

A Brief History
of the
Discovery of Insulin

by Paul Foreman



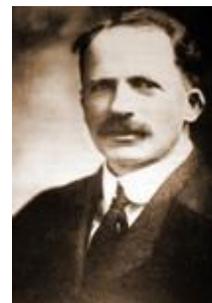
Sir Frederick Grant Banting (1891 - 1941)
Canadian Physician/Surgeon
30 Years old in 1921
Won Nobel Prize for medicine in 1923



Charles Herbert Best
(1899 - 1978)
Canadian Science Student & Physiologist
22 Years old in 1921



James Bertram Collip (1892 - 1965)
Canadian Biochemist



John James Rickard Macleod
(1876 -1935) Scottish Physiologist
Won Nobel Prize for physiology & medicine 1923

Note: Banting & Macleod shared their Nobel Prize with Best & Collip

Before 1921, it was exceptional for diabetics to live more than a year or two. Most died much sooner from the dreadful and painful wasting disease, many only living a matter of weeks. One can only imagine what it must have been like, for the countless distraught people diagnosed with diabetes, knowing that they had very little time left to live. Imagine being the parent of a child diagnosed with diabetes before insulin was available.

Descriptions of diabetes can be traced back thousands of years, but it wasn't until 1889 that Oskar Minkowski linked diabetes with the pancreas. This was possibly the greatest single contribution to the study of diabetes. Minkowski was the assistant of Josef von Mering, the Professor of Medicine at Strasbourg. To settle an argument, the two German scientists operated on a dog to remove its pancreas. A day later, they found that the dog was diabetic. As Minkowski had suspected, it proved fatal. Diverted by other commitments and perhaps lacking the scientific knowledge to progress any further, he did not find the secret however, which lay hidden in the islets of tissue in the pancreas named after Langerhans - the first man who had observed them. Minkowski lived to see insulin discovered some thirty years later and died in 1931.



Paul Langerhans
(1847 - 1888)
German Medical Student



Oskar Minkowski
(1858 - 1931)
German scientist
& assistant to von Mering



Josef von Mering
(1849 - 1908)
Scientist & Professor
of Medicine at Strasbourg

Two young Canadian scientists, Sir Frederick Grant Banting and Charles Herbert Best picked up directly from where Oskar Minkowski had left off. In collaboration with biochemist James B Collip and physiologist J J R Macleod, Banting and Best carried out experiments that led to the discovery of insulin at the University of Toronto in Canada. Charles Best, a young student, had volunteered to help Banting with the experiments. His Aunt Anna had died from diabetes and he knew that as it was a hereditary disease it might well reappear in his family. Both men served in the Army overseas, Banting as a medical officer and Best as a sergeant major in a combatant unit. They struck up an immediate friendship and dedicated their time to researching diabetes.

Banting and Best began with a study of the literature associated with the last twenty years of research. Undeterred by the many failures they started to operate on dogs at the University of Toronto Medical Buildings. The two young men occupied a small room on the second floor. They did not have an assistant, so each day began with feeding the dogs, housed two levels up, in a sky-lit attic room. Close by, there was a small cubicle where they operated, tying off ducts in the dog's pancreases to observe and isolate the internal secretions. The constant monitoring of blood sugars through blood and urine samples was a laborious task. Imagine the difficulties of collecting urine samples from dogs!



In the hot summer of 1921 they decided to make one of the dogs diabetic and to extract the pancreas of another dog whose ducts had been tied securely for some five or six weeks. It was the extraction of the material from this dog that proved to be the crucial turning point in their studies. Fortunately, the degenerated pancreas was kept chilled which made success possible. The low temperature prevented any remaining protein-digesting enzyme of the main gland from inactivating the extract they had isolated. By late July, they had succeeded in isolating the substance we all know as insulin.

Soon they were injecting some of the material into the diabetic dogs. The initial effects were not that dramatic, but the substance was lowering the sugar levels in the blood and urine. For the next few weeks they worked day and night on a succession of diabetic dogs, using the extract to produce life saving results. They fed the dogs sugar and then injected the extract to observe reductions in the blood sugar levels. They observed, that injecting too much of the extract resulted in excessively low blood sugar, or 'Hypoglycemia'. The extract was first referred to as "Isletin" after the secreting cells within the pancreas - the Islands of Langerhans. Later, the name was changed to "Insulin" to aid spelling and pronunciation throughout the world. The word Insulin comes from the Greek "Insula" meaning 'island'.

Banting and Best continued their experiments and found that the insulin from unborn calves was far more potent as it contained little or no digestive enzymes. There was a ready supply of pancreases available from abattoirs, which would have otherwise gone to waste. Fired with ambition they pressed on in order to apply their findings to human patients. Many great minds and valuable facilities now became available for this task. Intense research followed and monthly reports highlighted important findings.

On 11th January 1922, at the Toronto General Hospital, a young boy called Leonard Thompson, who had been diagnosed in 1920 at the age of 11, became the first human to be injected with insulin. Like many others, he was near to death and already spending most of his time in bed. Leonard agreed to be injected with the new 'insulin' drug and it saved his life.



The tempo quickened in the light of this success and other patients at the Hospital were also given insulin. They too recovered and soon the whole world was looking for information. Only twenty weeks had elapsed since the first injection of insulin to a diabetic dog, led to a human receiving treatment. This was a very short time and more investigation was needed in order to save lives on a grand scale. Another period of intense research followed and thanks to large-scale manufacture in many countries, the use of insulin spread around the world with incredible speed.

The initial increase in the production of insulin during 1922 was astonishing. From May to November the output was trebling every month in an effort to keep up with demand. Within a year, millions of lives were saved. The incidence of death by diabetic coma dropped from a staggering 63.8% (1898 - 1914) to 8.3% (1922 - 36) and then again to just 1.3% (1950 - 1957)

The discovery of insulin was without doubt the biggest ever miracle in medical history. It quite simply turned the phrase "diabetic death" into "diabetic life". The world prevalence of diabetes is currently estimated at 123 million and that figure is predicted to double over the next 10 - 15 years.

Thanks to the work of Banting and Best, millions of lives will continue to be saved - we can only live in hope of another miracle - the finding of a cure.

Sources of reference:

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"The Insulin Man - The Story of Sir Frederick Banting" by John Rowland 1965

"The Discovery of Insulin" by Michael Bliss 1988

"The Story of Insulin" by Prof G A Wrenshall, Dr G Hetenyi Jr & Dr W R Feasby 1962

More info:

<http://www.discoveryofinsulin.com/>