie



X-ray images help doctors treat bone injuries.

Marie Curie discovered different ways that radiation could be used to benefit health. Much of her work involved the form of radiation known as x-rays.

You are probably familiar with x-rays. Doctors use x-rays to make pictures of your bones and teeth. Curie's research helped doctors understand how to use these pictures to treat people.

During World War I, Curie invented portable x-ray machines. These machines were used to help injured French soldiers.

Curie also found that the x-rays given off by radium can kill cancer cells. Doctors then began using radium to treat patients with cancer. Today, other cancer treatments are based on Curie's discovery. Curie was the first woman to win a Nobel Prize. In fact, she won two Nobel Prizes. She won one for her physics research and another for her chemistry research. Curie was also the first woman to teach at a famous school in Paris known as the Sorbonne.

Ida Henrietta Hyde (1857–1945)

Ida Henrietta Hyde was an American physiologist. A *physiologist* is a scientist who studies how the body works. Hyde's research helped doctors and scientists understand the cells and tissues of the body.

Hyde did much of her research with crabs, grasshoppers, and other animals in the laboratory. To aid her in her work, she invented a device called the *microelectrode*. This device can be used to measure the electrical activity inside body cells.

Hyde's invention revolutionized the study of nerve tissue. It became possible for researchers to learn about many disorders of the nervous system. Some of these disorders are stroke, epilepsy, and multiple sclerosis. Understanding how nerve cells are affected in these illnesses helps researchers invent new ways to treat people.

Hyde also worked to help scientists better understand how radiation affects the body. Too much of this type of radiation can cause cancer and other health problems. Hyde studied how to use this type of radiation while reducing its health risks.

A nerve cell



Harvard Medical School

Hyde lived at a time when women were not expected to have careers in science. She did not let such ideas stop her from following her dreams.

Hyde studied biology in college. She earned her bachelor's degree in only three years. While a graduate student, she became the first woman researcher at Woods Hole Marine Biological Laboratory in Massachusetts.

A professor at Strasbourg University in France heard about her innovative research. He wanted Hyde to earn a doctoral degree from Strasbourg. However, that school had a rule against enrolling women as students. Instead, Hyde became the first woman to earn a doctoral degree from Heidelberg University in Germany.

After earning her degree, Hyde became the first woman researcher at Harvard Medical School in Massachusetts. In addition, she was the first woman elected to the American Physiological Society.

Hyde's life has inspired many women to become scientists.



Virginia Apgar

Virginia Apgar (1909–1974)

Right after you were born, the doctor probably gave you an Apgar score. An Apgar score is a measure of the health of a newborn baby.

Doctors look at five traits to assign an Apgar score. These are the baby's skin color, heart rate, nerve reflexes, muscle tone, and breathing. Doctors assign a number of 0, 1, or 2 to each trait. Then they add the scores together. A baby with a total score of 7 or greater receives regular care. A baby with a score less than 7 may need special care.

An American doctor named Virginia Apgar invented the Apgar score in 1952. Today doctors all over the world use the Apgar score to help them decide the best ways to care for newborns. The lives of many babies have been saved because of the Apgar score. It is an easy and effective way to care for newborn babies.

Apgar broke through traditional barriers to women in science and medicine. She worked in a field of medicine called *anesthesiology*. Doctors who work in this field determine and measure the drugs used to eliminate pain during surgery.

In 1938 Apgar became the first director of anesthesiology at Columbia-Presbyterian Medical Center in New York City. In 1949 she became the first woman professor at Columbia's College of Physicians and Surgeons.

She thought that many newborns suffered because doctors did not pay enough attention to their needs. Her concern led to her invention of the Apgar score system.

Apgar also wanted to stop birth defects in babies. She became the head of the birth-defects division of the organization now known as the March of Dimes. This is a health agency that supports medical and social services for children and women. She helped raise money for research on birth defects.



Babies receive Apgar tests right after they are born.

Gertrude Belle Elion (1918–1999)

Countless people around the world owe their lives to Gertrude Belle Elion. She was an American biochemist who invented many medicines that the government patented.

Elion worked with biochemist George Herbert Hitchings at a company near New York City. They discovered how the growth of diseased cells differs from the growth of normal cells. They used this discovery to design many drugs. These drugs killed diseased cells without harming normal cells.

Elion and Hitchings invented the first drug that was effective in treating patients with cancer. The drug helped fight *leukemia*, a form of blood cancer.

They also invented a drug that helps organ transplants work well. In *organ transplants*, doctors give a sick person an organ, such as a kidney, from the body of another person. Without the right drugs, the transplanted organ may not survive.

Another drug invented by Elion and Hitchings can heal the sores from diseases like chicken pox.



Gertrude
Belle Elion



Gertrude Belle Elion invented medicines made in factories today.

When Elion was fifteen, her grandfather became sick with cancer. As a result, she decided to become a cancer-fighting chemist. She studied chemistry and graduated from college with the highest possible honors.

When Elion began looking for work as a young chemist, she was fully qualified. She had very good grades from school, and two degrees in science. However, many companies refused to hire her because she was a woman. Some people who were hiring at these companies thought that only men should be chemists.

During World War II, many men had to leave their jobs to fight in the war. Their jobs needed to be filled. Elion was hired for one of these jobs in 1944. She soon proved that she was a first-rate chemist. She worked for the company that hired her for almost forty years.

Elion, Hitchings, and scientist Sir James Whyte Black won a Nobel Prize in 1988 for their research in drug design. In 1991, President George H. W. Bush awarded Elion with the National Medal of Science.



Rosalyn Sussman Yalow

Rosalyn Sussman Yalow (1921–)

Rosalyn Sussman Yalow is an American medical physicist. A *medical physicist* is a scientist who uses physics to do medical research.

Yalow and a scientist named Solomon Berson invented a laboratory technique called *radioimmunoassay* (RIA). This technique is used to measure the amounts of different substances in blood samples.

First, substances in the blood are “tagged” with a radioactive chemical. A special counter detects the energy given off by the chemical. The counter then shows how much of the substance is in the blood. Some RIA systems are portable and fully automated.

RIA is an effective way to measure many kinds of substances in blood. For example, it can show how much insulin is in the blood of a patient with diabetes. *Insulin* helps control how the body uses sugars. Doctors can then use this measurement to help them treat the patient.

Another technique is often used today instead of RIA. This technique is called ELISA. ELISA does not use radioactive chemicals.

A book about Marie Curie inspired Yalow to be a scientist when she was a college student. The book was written by Curie’s daughter Eve. Its title was *Madame Curie: A Biography*.

Yalow graduated from college in 1941. She went on to study physics as a graduate student at the University of Illinois at Urbana-Champaign. She was one of the few female teaching assistants at the university. Yalow earned her doctoral degree in nuclear physics at the university in 1945.

Yalow returned to New York, where she got a job at a veterans’ hospital. She was named assistant chief of the hospital’s radioisotope service in 1950. A *radioisotope* is a radioactive form of an element. She began working with Solomon Berson at this hospital. The two scientists worked together for twenty-two years.

Yalow became director of the Berson Research Laboratory at the hospital in 1973. In 1977 she won a Nobel Prize for her research.



A Nobel Prize medal

Patricia E. Bath (1942–)

Patricia E. Bath is an American eye doctor and surgeon. Bath has dedicated her life to treating patients with blindness and to preventing blindness. She has restored sight to many people who have lost it through illness or injury.

Some people lose their sight as a result of cataracts. A *cataract* is a cloudy patch that forms on the lens of an eye. It can be caused by age, illness, or injury. Some babies are born with cataracts. Cataracts can be so large that they cause complete blindness.

Bath invented a device that the government patented. This device destroys cataracts with a laser. Surgeons can use this innovative device to painlessly destroy cataracts in blind patients. The patients can then see again.

Bath's laser technique was a great improvement over the traditional technique for treating patients. Using the older technique, a surgeon would use a grinding device to scrape away at the cataract. Bath's laser removes cataracts faster and with greater accuracy than the old method.

Patricia E. Bath is an innovative eye doctor.



Bath pioneered methods for treating patients in remote areas.

Bath has been a trailblazer for African American women. She was the first African American woman to get a patent for a medical invention. She was the first African American woman surgeon at the University of California at Los Angeles (UCLA) Medical Center. She was the first woman to teach at the UCLA Jules Stein Eye Institute.

Bath also helped found the American Institute for the Prevention of Blindness. This organization seeks to protect and restore sight. It is most concerned with making eye care available to people who normally do not get it.

One way that Bath brings eye care to people is by using computers to see and talk with patients. This method makes it possible to treat sick people who live in places where there is little access to health care.

Bath has inspired many young African American women to become doctors. Who knows what great treatments and cures these women will invent?

Vocabulary

innovative (in' ō vā tæv) (page 3) *adj.* Creative.

portable (por' tə bəl) (page 5) *adj.* Able to be carried.

inspired (in spird') (page 7) *v.* Past tense of **inspire**: To motivate someone in a positive way.

effective (ē fek' tæv) (page 8) *adj.* Productive; useful.

traditional (trə di' shə nəl) (page 9) *adj.* Possessing certain values or practicing customs that are long-held within one's family or another social group.

patented (pa' tən dəd) (page 10) *v.* Past tense of **patent**: To grant rights or permission to an inventor.

automated (ôt' ə mā təd) (page 12) *adj.* Able to work without the help of humans.

Comprehension Focus: Drawing Conclusions

1. Would you conclude that Ida Henrietta Hyde's education and career were affected by attitudes toward women at the time? Explain.
2. Would you conclude that Gertrude Belle Elion's personal background influenced her contributions to medicine? Explain.

The logo features a stylized yellow book icon with rays emanating from the top, positioned above the text "LEVELED READERS" which is set within a yellow banner.

LEVELED READERS

Many women have been at the forefront of medical research. People around the world owe their lives to these women who revolutionized medicine.



SRAonline.com

The McGraw-Hill Companies

ISBN: 978-0-07-617001-2
MHID: 0-07-617001-2



**Mc
Graw
Hill** **SRA**