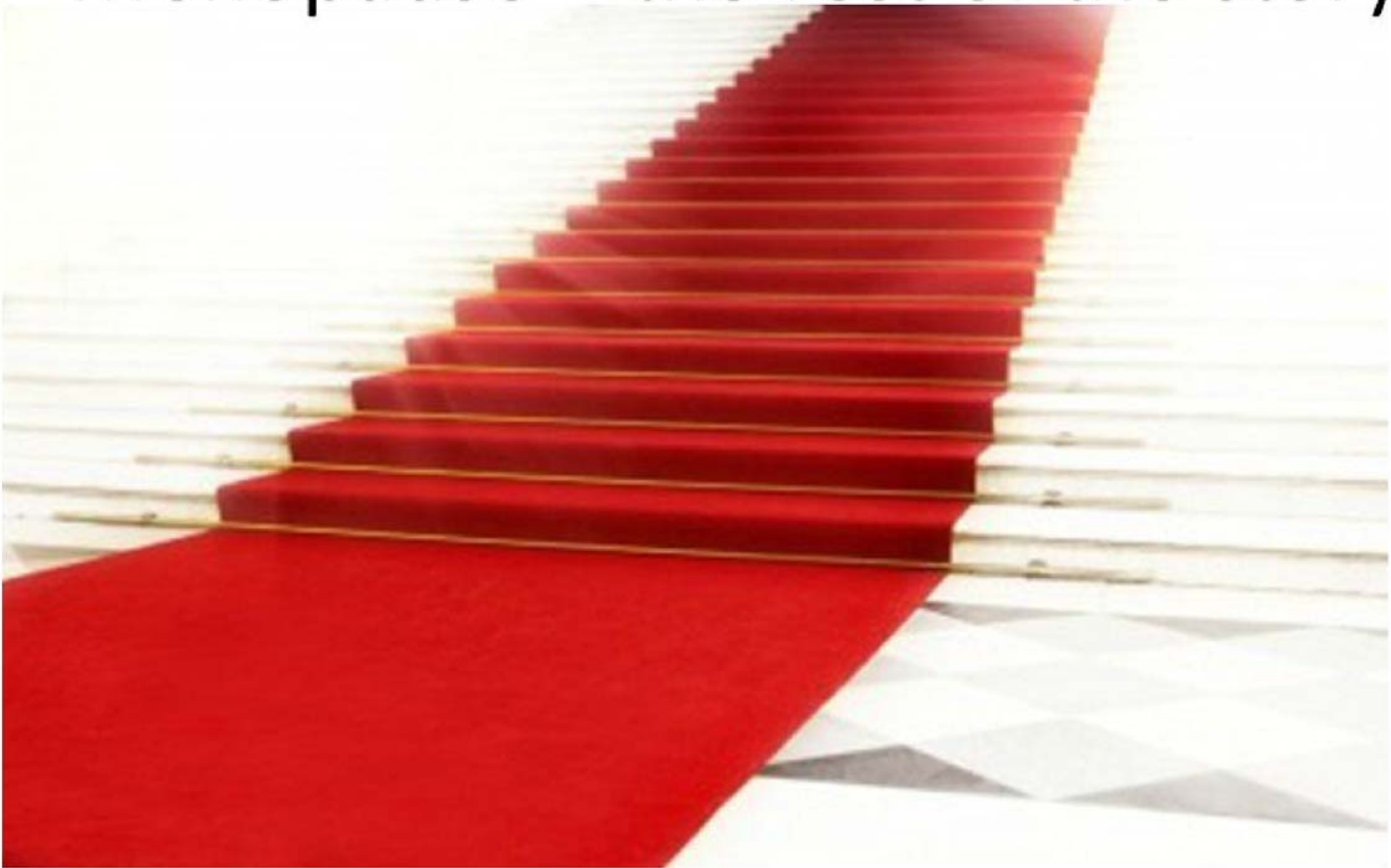


# Menopause – the rest of the story



**As we noted** in last month's column on menopause, many women become outstanding in their field during this special time in their lives. In this column, we highlight four Nobel Laureates in the sciences: Gerty Cori, Maria Goeppert-Mayer, Barbara McClintock, and Gertrude Elion. Nobel Prizes are awarded for outstanding achievements in physics, chemistry, medicine, literature, and peace. For many of these recipients, the prize comes in the final third of their lives, recognizing a lifetime of accomplishments. These four women's efforts have made our lives better.



**Gerty Cori** received the Nobel Prize in Physiology or Medicine in 1947. She was the first American woman and the third woman to receive a Nobel Prize in the sciences. Like both scientific women Nobel Laureates before her – Marie Curie and her daughter, Irene Joliot-Curie – Cori's research partner and co-recipient was her husband, Carl Ferdinand Cori.

Gerty Cori was educated in Prague and received her M.D. there. After immigrating to the U.S., she and Carl focused on two major areas of biochemistry: sugar metabolism (how sugars supply energy to the body) and glycogen storage disorders. The Cori's work was so fundamental to understanding how the body processes food into energy that it can use, that the process is named after them: the Cori cycle. The Cori cycle

fundamentally changed the way that scientists thought about reactions in the human body. Their laboratory gained such an international reputation that no less than five Nobel Laureates spent part of their careers in the Cori's laboratory working with them on various scientific issues.

Later in her career, Gerty Cori worked on the inherited, rare, childhood diseases known as glycogen storage disorders. She demonstrated that these disorders are caused by disruptions in sugar metabolism. Her work convinced other researchers in biomedicine that understanding the structure and roles of enzymes could be critical to the understanding of the diseases themselves. In this way, she again opened up new fields of study for other scientists.



In 1963, **Maria Goeppert-Mayer** became the first U.S. woman to receive the Nobel Prize in Physics. Her interest was in the structure of atoms. Recognition came after many years when she had worked as a “volunteer” – her husband was a chemistry professor and due to nepotism rules, both spouses could not be hired with pay. After volunteering at Johns Hopkins University, she became a lecturer in chemistry at Columbia University. There, she met Enrico Fermi, Nobel Laureate in Physics in recognition for his work on radioactivity. With Fermi, she became one of the nuclear physicists on the Manhattan Project – that developed the atomic bomb used during World War II.

After World War II, Goeppert-Mayer moved to Chicago to be a senior physicist at Argonne National Laboratory – the first time she had a position on equal footing with her colleagues. At Argonne, Goeppert-Mayer began studying unusually stable elements and found patterns that she called “magic numbers”. From these, she developed the theory of the shell model for the nucleus in conjunction with spin-orbit coupling. For this theory, she was awarded the Nobel Prize. One of the headlines when she received the prize was “San Diego Mother Receives Nobel Prize.”



Twenty years later, in 1983, **Barbara McClintock** became the first woman to receive an un-shared Nobel Prize in Physiology or Medicine for her work on mobile genetic systems (sometimes referred to as jumping genes). Her discovery refers to the ability of genes to change positions on the chromosome. This theory would eventually be used to explain inheritance patterns that lie outside of strict Mendelian law based on simple ratios of dominant and recessive genes.

McClintock's work had originally been published in 1950,

but was not well received by the scientific community. In fact, it was not until the 1970s, when technology had been developed that enabled scientists to study at the molecular rather than the cellular level, that her theories became accepted. McClintock continued to work until age 90. She has been featured on a U.S. postage stamp.



The final scientist we would like to highlight in this article is **Gertrude Elion**. She decided to become a cancer researcher when she watched her beloved grandfather die a painful death from stomach cancer, when she was in high school. When she graduated from college in 1937 at age 19, no laboratory would hire her as a chemist because she was a woman. Thus, she began secretarial school but was able to obtain a one-semester opportunity to teach biochemistry to nurses and was then able to obtain a position in a friend's lab. While working as a science teacher in the public schools and living at home, she earned her M.S. degree in chemistry from New York University. Again, she had difficulty finding a job when she finished graduate school.

For Elion, World War II provided an opportunity for a job – since men were not available, women were hired. Elion was hired in the lab of George Herbert Hitchings, a biochemist with Burroughs Wellcome. Their working relationship started in 1944 and continued for the rest of their careers. In 1988, they shared the Nobel Prize for Physiology or Medicine for their discoveries of important principles for drug treatment.







By 1951, Elion discovered the first effective compound against childhood leukemia. Eventually, this drug used in combination with other drugs and radiation treatment would make leukemia one of the most curable cancers. Knowledge of this drug led to the development of the first immunosuppressant drug which prevents rejection of human kidneys and treats rheumatoid arthritis. Elion also worked on treatments for gout, malaria, and urinary and respiratory tract infections. She was also instrumental in the development of a drug used to treat herpes, shingles, and chicken pox and AZT, a drug used to treat AIDS. Elion said “The Nobel Prize is fine, but the drugs I’ve developed are rewards in themselves.”

We salute these women, all of whom have been inducted into the National Women’s Hall of Fame, for their amazing accomplishments and the benefits we have derived from their passion, determination, and persistence.

**Charlotte S. Waisman**, PhD, co-author of *Her Story: A Timeline of the Women Who Changed America* (HarperCollins), is a national champion and advocate for women as a professor and keynote speaker. As an executive coach, Waisman coauthored *50 Activities for Developing Leaders* and *The Leadership Training Activity Book*. She is a principal with a consulting company specializing in leadership and workforce excellence initiatives.

**Jill S. Tietjen**, PE, co-author of *Her Story: A Timeline of the Women Who Changed America* (HarperCollins), is an author, speaker and electrical engineer. Her other books include the *Setting the Record Straight* series. Tietjen is a top historian on scientific and technical women. She is President/CEO of *Technically Speaking*, a consulting company that specializes in improving career opportunities for women in technology.

Sign up for our ENewsletter at [www.herstoryatimeline.com](http://www.herstoryatimeline.com)