

History of Diabetes: American Diabetes Association®

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1910

English physiologist Sir Edward Albert Sharpey-Schafer's study of the pancreas leads him to the discovery of a substance that would normally be produced in non-diabetics: insulin. The name comes from the Latin *insula*, meaning island, referencing the *insulina* hormone that helps the body use glucose for energy. The beta cells of the pancreas make insulin. When the body cannot make enough insulin, it is taken by injection or through use of an insulin pump. X -producing islets groups of cells located in the pancreas that make hormones that help the body break down and use food. For example, alpha cells make glucagon and beta cells make insulin. Also called islets of Langerhans (LANG-er-hahns). X of Langerhans in the pancreas an organ that makes insulin and enzymes for digestion. The pancreas is located behind the lower part of the stomach and is about the size of a hand. X .

1916

Elliott Joslin, MD, publishes the first edition of *The Treatment of Diabetes Mellitus* a condition characterized by hyperglycemia resulting from the body's inability to use blood glucose for energy. In type 1 diabetes, the pancreas no longer makes insulin and therefore blood glucose cannot enter the cells to be used for energy. In type 2 diabetes, either the pancreas does not make enough insulin or the body is unable to use insulin correctly. X . A clinician and educator, Joslin is renowned throughout the world as one of the most influential voices in diabetes care.

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1921

Frederick Banting, MD, and his then student assistant, Charles Best, MD, extract insulin from dog pancreases. Banting and Best were working in laboratory space at the University of Toronto provided by Professor J.J.R. Macleod. They inject the insulin into dogs whose pancreases have been removed, and the animals' blood sugar¹. A class of carbohydrates with a sweet taste, including glucose, fructose and sucrose. 2. A term used to refer to blood glucose.X levels go down. James Collip purifies the extract so that it can be used in humans. Banting and Macleod were awarded the 1923 Nobel Prize in Physiology or Medicine, though the contributions of all four men have been recognized as important in the discovery of insulin.

1923

Eli Lilly and Company begins commercial production of insulin. In the decades that follow, manufacturers develop a variety of slower-acting insulins, the first being protamine insulin introduced by Novo Nordisk in 1936.

1924

At a time when less than half of all babies born to mothers with diabetes survive, Priscilla White, MD, starts the Joslin Pregnancy Clinic. Fifty years later, Dr. White achieves a 90 percent survival rate among babies born to her patients.

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1940

The American Diabetes Association is founded to address the increasing incidence a measure of how often a disease occurs; the number of new cases of a disease among a certain group of people for a certain period of time. X of diabetes and the complications harmful effects of diabetes such as damage to the eyes, heart, blood vessels, nervous system, teeth and gums, feet and skin, or kidneys. Studies show that keeping blood glucose, blood pressure and low-density lipoprotein cholesterol levels close to normal can help prevent or delay these problems. X that develop from the disease.

1949

Rachmiel Levine, MD, discovers that insulin works like a key, transporting glucose The food you eat gets digested and broken down into a sugar your body's cells can use. This is glucose, one of the simplest forms of sugar. X into cells.

Becton Dickinson and Company begins production of a standardized insulin syringe a device used to inject medications or other liquids into body tissues. The syringe for insulin has a hollow plastic tube with a plunger inside and a needle on the end. X designed and approved by the American Diabetes Association.

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1950

The American Dietetic Association, and the U.S. Public Health Service devise a meal planner that divides foods into six groups, or “exchanges”, based on the calories, carbohydrateAnother word for sugars. The main source of energy for the body. Carbs get digested quickly and easily into glucose. Carbs are the foods that affect blood glucose the most. Examples of carbs are fruits, starchy vegetables, breads, pastas, rice, sugar, syrup and honey.X , protein1. One of the three main nutrients in food. Foods that provide protein include meat, poultry, fish, cheese, milk, dairy products, eggs, and dried beans. 2. Proteins are also used in the body for cell structure, hormones such as insulin, and other functions.X , and fatone of the three main nutrients in food. Foods that provide fat are butter, margarine, salad dressing, oil, nuts, meat, poultry, fish and some dairy products. 2. Excess calories are stored as body fat, providing the body with a reserve supply of energy and other functions.X in each serving of food.

1952

The American Diabetes Association funds its first direct research grants.

1953

Tablets for testing urine glucose become widely available, and urine test strips appear over the next few years. These options are simpler than using Benedict’s solution, which must be mixed with urinethe liquid waste product filtered from the blood by the kidneys, stored in the bladder, and expelled from the body by the act of urinating.X and heated over boiling water.

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1955

Sulfonylureas, oral medications that stimulate the pancreas to release more insulin, are available. New, more potent forms of these drugs will become available later.

1959

Using radioimmunoassay technology, Solomon Berson, MD and Rosalyn Yalow, PhD develop a method for measuring insulin in the blood. They notice that some people with diabetes still make their own insulin, and they identify “insulin-dependent” (type 1) and “non-insulin-dependent” (type 2) diabetes. This term is not used anymore.

1961

Glucagon, a hormone chemical produced in one part of the body and released into the blood to trigger or regulate particular functions of the body. For example, insulin is a hormone made in the pancreas that tells other cells when to use glucose for energy. Synthetic hormones, made for use as medicines, can be the same or different from those made in the body. Glucagon, produced by the pancreas that raises glucose levels, is introduced by Eli Lilly and Company as a treatment for severe hypoglycemia, a condition that occurs when one's blood glucose is lower than normal, usually less than 70 mg/dL. Signs include hunger, nervousness, shakiness, perspiration, dizziness or light-headedness, sleepiness and confusion. If left untreated, hypoglycemia may lead to unconsciousness. Hypoglycemia is treated by consuming a carbohydrate-rich food such as a glucose tablet or juice. It may also be treated with an injection of glucagon if the person is unconscious or unable to swallow. Also called an insulin reaction.

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1964

The Ames Company introduces the first strips for testing blood glucose, the main sugar found in the blood and the body's main source of energy. Also called blood sugar. X by color code.

1966

The first successful pancreas transplant is performed at the University of Minnesota Hospital.

1970

The Ames Company introduces the first glucose meter.

1971

Insulin receptors are discovered on cell. The tiniest living unit that we are made up of. Cells are alive and need glucose (food) for energy to survive. X membranes. This discovery raises the possibility that missing or defective insulin receptors are on the outer part of a cell that allow the cell to bind with insulin in the blood. When the cell and insulin bind, the cell can take glucose from the blood and use it for energy. X may prevent glucose from entering the cells, thus contributing to the insulin resistance, the body's inability to respond to and use the insulin it produces. Insulin resistance may be linked to obesity, hypertension, and high levels of fat in the blood. This occurs most often in people with type 2 diabetes but people with type 1 diabetes can have insulin resistance, too. X of type 2 diabetes a condition characterized by high blood glucose levels caused by either a lack of insulin or the body's inability to use insulin efficiently. Type 2 diabetes develops most often in middle-aged and older adults but can appear in young people. X .

1972

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The relationship between blood vessel disease and hyperglycemia too much glucose in the blood. Fasting hyperglycemia is blood glucose above a desirable level after a person has fasted for at least 8 hours. Postprandial hyperglycemia is blood glucose above a desirable level 1 to 2 hours after a person has eaten. X is reported.

U100 insulin is introduced. With the availability of this single concentration and with insulin syringes marked with only a U100 scale, frequency of dosing errors could be reduced.

1974

Development of the Biostator enabled continuous glucose monitoring and closed loop insulin infusion.

Human Leukocyte Antigens (HLAs) are discovered on cell surfaces. People with type 1 diabetes a condition characterized by high blood glucose levels caused by a total lack of insulin. Occurs when the body's immune system attacks the insulin-producing beta cells in the pancreas and destroys them. The pancreas then produces little or no insulin. Type 1 diabetes develops most often in young people but can appear in adults. X have specific patterns of HLA that are associated with varying levels of risk for diabetes.

1976

The first insulin pumps were invented.

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1977

Rosalyn Yalow, PhD is awarded the Nobel Prize in Physiology and Medicine for her work in measuring insulin in the body.

Boston researchers develop a test to measure glycosylated hemoglobin (A1C). A1CA1C is a test that measures a person's average blood glucose level over the past 2 to 3 months. Hemoglobin (HEE-mo-glo-bin) is the part of a red blood cell that carries oxygen to the cells and sometimes joins with the glucose in the bloodstream. Also called hemoglobin A1C or glycosylated (gly-KOH-sih-lay-ted) hemoglobin, the test shows the amount of glucose that sticks to the red blood cell, which is proportional to the amount of glucose in the blood.X testing becomes the gold standard for measuring long-term diabetes control.

1978

Researchers at the City of Hope National Medical Center in Duarte, California, and Genentech, Inc., in San Francisco, induce E. coli bacteria to produce insulin identical to human insulin.

Portable insulin pumps are introduced and researchers achieve normal blood glucose levels in patients using them. But, due to their large size, they are impractical at this time.

The National Diabetes Information Clearinghouse is created by the federal government to gather and document all diabetes literature.

1979

The National Diabetes Data Group develops a new diabetes classification system: 1) insulin-dependent or type 1 diabetes, 2) non-insulin-dependent or type 2 diabetes, 3) gestational diabetes, and 4) diabetes associated with other syndromes or conditions.

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1980

A new animal model of type 1 diabetes, the non-obese diabetic (NOD) strain of mouse is described in Japan.

Introduction of the basal-bolus extra amount of insulin taken to cover an expected rise in blood glucose, often related to a meal or snack.X concept enabled "intensive insulin therapy" to be used in the clinic to effectively treat people with type 1 diabetes.

1982

The FDA approves human insulin produced by genetically altered bacteria.

A 64K autoantibody is discovered and is found to be associated with type 1 diabetes.

1983

A link between hypoglycemia and brain metabolismthe term for the way cells chemically change food so that it can be used to store or use energy and make the proteins, fats, and sugars needed by the body.X is established.

Second-generation sulfonylureas enter the market allowing patients to take smaller doses and with reduced side effectsthe unintended action(s) of a drug.X .

1984

The insulin molecule is identified to be a target of autoimmune response in individuals with type 1 diabetes.

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1985

Scientists discover a relationship between pregnancy and the worsening of diabetic retinopathydiabetic eye disease; damage to the small blood vessels in the retina. Loss of vision may result.X .

1986

The National Diabetes Data Group reports that type 2 diabetes is more common among African Americans, Mexican Americans, and Native Americans than among Caucasians. Fifty percent of all Pima Indians in Arizona over the age of 35 have diabetes – the highest rate in the world.

1987

The 64K autoantibody originally discovered in 1982 is found to be predictive of type 1 diabetes.

Researchers determine that tight control of glucose levels during pregnancy is important for the health of the baby, and continue to study how diabetes increases the risk for birth defects.

1989

American Diabetes Association releases its first Standards of Care to guide physicians in the treatment of diabetes.

Glucose is discovered to be distributed into muscle and fat cells via a transporter known as GLUT-4. Understanding how glucose is transported from the bloodstream into cells to be used as fuel is important to locating different drug targets that can improve insulin sensitivity.

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1990

The 64K autoantibody associated with type 1 diabetes is identified. This protein, GAD, or glutamate decarboxylase, is an important enzyme. An enzyme (EN-zyme) is a protein made by the body that brings about a chemical reaction, for example, the enzymes produced by the gut to aid digestion. X involved in cellular communication in the brain and pancreas. The immune system, the body's system for protecting itself from viruses and bacteria or any "foreign" substances. X's attack on GAD triggers a progressive autoimmune response that leads to diabetes.

1993

The Diabetes Control and Complications Trial (DCCT) showed that keeping blood glucose levels as close to normal as possible slows the onset and progression of eye, kidney, and nerve diseases caused by diabetes. In fact, it demonstrated that any sustained lowering of blood glucose helps, even if the person has a history of poor control.

1994

Captopril is FDA approved to treat end-stage renal disease having to do with the kidneys. A renal disease is a disease of the kidneys. Renal failure means the kidneys have stopped working. X disease.

Leptin, the fat cell hormone that modulates feeding behavior and hormone secretion, is cloned.

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The Scandinavian Simvastatin Survival Study (4S) showed that cholesterol type of fat produced by the liver and found in the blood; it is also found in some foods. Cholesterol is used by the body to make hormones and build cell walls. Lowering with statins markedly reduced the risk of myocardial infarction an interruption in the blood supply to the heart because of narrowed or blocked blood vessels. Also called a heart attack. , stroke condition caused by damage to blood vessels in the brain; may cause loss of ability to speak or to move parts of the body. or death. The effect was greatest in individuals with diabetes.

Mid-1990s

The incretin hormone GLP-1 is discovered. Incretin hormones are secreted from the gut in response to food, and encourage the body to produce insulin. Discovery of GLP-1 will later lead to a new class of diabetes drugs that can increase insulin secretion in response to glucose, and even increase the amount of beta cells in the pancreas.

1995

The drug metformin becomes available in the U.S. Metformin an oral medicine used to treat type 2 diabetes. It lowers blood glucose by reducing the amount of glucose produced by the liver and helping the body respond better to the insulin made in the pancreas. Belongs to the class of medicines called biguanides. (Brand names: Glucophage, Glucophage XR; an ingredient in Glucovance) is a biguanide class of oral medicine used to treat Type 2 diabetes that lowers blood glucose by reducing the amount of glucose produced by the liver and by helping the body respond better to insulin. (Generic name: metformin) that prevents glucose production in the liver an organ in the body that changes food into energy, removes alcohol and poisons from the blood, and makes bile, a substance that breaks down fats and helps rid the body of wastes. .

1996

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The drug acarbose, brand name Precose (Bayer Corporation) becomes available in the U.S. Acarbosean oral medicine used to treat Type 2 diabetes. It blocks the enzymes that digest starches in food. The result is a slower and lower rise in blood glucose throughout the day, especially right after meals. Belongs to the class of medicines called alpha-glucosidase inhibitors. (Brand name: Precose)X is an alpha-glucosidase inhibitor that slows digestion of some carbohydrates.

Lispro (a lysine-proline analog) is introduced by Eli Lilly and Company as the world's fastest acting insulin.

1997

Troglitazone, brand name Rezulin (Parke-Davis), is approved by the FDA. It is the first in a class of drugs known as thiazolidinediones, and it improves insulin sensitivity in muscle cells. It is eventually removed from the market due to liver toxicity. Rosiglitazonean oral medicine used to treat type 2 diabetes. It helps insulin take glucose from the blood into the cells for energy by making cells more sensitive to insulin. Belongs to the class of medicines called thiazolidinediones. (Brand name: Avandia)X and pioglitazonean oral medicine used to treat type 2 diabetes. It helps insulin take glucose from the blood into the cells for energy by making cells more sensitive to insulin. Belongs to the class of medicines called thiazolidinediones. (Brand name: Actos)X , also in this drug class, are later brought on to the market.

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The terms “insulin-dependent diabetes” (IDDM) and “non-insulin-dependent diabetes” (NIDDM) had long been used to describe different groups of diabetes patients. The terms type 1 diabetes and type 2 diabetes are now accepted to define diabetes by cause rather than treatment. In addition, the fasting glucose level for diagnosing diabetes is lowered from 140 mg/dl to 126 mg/dl milligrams (MILL-ih-grams) per deciliter (DESS-ih-lee-tur), a unit of measure that shows the concentration of a substance in a specific amount of fluid. In the United States, blood glucose test results are reported as mg/dL. Medical journals and other countries use millimoles per liter (mmol/L). To convert to mg/dL from mmol/L, multiply mmol/L by 18. Example: 10 mmol/L $\times 18 = 180$ mg/dL.X .

1998

Repaglinide, brand name Prandin (Novo Nordisk) is developed. Repaglinidean oral medicine used to treat type 2 diabetes. It lowers blood glucose by helping the pancreas make more insulin right after meals. Belongs to the class of medicines called meglitinides. (Brand name: Prandin)X belongs to a class of drugs known as meglitinides. They stimulate insulin secretion in the presence of glucose.

The United Kingdom Prospective Diabetes Study (UKPDS) shows that people with type 2 diabetes who practice tight control of blood sugar levels and blood pressurethe force of blood exerted on the inside walls of blood vessels. Blood pressure is expressed as a ratio (example: 120/80, read as "120 over 80"). The first number is the systolic (sis-TAH-lik) pressure, or the pressure when the heart pushes blood out into the arteries. The second number is the diastolic (DY-uh-STAH-lik) pressure, or the pressure when the heart rests.X levels reduce their risk of complications, similar to the results of the DCCT in people with type 1 diabetes. Together these two studies transform the nature of diabetes care around the world.

2002

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Treatment with the anti-CD3 monoclonal antibody, hOKT3gamma1(Ala-Ala), slows the deterioration of insulin production and improves metabolic control during the first year of type 1 diabetes in the majority of patients.

The American Diabetes Association defines prediabetes as impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT). IFG is defined as a fasting blood glucose of 100-125 mg/dl, and IGT is defined as a glucose level from 140 mg/dl – 199 mg/dl two hours after consuming a glucose-rich drink. Later, A1C levels of 5.7% to 6.4% are also used to identify individuals with prediabetesa condition in which blood glucose levels are higher than normal but are not high enough for a diagnosis of diabetes. People with prediabetes are at increased risk for developing type 2 diabetes and for heart disease and stroke. Other names for prediabetes are impaired glucose tolerance and impaired fasting glucose.X .

2005

Exenatide, brand name Byetta, is approved in the U.S. as a first-in-class incretin mimetic (GLP-1) drug to treat type 2 diabetes. An injectable drug, exenatide works by increasing insulin production in response to blood glucose levels.

Pramlintide, brand name Symlin, is approved in the U.S. as an injectable adjunct treatment for people who use insulin at mealtimes but still fail to achieve desirable blood glucose levels.

2006

FDA approves JANUVIA (sitagliptin phosphate), the first in a new class of drugs known as DPP-4 inhibitors that enhance the body's ability to lower elevated blood sugar. DPP-4 is an enzyme that naturally blocks GLP-1 from working, so by inhibiting this enzyme, GLP-1 works in the gut to promote insulin secretion.

2008

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The results of the ACCORD, ADVANCE and VADT studies are published and presented at the American Diabetes Association Scientific Sessions. All three studies fail to show a benefit of intensive glycemic control on cardiovascular outcomes in people with type 2 diabetes who are at high cardiovascular risk. The results from these studies lead to clinical recommendations that call for a more individualized approach for setting glycemic goals and treatment targets.

2013

FDA approves Invokana (Canagliflozin), the first in a new class of drugs known as the SGLT-2 inhibitors, for lowering elevated blood sugar in patients with type 2 diabetes. SGLT-2 inhibitors block the activity of sodium glucose transport proteins in the kidney, reducing glucose re-uptake and increasing secretion of glucose in the urine.