

The Discovery of Insulin: The Ultimate Key to Uncovering the Secret of Diabetes

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It is well established that diabetes mellitus is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas or the ineffectiveness of the insulin produced. Such a deficiency results in increased concentrations of glucose in the blood, which in turn affects the body at a multi-organ level. The blood vessels and nerves are particularly susceptible to this damage (WHO, 2010).

Although diabetes has been recognized and described since antiquity, the comprehensive understanding of its pathogenesis is somehow recent and goes back to early 1900 with the discovery of insulin.

The history of Diabetes began around 1550BC with the first references of the disease in an Egyptian papyrus. It was described as a rare disease causing frequent urination and weight loss. Around the same time, ancient Indian healers noticed that the urine of patients with diabetes attracted ants so they named the disease: “madhumeha”, meaning honey urine.

In 250 BC, the Greek Apollonius of Memphis labelled the disease “diabetes” or “to pass through” hinting to a sugary substance passing through the urine.

In 131-201 CE, a Greek physician, Galen of Pergamum links diabetes to an affliction of the kidneys. In the famous publication of the Persian polymath Avicenna, “The Canon of Medicine” in 1025, diabetes was associated with an abnormal appetite, sweet urine, sexual dysfunction and gangrene. In his writings, Avicenna described 2 types of diabetes: primary and secondary and prescribed a mixture of herbal plants: lupine, trigonella and zedoary seed to reduce sugar excretion. A herbal treatment that is still prescribed nowadays.



Based on previous works done in 1869 by the medical German student Paul Langerhans who identified tiny island-like cells in the pancreas (The islets of Langerhans) and in 1889 by Joseph von Mering and Oskar Minkowski who removed pancreas from dogs and noticed that they develop symptoms of diabetes, Jean de Meyer and Sir Edward Albert Sharpey-Schafer propose in the early 1900 the name “insulin” to the substance secreted by the pancreas. Insulin is latin for “insula”, meaning island in reference to the tiny cell islands in the pancreas: the islets of Langerhans.

The discovery of insulin not only allowed scientists to put the puzzle pieces together and understand the pathophysiology of diabetes but also to build the foundation of the first effective diabetes therapy. If experiments showed that the absence of insulin led to diabetes so why not give the patients injections of this substance to reverse the pathology? This is what two Canadian colleagues and scientists Banting and Best did in 1921.

Frederick Banting and Charles Best purified the hormone insulin from bovine pancreases and administered it to a first patient in 1922. The result was an elimination of glycosuria (glucose in the urine) and a 77% drop of glycaemia (glucose in the blood) for the patient.

By the fall of 1923, 25000 patients were treated with insulin injections in Canada and the United States. Banting received a Noble prize for this breakthrough and World Diabetes Day is now being celebrated worldwide on November 14 which coincides with Banting’s birthday.

Other important landmark discoveries can be cited such as:

- 1922: Development of Metformin which is now, among other oral drugs, the first-line treatment in type 2 Diabetes.
- 1936: A publication by Sir Harold Percival clearly explaining the difference between Type I and Type II Diabetes.
- 1940: Development of the Long Acting Insulin NPH.
- 1942: introduction of the first sulfonylureas.
- 1980: The biosynthesis of human insulin.

- 1996: The introduction of insulin analogues with higher and improved Absorption, Distribution, Metabolism and Excretion (ADME).
- 2005: FDA approves a new drug for type 2 Diabetes derived from the Gila monster. Exendin4, found in the venom of the lizard triggers one of the insulin- releasing pathways.
- 2008: Suzanna M. de la Monte proposes the term “ type 3 diabetes ” to describe insulin resistance in the brain.
- 2013: The University of Cambridge trials an artificial pancreas which combines the technology of an insulin pump with a continuous glucose monitor.
- 2015: Dr Edward Damiano introduces the iLet , a bionic pancreas that delivers both insulin and glucagon every five minutes. Damiano describes the device as a “bridge to a cure”.

Since the discovery of insulin, many treatments were elaborated for diabetes and research is still ongoing to develop more targeted and sophisticated drugs.

