

Introduction

Have you ever heard of insulin? Did you know the inventors (Frederick Banting and John J.R. Macleod) received a Nobel Prize for one of the most important and controversial breakthroughs in medical history! My report is about a great Canadian invention, which has made a great impact on people's lives, insulin. I chose this topic because I think insulin is a great part of Canadian history and it has saved many lives. You are going to learn about what insulin is and how it is used to treat diabetes, who invented insulin, who were the first people to receive insulin, what the different types of insulin are and how it is injected, and how insulin has impacted people's life.

What is Insulin and how is it used to Treat Diabetes?

When a person has diabetes their pancreas produces very little or no insulin and in some people their body cannot use the insulin properly. Insulin is a hormone your pancreas produces, it controls the level of glucose (sugar) in the bloodstream. When we eat foods such as grains and starches (bread, cereal, rice, pasta, corn, potatoes), fruit (bananas, apples, oranges, grapes), milk and alternatives (milk, yogurt, pudding) and sweets (jam, pop, cookies, ice cream, candy) we need insulin to help the glucose (sugar) enter the cells. Once the glucose (sugar) enters the cells it can be used for energy or stored for future use. People with Type 1 Diabetes have to take insulin every day to live. They get insulin through injections. Insulin is an important hormone needed to use glucose (sugar) for energy in the body.

Who Invented Insulin?

Did you know there were three inventors of insulin? They found the research was hard and experienced many barriers. The inventors were Frederick Banting, Charles Best, and James Collip. John J.R. Macleod was their supervisor. Frederick Banting lived in Alliston, Ontario and he served in World War 1. He was a physician and surgeon in London, Ontario. Did you know he developed his idea of insulin when he was completing backgrounding reading, to prepare a talk for medical students about the

pancreas? Frederick Banting thought if he could stop the flow of digestive juices out of the pancreas by closing off the openings in the pancreas, which produce the juices, then a different pancreas cell could make and release the substance (insulin). Then Banting could isolate the substance (insulin) and use it to treat diabetes.

Out of Macleod's student helpers, Charles Best was the student who won the coin toss to start working with Banting. They started their experiments under Macleod's direction at the University of Toronto on May 17th, 1921. Banting and Best started injecting extracts (isletin) into dogs with diabetes on July 30th, 1921. The injections seemed to reduce the blood glucose (sugar). Later they found out they could get extracts (isletin) from the chilled beef or pork pancreas. The inventors also made progress in purifying the ground up- tissue that seemed to contain the isletin. However, the extracts still did not work consistently.

James Collip was a biochemist and a professor at the University of Alberta who joined the team in December of 1921. Collip improved Banting and Best's extracts. The key breakthrough was Collip purified the extracts by taking out the toxic contaminants. These three inventors worked through many barriers to test their idea and develop an extract for treating diabetes.

Who were the First People to Receive Insulin?

Did you know insulin saved many people's lives? I am going to talk about two people who benefited from the invention of insulin. The first person to receive insulin was a fourteen year old boy, Leonard Thompson. He was dying of diabetes and was only sixty-three pounds. Leonard received his first injection of insulin on January 11th, 1922. The first injection had no effect, but twelve days later they resumed treatment and it

was a success. His blood and urine sugars went back to normal and his other diabetes symptoms went away.

Teddy Ryder was a five year old boy with diabetes. In the spring of 1922, he was twenty-six pounds and could only take a few steps on his own. His uncle, a doctor in New York wrote to Fredrick Banting. He wrote “It looks to me as though a few months is all he can hold out. I need not tell you how earnestly I hope you will see your way clear to treat him.”

Frederick Banting did decide to help Teddy. Teddy travelled by train to Toronto with his mom. Teddy received his first dose of insulin on July 10th, 1922. After receiving insulin for many months he was strong enough to return home with his family and his brand new life in the fall of 1922. The invention of insulin allowed Teddy to live until he was 71 years of age.

What are the Different Types of Insulin and how is it Injected?

Did you know insulin used to be made from the pancreas of cows and pigs? Since 1983, insulin has been produced in a laboratory by taking a synthetic gene and adding it to bacteria or yeast. This produces insulin identical to what the human pancreas produces. With more changes, companies can make insulin with different action times. The different types of insulin are rapid-acting, fast-acting, intermediate-acting, and long-acting.

Fast-acting is taken right before a meal and it works in about 10-15 minutes. It helps control the rise in blood glucose (sugar) from the foods eaten for 3-4 hours. Long-acting works throughout the day and night by providing you with low levels of Insulin all the time. It lasts up to 24 hours.

Now I will talk about how insulin is injected. Insulin is injected through syringes, pens, and pumps. The syringe has a needle, barrel, and a plunger. Syringes can come in many different sizes. Insulin is drawn up into the syringe from a bottle. Another way people inject insulin is through an insulin pen. Did you know an insulin pen looks like a normal pen? You insert an insulin cartridge into the pen. Another way to inject insulin is with a pump. The pump is small and contains a refillable cartridge (to hold the insulin). The pump has a computer to program how much insulin to give continuously, like the pancreas would naturally do. Then the person can give manual surges of insulin when eating or correcting high blood glucose (sugar) levels. Having different types of insulin and ways to inject it have improved the management of diabetes.

How has Insulin Impacted People's lives?

My uncle Lonnie has Type 1 Diabetes. I interviewed my uncle to better understand how having diabetes impacts his life and how he manages his diabetes with insulin.

1. When did you find out you have diabetes?

In the spring of 2008. My uncle was 27 years of age when he was diagnosed with diabetes.

2. What were your signs and symptoms of your diabetes?

He was thirsty, lost weight, was tired, and craved sugar. He was eating blizzards and chocolate bars all the time.

3. What types of equipment do you use to inject insulin?

He uses insulin pens, he has a pump, which he has used in the past to manage his diabetes. He has syringes on hand in case of emergencies.

4. How does diabetes affect your everyday life?

He has more concerns about what foods he is eating and how much. My uncle cannot eat a lot of pasta as it digests slowly and causes his blood glucose (sugar) to rise too high.

5. What are the challenges of using insulin?

Having to keep it cool and making sure it does not get damaged. You cannot be spontaneous if you do not have your insulin with you. For example, if an ice cream truck drives by you cannot run and get ice cream with no insulin.

6. What is it like always having to use insulin?

It is an inconvenience as you have to take your insulin early in the morning. Also it is hard to remember if you took your insulin or not as you are so used to taking it every day.

7. What are some of the tools you have used in the past and are using now to help manage your diabetes?

When he first started managing his diabetes he tested his blood glucose (sugar) by pricking his finger and testing the blood on a monitor. Now he uses a continuous blood glucose monitor (CGM). The sensor is inserted just under the skin. It measures your glucose (sugar) levels 24 hours a day. A transmitter sends results to his cell phone. Lonnie has used many different ways to inject insulin. For example, he started out using a syringe then switched to an insulin pen. Next he used an insulin pump and now he has switched back to using pens as he can control his blood glucose (sugar) levels best using the pens.

8. What are some of the types of insulin you use now and when do you take your insulin?

He uses Novd (fast-acting insulin). It works for three hours. He also uses Levimer, which works for twenty-four hours (long-acting). He takes his long-acting insulin in the morning and at bed. The fast-acting insulin is taken before he eats foods, which raise his blood glucose (sugar) levels. Lonnie takes 5 injections of insulin on a good day.

9. Has insulin made it possible for you to eat the foods you enjoy?

Yes, pretty much.

My interview with my Uncle Lonnie has helped me to understand how diabetes is managed and how important the invention of insulin is for people with diabetes.

Conclusion

My topic is important to Canadian history, because it has made a great impact on people's life all around the world. If insulin was not invented people would not have lived for very long. Insulin has helped people with diabetes to live long and healthy lives. I found it interesting that there are many different types of insulin and they are used at different times of the day. What I would do differently next time is have more time to ask questions in my interview and go more in depth with the answers.

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Break through T1D

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