

# DIABETES CLOSE UP

August, 2003  
DCU Book Review #1

Bliss, Michael. *The Discovery of Insulin*. (University of Chicago Press, 1984). 304 pages.

**The most significant complication from diabetes, before the invention of insulin, was falling into a hyperglycemic induced coma.** Pioneers such as Drs. Fred Allen and Elliott P. Joslin were able to help some diabetics prolong their life by as long as a year or two with careful management of carbohydrate intake. Before insulin, dying from diabetes meant starving to death and eventually falling into coma. Diabetes patients were in such painfully malnourished states, often weighing under 70 pounds upon admittance to a hospital, that the only tragic figures who could remind these doctors of their earliest patients were victims of concentration camps during World War II or mass famine in Africa.

**The *Discovery of Insulin* highlights one of those incredible moments in medical history where a new treatment literally raises people from the dead.** Author Michael Bliss brilliantly illustrates one of the most significant medical findings in modern medicine while paying special attention to the facts explaining the controversies associated with its discovery. Insulin was discovered at the University of Toronto and Bliss's position as a professor of history at the university enables him to utilize previously unpublished and privately held documents. He uses vivid detail and skillfully paints a picture of the significant gains and trying mishaps along the tenuous path to insulin discovery in the early 1900s.

The story was written by Bliss to serve as a “readable and definitive history of the discovery of insulin,” aimed at academics and lay readers alike. It is a compelling and heartwarming story that any reader, not just medical professionals and diabetics, could enjoy. Some passages detailing the first trials may merit a more cursory reading en route to the latter intrigues of patent wars, production problems and the not so simple question of who deserved credit for the discovery.

**This defining event in the history of diabetes took place in a low-priority, dingy laboratory at the University of Toronto in 1921-1922.** As North America was

prospering and its people were beginning to over-consume and subsequently gain weight, diabetes was already becoming a disease in which doctors could specialize. Frederick Banting, a struggling surgeon, was searching for a place to advance his research on pinpointing the cause of glycosurea (sugar in the urine) – one of the key symptoms, at the time, of diabetes. Banting became interested in treating glycosurea with extracts of an organ whose function was just beginning to be discovered—the pancreas.

**Under the leadership of John Macleod, a highly respected professor of physiology at the University of Toronto, Banting worked with his partner Charles Best, a medical student, to perfect an extract.** James Collip provided help in purifying their extract and the first clinical trials with a purer form of what was now referred to as either “isletin” or “insulin” began. The results were phenomenal and patients and doctors in North America began clamoring for what the press had dubbed “a miracle cure”.

**Early production was difficult.** Collip forgot how he had produced his first successful batch and needed two additional months to rediscover his own method. George Clowes, director of research for Lilly, had secured patent rights and was working night and day to perfect a method of production. However, this was the time of Prohibition and when the government decided to regulate the composition of alcohols used by drug manufacturers to purify solutions, the method for producing insulin was momentarily “lost” once again. Lilly provided vital supplies of insulin to America, Canada and England in 1922 and 1923 and was duly rewarded with long-standing market dominance. However Bliss points the reader to the Lilly family’s commitment to research and development, as well as the vital help Clowes provided in refining the production method and scaling it for mass production...it truly was a race for what they thought might be a “cure” and Lilly worked hand in hand with the University to perfect it as quickly as possible.

**It was a fabulous time to work as a diabetes doctor** and the clinicians who were able to get their hands on insulin were rewarded with patients who awoke from comas, could increase their caloric intake from the high hundreds to over 2,000 and had a newfound appetite for physical activity and carbohydrates. When Dr. Allen returned to his diabetes clinic late a night from a trip to Toronto to see what insulin was all about, the majority of his patients were awake and awaiting him in their darkened ward. With tears in his eyes he reportedly said, “I think...I think we have something for you.” Of course anyone with diabetes themselves or with a family member or close friend with the illness will have special appreciation for the enormity of the statement.

**Intertwined in the story of the discovery of insulin is the controversy over the Nobel Prize awarded for this achievement.** The discovery of insulin is plagued with controversy over who should have been the recipients of the prestigious Noble Prize. Many were concerned over Macleod and Collip, another professor at the University of Toronto, receiving the same portion of the award as Banting and Best, the primary researchers in the discovery of insulin. Bliss uses handwritten journals and archived interviews of all parties involved to present the facts of this story in an objective, impartial manner—all in all a very fine piece of writing and well worth your time if you are interested in learning more about the history of diabetes.

**A side note:** Michael Bliss spoke at the 2003 AADE in Salt Lake City. His talk touched on many of the anecdotes and themes of his book and included the interesting facts that both Elizabeth Banting and John Ryder, two of the very first recipients of insulin, were still alive when he was researching his book. Elizabeth Hughes passed away after receiving insulin for over 60 years, while John Ryder began insulin in 1922 and took it every day until his death in 1993. After receiving a rousing standing ovation, Prof. Bliss returned to the microphone to offer his humble opinion that the cheers were in fact in recognition of the remarkable achievements of insulin's discoverers, not for his own historical work. Obviously the historical truth was amazing in itself but Bliss took the crowd from near tears to ovations with his riveting speech...much as he achieves with his book. Our detailed notes on the talk are below.

*--Nicholas Echelbarger, Holly Lanham, and Kelly Close*

**“The Miracle of Insulin” – Michael Bliss, PhD – Keynote Address, AADE, 2003, Salt Lake City, UT**

1. Bliss began his speech by citing several emotional stories in which he recounted the nightmare of living with diabetes before the discovery of insulin.
  - a. About 100 years ago, before insulin, children who suffered from juvenile diabetes survived anywhere from 1 month to 2 years.
  - b. Symptoms included weight loss, coma, and eventually death
  - c. Doctors tried, but failed to treat diabetes.
  - d. Doctors tried to treat diabetes with sugar, opiates, and other quackery cures (alcohol, etc.)
2. **Diabetes treatment then began to focus on diet** - often using a starvation or under-nutrition approach to treat diabetes.
  - a. This treatment may have worked for Type 2 diabetics, but did not work for people with Type 1 diabetes.
  - b. With luck, starvation bought a patient 1-2 years of extra life.
3. **In the meantime, Frederick Banting and Charles Best had** been working on the discovery of a pancreatic extract to treat high blood glucose associated with diabetes.
  - a. Many other researchers before Banting & Best had worked on the discovery of insulin as well.
  - b. Banting and Macleod were awarded the Nobel Prize for the discovery of insulin. However, Banting split his half with his research assistant, Charles Best, and Macleod then split his half with his colleague, Collip.
  - c. Collip was responsible for making breakthroughs in the process of developing the extract. The process involved removing harmful toxins and impurities, which detracted from the healing potential of the extract.
  - d. During this same time, Lilly was becoming interested in producing insulin on a mass scale.
4. **In July 1922, Lilly started production on Iletin** – the name of insulin at the time.
  - a. One of the first patients, Leonard Thompson, was given the pancreatic extract in January 1922.

- i. He was 65 pounds
  - ii. After being given the extract he improved dramatically.
  - iii. Leonard was the first successfully treated human patient.
  - iv. He lived for 14 years after the first dose of insulin and unfortunately died from influenza and complications from diabetes.
  - v. Reportedly, Leonard did not take particularly good care of his condition.
- b. Ted Ryder, another original patient, was the first person to survive 70 years on insulin.
- c. Elizabeth Hughes was another early patient on insulin.
  - i. She was the daughter of a prominent US politician
  - ii. She was taken to Dr. Allen (a physician who practiced the starvation approach to treating diabetes) who placed Elizabeth on the starvation diet.
  - iii. She was unusually compliant with the restrictive diet.
  - iv. Dr. Allen was hopeful that if Elizabeth stuck to her diet, a cure would be discovered in time to save her life.
  - v. Her weight fell to near 50 pounds and her life was fading.
  - vi. Banting examined the patient and noted her extremely emaciated (about 45 pounds) condition
  - vii. After his assessment, Banting started her insulin that day and immediately upgraded her diet to 2200 calories. She was closely monitored and her diet was advanced to 3300 calories – she wrote in her journal, “I ate a piece of white bread for the first time in 3 ½ years.”
  - viii. Before the mass production of insulin, researchers (Banting and Best, et al) frantically prepared the potent extract to treat her condition and save her life.
  - ix. Elizabeth was able to return to Washington after her early treatment in Toronto.
  - x. Elizabeth lived a long life, traveled extensively, and had three children. When Bliss was researching his book, he put out inquiries to anyone knowing when Elizabeth had died. Legend varies, but sounds like she surprised him by ringing him up! She died in 1981 of coronary complications of diabetes.
- d. Another case, Haven, who was 73 pounds, was a diabetic who reportedly was ready to die.
  - i. On May 21, 1922, he was the first patient in the US to receive insulin.
  - ii. The extract was so impure and erratic that Haven suffered horrible pain and complications.
  - iii. After many reactions, doctors discovered that he was allergic to the pork insulin and began giving him insulin produced from beef instead.

- iv. Haven lived a fairly normal life and died at age 59 from cancer after 34 years of insulin treatment.
  - v. He married and had two children.
- 5. **After the discovery of insulin**, Joslin was integral in the continued research of diabetes.
- 6. **The new era in insulin focused on** improving the quality of life for patients with diabetes – not just on enabling them to live a short life. Onward!