

Gertrude Elion's Journey into Science

"And I actually watched him die in the hospital, going through a lot of pain, and thinking that certainly there must be a way to cure this disease. But I didn't see how a doctor could cure cancer unless he had some medicine to do it with. So, how would you make a medicine? Well, you had to be a chemist. And I suddenly thought, why not? Why can't I do it? Just as simple as that: why not?"

Gertrude B. Elion

If you have ever seen a loved one suffer, or if you have ever visited them in hospital – lying frail and fragile – then you will know exactly how much it kills you to see them aching and hurting. If you have ever been in that situation, then you will also recall the sickening feeling of inadequacy at not being able to do more to help, not having the power to rid them of pain. Not being able to save their life. Well, if you have been in such a situation, then you will understand, more than anyone else, how Gertrude Elion felt.

The sudden death of Elion's grandfather

Gertrude Elion was born on January the 23rd, 1918 in New York City to immigrant parents from Eastern Europe. When Gertrude was three, her grandfather came to America to escape WW2. He often took her on walks and his presence had a tremendous impact on Gertrude. As a child, she had an "insatiable thirst for knowledge" which meant that Elion couldn't decide which major to specialise in – she loved all her subjects equally. At the time when the 15 year-old Elion was pondering on this thought, she was struck with tragedy; her dearly-loved grandfather was incredibly ill with stomach cancer. She witnessed his death in hospital after all the best efforts of doctors and the powers of medicine had failed to save his life. Her grandfather had died painfully and the young Gertrude felt his pain as if it were her own; she decided that no one should suffer as much.

Gertrude Elion channelled her sense of loss into a newfound determination: the girl who couldn't decide what to major in, now had her heart firmly set on science. Elion later entered Hunter College in 1933 and decided to major in chemistry. As well as the death of her grandfather, Elion was also influenced by her mother, who was a housewife, and as a result, Elion strived to achieve what her mother could only dream of. Thus, began Gertrude Elion's journey into a man's world, the Pandora's box of obstacles had been unlocked.

Challenges

Don't be afraid of hard work. Nothing worthwhile comes easily. Don't let others discourage you or tell you that you can't do it. In my day, I was told women didn't go into chemistry. I saw no reason why we couldn't. – Gertrude Elion

It was the time of the stock-market crash of 1929 and Elion's family had suffered hugely. As a result, Elion found it hard to get a good education and even harder to find a suitable job. The fact that she was a woman didn't help either. It is even true that Elion applied to 15 graduate schools and was rejected by them all! None of these troubles phased this inspirational woman, she eventually took up a role as an unpaid volunteer in a chemistry lab. Times were troublesome but Elion's hunger for knowledge pushed her to persevere.

More tragedy

I had fallen in love with a young man..., and we were planning to get married. And then he died of subacute bacterial endocarditis... Two years later with the advent of penicillin, he would have been saved. It reinforced in my mind the importance of scientific discovery... – Gertrude Elion

Elion had now recovered from the death of her grandfather but she would receive another brutal reminder of the inadequacy of medical treatment. Her fiancé, Leonard Carter, dies. The killer was a simple bacterial infection, for which a treatment would be found two years later. Gertrude Elion understood how preventable his death could have been if medical research had been accelerated only slightly and now she knew, more than ever, how important the roles of people like herself were in saving hundreds and thousands of lives. Although Leonard Carter's death left an

irreparable hole in Elion's heart – she never married again – Elion channelled her passion and commitment into her work. Here was a woman who never stopped dreaming.

Elion and George Hitchings

In 1944, Elion entered a partnership that would change her life and all of ours forever. She was employed by George Hitchings and Burroughs-Wellcome Institute (later to become Glaxo Smith Kline). Here, Elion flourished; she helped to discover a wide array of drugs, some of which you may have heard of or even seen on the shelves of your local pharmacy.

In 1950, Elion developed a drug called 6-MP which would treat leukaemia. In 1952, pyrimethamine was developed which was the first effective treatment against malaria (a deadly disease carried by female Anopheles mosquitos which affects millions of people each year). She then helped in the discovery of Imuran in 1961 which would be used in transplant surgeries and would consequently improve survival rates and make over 100, 000 transplants successful. Elion's work was not finished and her pharmaceutical accomplishments could not be slowed down. In 1963, Zylprim was developed to treat gout and 14 years later, Zovirax (acyclovir) was developed to treat shingles and herpes. Even though Elion retired aged 65, her legacy continued in her lab and, using her equipment and methodology, AZT – the first treatment for AIDS – was developed.

In 41 years Elion accomplished all of this, in just 41 years she improved the lives of millions of people – men, women, children and the elderly. From the impoverished regions of sub-Saharan Africa to the wealthy upper class of America, Elion's drugs and her unfailing dedication to science have improved countless lives. Her treatments have meant that operations and transplant surgeries are no longer the dreaded events that they used to be, people can now recover from illnesses with strength and many more years of precious life left. Those who have previously been sent to death's door, can now turn back in good health and look forward to a happy, healthy future.

The Nobel Prize and many more accomplishments

The Nobel Prize is fine, but the drugs I've developed are rewards in themselves. – **Gertrude Elion**

Of course, Elion's work would not go unnoticed – it demanded attention and praise even though Elion herself was as humble and courteous as ever. In 1988, Elion received a joyous phone call, she was to receive the Nobel Prize in Physiology or Medicine. This was the pinnacle of Elion's career. This prize acknowledged Elion's genius and marked her contributions to medicine and to the well-being of all people who are ill and suffering. Despite being catapulted into the public eye and rising to a whole new level of fame, Elion retained her original unpolluted love for science and she never took her achievements for granted.

Inevitably, Elion went on to receive a myriad of other awards and accolades including: The National Medal of Sciences in 1991, elected into the National Academy of Sciences in 1990, being the first woman to be inducted into the National Inventors Hall of Fame in 1991 and received the lifetime achievement award from the Lemelston-MIT Prize Program.

A scientific hero

Gertrude Elion embarked on her scientific journey as a 15 year-old girl – broken by the loss of her grand-father and driven to alleviate others of that same pain. The dream she enkindled in that hospital remained with her throughout her life, like a flame refusing to be put out, only growing brighter and stronger with time.

Elion is a role model for all the women of science, she was brave in the face of discrimination and she never took no for an answer. Her undeterred love for her work and her ambition to overcome all challenges thrown in her path should be of an example to all the young girls and boys alike who aspire to succeed in any scientific field.

This leads us, inevitably, to the question of what if? What if Gertrude Elion's grandfather had not died of stomach cancer? What if Elion chose another career path? How many lives would have been lost without Elion's drugs? How far behind would modern medicine be?