

Frederick Banting

Charles Best

Medical Researchers: Discovery of Insulin



HARRY
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The discovery of insulin brought hope to millions of diabetes sufferers, including kings, great statesmen, scientists, famous actors, writers, doctors — people from virtually all walks of life.

Dr. Frederick Banting and his assistant Charles Best, working in a borrowed lab at the University of Toronto in the summer of 1921, discovered that the hormone insulin, a secretion of the pancreas, could be successfully used to treat diabetes. This was one of the most important medical discoveries of the twentieth century! The discovery of insulin was not vague, esoteric, or of questionable value to society. Its impact was clear, practical, and immediate. There were literally millions of people all over the world who suffered from diabetes, and who could previously only look forward to a life with a progressive illness that usually led to an early death. Banting and Best's discovery of insulin brought hope to all these sufferers, including kings, great statesmen, scientists, famous actors, writers, doctors — people from virtually all walks of life. Banting was lionized in the press and heaped with honours from all over the world. He received the Nobel Prize for Medicine in 1923 when he was only thirty-two years old. The Nobel Prizes had only been introduced and awarded since 1901, and Banting was the first Canadian to receive one. As a result of his Nobel Prize, he went from obscurity to world fame, from small-town doctor to world-renowned scientist, and he became a national hero overnight. He also became a living legend and it was said that he spent the rest of his relatively short life trying to live up to the legend.

Frederick Banting was born on November 19, 1891, on a farm near Alliston, Ontario. He attended school in Alliston, where he had an average but undistinguished academic career, but he excelled at athletics, was good at art, and was a hard-working determined student.

After graduating from high school, Banting entered Divinity College to satisfy his parents' wishes. He soon realized that medicine was his real interest, and he transferred into the medical program. When he graduated as a doctor in 1916, World War I was at its peak, and he felt compelled to do his part for his country. He enlisted in the Royal Canadian Army medical corps and was sent to Europe to work as a military surgeon in a rear field hospital. However, he was not satisfied and wanted to do more, so he

transferred to the front at Cambrai, France. Under continuing enemy fire, the field medics treated the most severely wounded troops before they were transferred to the hospitals behind the lines. Banting displayed great bravery in his field duties and was recommended for the King's Cross, which was not granted. He was later wounded by shrapnel, which severed an artery in his right arm. Even though his arm became badly infected, he refused to have it amputated because he knew that would probably end his medical career. He was awarded the King's Cross this time, and the award was pinned on him personally by King George V.

After the war, he served for a year as resident surgeon at Toronto's Hospital for Sick Children. But for a young doctor just out of the army, earning a decent living was a practical necessity. So Banting opened a small practice in London, Ontario. He also lectured at the Medical School of the University of Western Ontario, and conducted research in neurophysiology under Dr. F.R. Miller.

One day while Banting was preparing a lecture on the pancreas, he read a paper by Moses Barron in a medical journal. The article described changes that occurred in the pancreatic juices when the pancreatic duct was blocked by gallstones. Banting was intrigued by the possibility that something that occurred in this process might hold the secret to diabetes — a disease that had distressed Banting since his schooldays, when a young classmate slowly wasted away from the disease before his eyes and finally died in her teens.

Diabetes was first recorded by Roman physicians almost 2000 years ago. It is a debilitating disease that leaves its victims listless and suffering from progressive weight loss. The only treatment in 1920 was a strict diet that was generally incapable of sustaining a healthy body. Thus diabetes was often a death sentence for its victims.

The moment of genius for Banting came when he awoke from his sleep that night with the Barron article still on his mind. He wrote himself a note: "Tie off pancreas ducts of dogs. Wait six or eight weeks. Remove and extract." It was generally known that the pancreas was the control centre for diabetes. Banting's focus was on the Islets of Langerhans, a part of the pancreas that clearly had a separate and distinct function of its own. He believed that if the hormone secretion from the Islets of Langerhans could be isolated, it might be the control substance for diabetes.

He now had the idea, but he had neither a lab nor the funds for the necessary research. Miller advised Banting that Dr. John MacLeod of the University of Toronto had the facilities and that he might be interested in helping Banting. Banting arranged a meeting with MacLeod and took the long trip to Toronto to explain his proposal to him. MacLeod was not much impressed, and Banting went away empty-handed.

However, Banting's determination kept him focused on his goal. After additional research and with a more elaborate written proposal, he again met with MacLeod, who was somewhat more impressed this time. He told Banting that he would be in Scotland for the summer, and that Banting could have the use of a small lab, ten dogs, and one of his assistants to work out his proposal in experimental form. Since Banting's medical practice in London was not large enough to keep him home, he immediately accepted MacLeod's offer. The assistant assigned to Banting was Charles Best, at the time a physiology and biochemistry student of Dr. MacLeod. Thus was formed the team that unlocked the secrets of the pancreas and discovered insulin.

Their experiments followed the inspired midnight note that Banting had written to himself. By tying off the pancreatic ducts of several of the dogs for seven weeks, Banting and Best destroyed the other functions of the pancreas; however, the Islets of Langerhans continued to produce insulin. They then extracted and injected the insulin into a diabetic dog. The dog recovered, and its blood sugar level returned to normal.

When MacLeod returned, he was suitably impressed that the breakthrough had been made and that the discovery of insulin would lead to the successful treatment of diabetes. But much experimental work still had to be done, the processes refined, and the substance purified to make it safe for human use. MacLeod put the full resources of his department at Banting's disposal. Among the "resources" were the services of J.B. Collip, a skilled biochemist, who refined and purified the insulin product.

The first human patient treated with insulin was a fourteen-year-old boy with severe juvenile diabetes. His recovery was remarkable and immediate. Other patients followed, with the same impressive results.

When the discovery of insulin was announced to the world, there was considerable confusion over who had actually discovered it. This happened partly because MacLeod, who was a highly respected doctor and researcher, referred to the discovery in a way that implied that it was his, and that Banting and Best were his assistants.

This misunderstanding was reinforced by media reports in the United States and Europe that attributed the discovery to MacLeod. Banting was justifiably furious over this unnecessary confusion. Finally, after nine months of silence, MacLeod made a public statement clearly attributing the idea to Banting and the discovery to Banting and Best — with valued assistance from MacLeod’s physiology department and the University of Toronto.

Obviously, the product would not have been available to the world so quickly without MacLeod’s recognition of its importance and the help his department provided to Banting and Best. But the discovery was theirs, and theirs alone.

For Banting, the discovery of insulin meant sudden fame, and he was soon showered with honours. Diabetics from all over the world came to Toronto for treatment. Every patient, including the rich and famous, wanted to meet him. Among the many early recipients of insulin were Thomas Edison, H.G. Welles, and King George V.

A grateful Canadian government granted Banting a lifetime annuity. In 1923, he was awarded the Nobel Prize for Medicine along with MacLeod. Banting was again incensed that Charles Best was not included in the honour. Members of the Nobel Committee later admitted privately that Best should have been awarded a share of the prize.

Banting gave half of his prize to Charles Best, and the other half to the Banting Medical Research Foundation. In addition, Banting did not personally patent his discovery, although it would have made him very wealthy. Instead, he turned over his rights to the University of Toronto, which passed the rights for manufacturing insulin to the Medical Research Council of Canada. Banting’s gestures were a measure of the man. In 1934, he was knighted by King George V, and from that point on, although he could use the title “Sir” Frederick Banting, he preferred to be called Doctor or “Chief.”

In 1930, the Banting Institute was opened at the University of Toronto, and Banting’s new department of medical research was housed there. In addition to improving the quality and quantity of insulin, his team carried out research in many other health-related fields, including cancer, lead poisoning in children, silicosis in miners, and polio treatment.

Those who worked closely with Banting knew that he was generally a gentle man, but that he also had a prickly personality and could be subject to fits of rage. On one

occasion, he actually punched out one of his colleagues in the laboratory. His personal life was also turbulent at times, and it became the subject of front-page coverage in the Toronto press. The media had cast him as some kind of god, and now expected him to act like one. Over time, Banting became somewhat reclusive, and he was happiest when he was on one of his periodic painting holidays with his friend, famous Canadian artist A.Y. Jackson.

When World War II started in 1939, Banting became chairman of the National Research Council's Committee on Aviation Medical Research. This was a new field of research, since planes could now fly higher, faster, and farther than ever before. Through this work, he became directly involved with the British Air Ministry, and in the fall of 1939 he went to Britain. Banting also volunteered to serve as a liaison officer with the RCAF (Royal Canadian Air Force) to convey important messages to Britain.

In early 1941, under a cloak of secrecy, he again set out for Britain to discuss his research with British colleagues. His plane took off from Newfoundland on February 21, but soon developed engine trouble and turned back. It crashed in an isolated area only fifteen minutes' flying time from the airport, killing all three passengers, including Frederick Banting. Only the pilot survived to tell of the events before the crash that killed one of Canada's most respected and revered men.

His relatively young age, his great accomplishment, his secret mission and his mysterious death all enhanced the image of some great mythical hero cut down in the prime of life. To Canadian historians that will always remain his image.

And what of Charles Best? He went on to become a highly respected professor at the University of Toronto and, in addition to his teaching, he continued to do original research.



Charles Best