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World Diabetes Day | November 14. From Adobe Stock[1]

Key Inforbits

- What is Diabetes?
- Role of Pharmacists and Technicians
- History of Diabetes
- Latest news about CGM

What is Diabetes?[2]

Diabetes is a common chronic disease that affects people of all ages. Diabetes is a major public health issue that affects about 537 million adults around the world. The number is predicted by experts to increase to 643 million by 2030 and to 783 million by 2045. In the United States, approximately 37.3 million people have diabetes. This makes up around 11% of the population. Further, 90% to 95% of all cases are type 2 diabetes, making it the most common type. compared to the other types, which include type 1 and gestational diabetes.

History of Diabetes[3,4,5,6,7]

Greek physician Aretaeus (80-138) was the first to use and define the term diabetes mellitus.[4] Moreover, the first to describe diabetes insipidus was Avicenna (or Ibn Sina, 980-1037 CE) in Persia. During the 18th and 19th centuries, Johann Peter Frank (1745-1821 CE) was the first physician to distinguish the differences between diabetes mellitus and diabetes insipidus. Although they both share the name diabetes, mellitus and insipidus are two very different health conditions. Both have the common symptoms of increased thirst and urination, but for completely different reasons. While diabetes mellitus relates to high blood sugar levels, diabetes insipidus has no relation to blood sugar levels. Thus, while diabetes mellitus is due to insufficient insulin hormone production or the inability to produce insulin, which is a hormone that regulates the body's blood sugar levels, diabetes insipidus is due to insufficient production of the hormone arginine vasopressin (AVP), which helps regulate the body's water levels.[5]

In 1889, the role of the pancreas in diabetes was discovered by Joseph von Mering and Oskar Minowski. This discovery was made when von Merin and Minowski uncovered that signs and symptoms of diabetes developed in dogs whose pancreas was removed, which caused the dogs to die shortly afterwards.

Sir Edward Albert Sharpey-Schafer in 1910 noted that diabetes was a result of lack of insulin. He is also credited as applying the term insulin for the hormone that regulates glucose. It comes from the Latin word for island, "insula," which he used in reference to the islets of Langerhans in the pancreas that produce insulin.

In 1921, the work of Von Mering and Minkowski was repeated by Sir Frederick Grant Banting and Charles Herbert Best who at the time was a research assistant in John MacLeod's laboratory,[6] to demonstrate that induced diabetes in dogs could be reversed by treating them with insulin from healthy dogs, which was harvested from their pancreatic islets of Langerhans. This experiment was a success in dogs; however, insulin from dogs was too impure and unsafe for use in humans. As a result, pancreas extract from cows was tried. The insulin hormone from the pancreas of cows was able to be successfully purified for human use by Banting, Best, and their chemist colleague James Collip at the University of Toronto. This resulted in the availability of an effective diabetes treatment in 1922.[7]

Sir Frederick Banting, MD. From Canadian Medical Hall of Fame.[8]

In 1923, the Nobel Prize in Physiology or Medicine was awarded to Banting and laboratory director John MacLeod for this development. Even though not all members of the team were recognized for the award, Banting and MacLeod shared their prize money with other team members, particularly Best and Collip. The patent was made available for free by Banting and Best so that patients with diabetes around the world could have access to insulin. In January of 1922, fourteen-year-old Leonard Thompson was the first patient to receive an injection of insulin for his diabetes at the Toronto General Hospital. The discovery of insulin helped Thompson live with diabetes for 13 more years. He unfortunately passed at the age of twenty-seven from pneumonia. Because of Banting's role in discovering insulin, World Diabetes Day is celebrated on his birthday, November 14.[7]

Role of Pharmacists and Technicians [9,10]

Diabetes mellitus causes substantial health and financial strain not only in the U.S. but also worldwide since it affects 8.5% of the global population. In fact, diabetes is the costliest chronic condition in the U.S., with one out of every four healthcare dollars being spent on a diabetic care. Due to primary care provider and endocrinologist shortages as well as the time required for complex diabetes care, patients often receive less comprehensive support during increasingly brief clinical visits. Pharmacists and technicians are uniquely positioned to contribute meaningfully to fill the gap in diabetes management.

Ways that pharmacists and technicians can improve the care of patients with diabetes include: [9,10]

- Pharmacists can help patients with medication management by ensuring correct use of medications and promoting adherence with the use of refill reminders, pill organizers, and synchronization programs.
- Pharmacists can check for drug interactions of patients' diabetes medication with current medications to identify and resolve problems. Also, pharmacists can adjust diabetes medication dosing in collaboration with physicians.
- Pharmacists can provide patient education to people with diabetes by instructing them on how to store insulin properly, correctly use vials/syringes for insulin injection, accurately time insulin doses with meals, and explain the importance of rotating injection sites. Additionally, pharmacists can demonstrate and train patients in the use of insulin pens, glucometers, and CGMs. Continuous glucose monitors (CGMs)
- Pharmacists can check blood glucose levels and help patients with interpreting glucose readings to identify patterns, as well as encourage consistent monitoring and logging of glucose readings to keep track of these patterns.
- Pharmacists can provide appropriate dietary guidance, encourage physical activity, and offer lifestyle advice for diabetes management.
- Pharmacists can follow-up with patients through telepharmacy to review blood glucose logs, monitor progress, and reinforce patient education.
- Because diabetes requires frequent, intensive follow-up and ongoing patient education, pharmacists can significantly aid in managing diabetes.
- The role of pharmacy technicians has experienced expanded opportunities with the Public Readiness and Emergency Preparedness (PREP) Act, which opened the door for pharmacy technicians to become essential in diabetes management. Because of this, technicians can conduct screening assessments such as the American Diabetes Association (ADA) prediabetes risk assessment screening and inform patients about prediabetes.
- Technicians can assist patients with choosing a blood glucose meter.[9,10]

Role of the Pharmacist [10]

Latest News about CGM [11,12,13]

Continuous glucose monitoring devices (CGMs) are revolutionary for people with type 1 diabetes and insulin-treated type 2 diabetes because they simplify monitoring blood glucose levels. The first CGM was introduced in 1999 by Medtronic Minimed, which was capable of tracking a patient's glucose levels for up to 72 hours. A fingerstick blood glucose sample was needed every 6 to 12 hours to complete sensor recalibration.[13] CGMs are wearable medical devices used to continually monitor blood glucose levels and can alert the wearer if the glucose levels are too high or too low. They are roughly the size of a few coins stacked together and are typically worn on areas such as the arms, legs, abdomen, or upper buttocks. There are three basic components to the CGM systems, which are

sensor, transmitter, and receiver. Modern CGM systems support people with diabetes in staying within their target glucose range of 70–180 mg/dL by offering smaller, more discreet sensors and can connect with Automated Insulin Delivery (AID) systems. An example of the three parts of all AID systems are, 1) CGM (e.g., Dexcom G6), 2) an insulin delivery device (e.g., twiist AID system), and 3) insulin delivery algorithm (e.g., Tidepool loop).[11]

Examples of CGMs and AID systems include:

- Dexcom G7 has AID integration with iLet Bionic Pancreas, Omnipod 5, Tandem t:slim X2 and Mobi, and open-source systems (Lopp, Trio).
- Dexcom G6 has AID integration with Tandem t:slim X2, Insulet Omnipod 5, iLet Bionic Pancreas.
- Abbott Freestyle Libre 3 Plus has AID integration with iLet Bionic Pancreas.
- Abbott Freestyle Libre 2 Plus has AID integration with Tandem t:slim X2, Insulet Omnipod 5.
- Guardian 4 has AID integration with MiniMed 780G.
- Medtronic Simplera has AID integration with The Simplera Sync pairs with Medtronic's 780G AID system
- Eversense 365 has AID integration with Sequel's new twiist system is planned.[11]

The first insulin pump to feature integration with the Tidepool Loop algorithm is the twiist AID system, which is approved for individuals with type 1 diabetes from age 6 years. The twiist AID system also offers customized dosing options and adjusting insulin delivery based on food's absorption rate to prevent blood sugar spikes. Moreover, twiist is the first FDA-approved AID system that allows users to control insulin delivery directly from their Apple Watch, offering greater convenience and flexibility. In addition, the twiist AID system allows personalized insulin dosing of each micro-dose of insulin by measuring both their amount and speed, which is important for providing more accurate glycemic control. In the U.S., the twiist AID system became officially available July 7, 2025. Additionally, the twiist AID system is planned to be sold in pharmacies with a pay-as-you-go option to make it more affordable. Getting insulin delivery systems through pharmacies simplifies the process for both patients and healthcare providers and often just needs co-pay.[12]

Twiist AID. From DiaTribe[14]

Dexcom G7 15 Day, the CGM system that is the longest lasting and most accurate, has received FDA Clearance on April 10, 2025.[15] Some features of the Dexcom G7 15 Day include:

- It is approved for patients with diabetes 18 years and older
- 15.5 days of wear make Dexcom G7 15 Day the longest lasting CGM system.
- It has the highest waterproof rating of any CGM device.
- Apple Watch can connect with the sensor, making diabetes management hands-free.
- It helps users gain clearer insight into how activity, food, and medication can affect glucose levels continuously by the features that enable automatic activity tracking, easy meal tracking, and new medication logging.

Dexcom G7. From DexCom[15]

- Finished sensors have a 12-hour grace period for being replaced.
- Dexcom Clarity application allows for easy viewing of glucose values, patterns, trends and statistics by means of various interactive reports.
- Enhanced alert options that can be personalized for better discretion.[15]

Lingo over-the-counter (OTC) CGM available at Walmart, October 21, 2025:[16]

- Interestingly, there are two OTC CGM's, Lingo and Dexcom's Stelo, for individuals 18 years and older who are not on insulin but want to monitor glucose levels for overall health and wellness management.
- Lingo can also help patients use their glucose analysis to make more informed decisions regarding activity, nutrition, and sleep.
- Lingo is particularly useful for individuals with prediabetes and/or family history of diabetes since it tracks glucose levels continuously and provides personal insights as well as coaching.
- Amazon was the first retailer to sell Lingo.
- Lingo combines a wearable sensor and app to help customers better understand and improve health and wellness.
- The FreeStyle Libre CGM technology platform was used as the foundation for Lingo.
- Lingo's availability at Walmart expands accessibility to health technology.[16]

Lingo OTC CGM. From Drug Delivery Business News[16]

What is the future of non-invasive glucose monitors?[17]

Many new devices are currently in development for CGM with various features and benefits. Some devices that you may see in the pharmacy in the near future include:

- **Nemaura Medical**
  - SugarBEAT is a small device that was developed by Nemaura Medical. It is attached to the skin like a patch and measures glucose continuously by an imperceptible electric current that runs through the skin. The electric current pulls glucose molecules from the interstitial fluid below top layer of skin into a chamber in the patch and detects glucose levels.
  - It has been approved in Europe and is currently pending FDA review in the U.S.[17]

sugarBEAT. From sugarBEAT.com[18]

- **DiaMonTech**
  - DiaMonTech, a Germany-based biotechnology startup, is engineering three variants of its non-invasive glucose monitor technology.
    - **The D-Base:** A shoebox-sized desktop device designed for shared use in clinical environments.
    - **D-Pocket:** A pocket-sized, hand-held glucose monitor activated by pressing a finger on the sensor.
    - **D-sensor:** A wearable sensor integrated into a bracelet-style device.

The D-Base. From DiaMonTech[19]

- These three versions utilize same technology for gathering and measuring glucose levels, which is referred to as "photothermal detection" by DiaMonTech. A beam of light is directed onto the skin by the sensor, which causes the glucose molecules within the skin to slightly warm up (about 1/1000 Celsius). In a matter of seconds, the sensor delivers a glucose measurement based on light absorption and reflection patterns.
- Evidence shows that the technology works and is reaching the level of accuracy of CGMs. However, each version is at a different approval level and still require development for enhanced precision. Thus, they are not yet available for purchase.[17]

[D-Sensor. From DiaMonTech][19]

- **GWave by Hagar**
  - Hagar, a startup based in Israel, has developed GWave, which is a non-invasive glucose monitor.
  - GWave continuously measure blood glucose levels via radio frequency waves. At present, the device is neither CE-certified nor FDA-approved.[17]

[GWave Logo. From Hagartech.com][20]

- **Know Labs**
  - Know Labs, a startup based in Seattle, has also used radio frequency for two of their non-invasive glucose sensors, known as Bio-RFD.
    - **The KnowU:** A palm-activated, pocket-sized device designed to deliver glucose measurements whenever needed.
    - **The UBand:** A wrist-worn device that provides continuous monitoring.
  - Despite the early phase of development, initial human data suggest strong potential. Bio-RFID measurements demonstrated accuracy comparable to fingerstick glucose tests and aligned with standards of existing CGM devices.[17]

[KnowU. From Know Labs][21]

- **Lassie by BOYDSense**
  - Lassie is a compact, pocket-sized device that estimates glucose levels by detecting specific compounds in the breath, which are produced as the body processes glucose for energy.
  - This device was announced in Berlin during a presentation at the Advanced Technologies & Treatments for Diabetes (ATTD) 2023 annual conference. The company is working on the algorithm for calculating glucose levels from certain breath compounds formed when glucose is converted into energy.
  - The product is still in development and not yet sold publicly, pending further trials and official approvals.[17]

[Lassie by BOYDSense. From boydsense.com][22]

Conclusion:

Diabetes is a global health crisis that requires timely and appropriate treatment. Pharmacists are positioned so they are readily available. The pharmacists' role in helping diabetic patients is wide and ranges from a variety of essential tasks, such as checking blood glucose levels, identifying drug-drug interactions, providing patient education, and more. Pharmacy technicians are also an important part of diabetes management. Although diabetes has a deep and fascinating history, the future of diabetes treatment is what people are more curious about. The discovery of insulin and the development of CGMs have been groundbreaking for people with diabetes. However, non-invasive glucose monitors are the future of diabetes treatment.

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The last "dose"[23] …

"HERE IS THE WORLD. BEAUTIFUL AND TERRIBLE THINGS WILL HAPPEN. DON'T BE AFRAID."

Frederick Buechner (1926 to 2022, American author and theologian)

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