100TH ANNIVERSARY OF THE DISCOVERY OF INSULIN

On July 27, 1921, one of the most important discoveries in medical history was made, forever changing the lives of diabetics.

WHAT IS INSULIN?

Insulin is a **HORMONE** made in the beta cells of the Islets of Langerhans in the **PANCREAS**. The beta cells release insulin to help the body either use or store blood sugar that comes from food an organism has consumed.

INSULIN & THE BODY

All types of **DIABETES** occur because of the body's inability to use blood sugar efficiently as a result of insufficient, ineffective or nonexistent insulin supplies.

TYPE 1 DIABETES

In those diagnosed with Type 1 diabetes, the pancreas no longer makes insulin. The beta cells have been destroyed, and they need insulin shots to use glucose from meals.

TYPE 2 DIABETES

Those diagnosed with Type 2 diabetes make insulin, but their bodies don't respond well to it. Some people with Type 2 diabetes need pills or insulin shots to help their bodies use glucose for energy.

HISTORY OF KNOWLEDGE

Even though the discovery of insulin dates back just 100 years, even the ancient Greeks understood the concept of diabetes and would diagnose it by **TASTING URINE**.

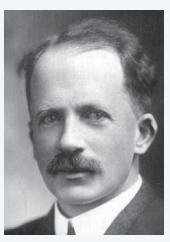
Over the centuries, awareness that urine conditions and levels of thirst related to blood sugar has grown. By the 19th century, scientists understood the pancreas played a role but didn't know to what extent.

In 1890, two physiologists removed the pancreas from a **DOG** and observed the development of severe diabetes.

In 1894, **SIR EDWARD ALBERT SHARPEY-SCHAFER** was the first to suggest that the pancreatic islets were driving the effects of the pancreas on blood sugar control. He coined the phrase "insuline" to describe the undiscovered substance.

ON THE PATH OF DISCOVERY

BANTING



MACLEOD

DR. FREDERICK G. BANTING believed other scientists failed to find the elusive hormone because digestive enzymes had destroyed it before it could be extracted. Banting wanted to eliminate the cells that produced the enzymes, leaving the islet cells alive and allowing him to extract the residue.

To explore his idea, Banting, an orthopedics surgeon, enlisted the help of **PROFESSOR JOHN JAMES RICKARD MACLEOD**. He also took on an assistant, **CHARLES HERBERT BEST**, to help with isolating insulin. Macleod organized the structure of the research, and Best used chemical testing of blood to check glucose levels.

The trio began testing Banting's theory on **May 17, 1921**. The research involved tying the ducts of a dog's pancreas until it produced the extract of islets. The extract was then given to dogs with pancreases. Initially, seven of the 10 dogs died.

On **July 27, 1921**, the scientists finally found success in preparing a dog with a removed pancreas and one with tied ducts. An injection was created from the degenerated pancreas and given to the dog. By taking blood samples, the scientists were able to document an **ANTI-DIABETIC ACTION** from the extract, naming it isletin. This would later come to be known as insulin.

BREAKTHROUGH FACES CHALLENGES

The extract appeared to have some toxic properties and caused severe side effects. Banting and Best changed their method for breaking down the pancreas, utilizing the hormone **SECRETIN.** They also faced challenges in collecting the extract without destroying it.

But the biggest obstacle was finding a way to **MASS PRODUCE** islet cells and insulin so it could be used as **WIDE-SCALE MEDICINE**.

They turned to using **COW PANCREASES**, which gave them a greater supply of insulin and produced improved results.

Biochemist **JAMES BERTRAM COLLIP** joined the team to work on purifying the insulin. His success led to testing, first on rabbits, then on humans.

The clinical trials began with a **14-YEAR-OLD BOY** with severe diabetes. This initial effort failed. However, Collip was able to further purify the extract and a second trial in January 1922 saw immediate success.

NOBEL RECOGNITION

In 1923, Banting and Macleod were nominated for a **NOBEL PRIZE**.

Banting nearly turned down the prize because Best was excluded from the nomination. He instead shared his credit and prize money with Best. Macleod did the same with Collip.

Banting was the first Nobel nominee from **CANADA**. A bottle of insulin is on the nation's 100 dollar bill in his honor.

GRAPHIC: Heather Bremer, CNHI News Indiana

TYPES OF INSULIN

Insulin cannot be taken in pill form because digestion would break it down just like the protein in food. For diabetics, insulin must be injected into the fat under the skin for it to enter the blood.

RAPID-ACTING

ONSET: 15 minutes
PEAK: One or two hours
DURATION: Lasts between two to four hours

REGULAR OR SHORT-ACTING

ONSET: Within 30 minutes
PEAK: Two to three hours
DURATION: Three to six hours

INTERMEDIATE-ACTING

ONSET: Two to four hours
PEAK: Four to 12 hours
DURATION: 12 to 18 hours

LONG-ACTING

ONSET: Several hours after injection
DURATION: Tends to lower glucose levels up to 24 hours

ULTRA LONG-ACTING

ONSET: Six hours
PEAK: None
DURATION: Lasts about 36 hours or longer

Onset: The length of time before insulin reaches the bloodstream and begins lowering blood sugar.

Peak time: The time during which insulin is at maximum strength in terms of lowering blood sugar.

Duration: How long insulin continues to lower blood glucose.

SOURCES: CDC; Nobel Foundation; American Diabetes Association; medicalnewstoday.com | PHOTO: Metro Creative | ICONS: tezar tantular, Adrien Coquet, bmijnlieff, Alexandr Lavreniuk, Cards Against Humanity, Anton Borzenkov, Don Daskalo from Noun Project