

DIABETES & THE HEART

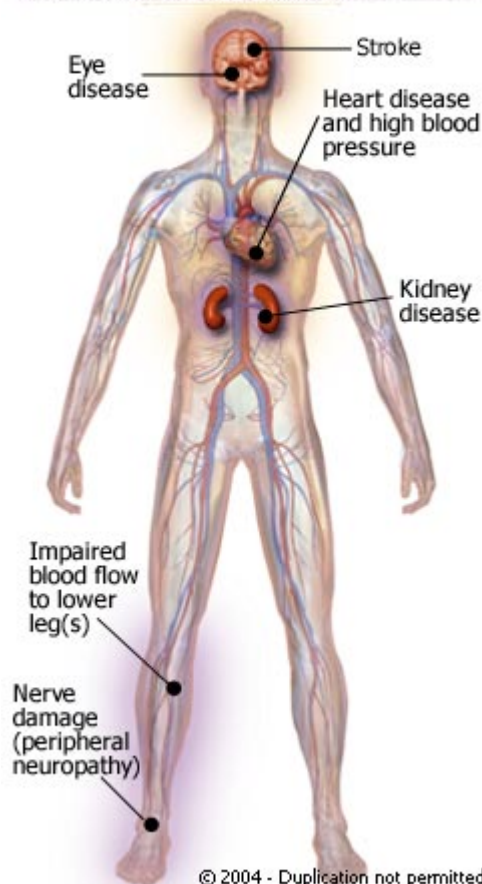
Summary

Diabetes is a disorder of the body's ability to use **glucose**, the body's main source of energy. Normally, the body uses glucose with the help of the hormone **insulin**. If the body does not produce enough insulin or is unable to use insulin properly, glucose may build up to unhealthy levels in the bloodstream.

There are two **types of diabetes**: type 1 and type 2. Type 1 is thought to be caused by a combination of genetic and environmental factors. For reasons largely unknown, the body's immune system attacks itself, destroying its own insulin-producing beta cells in the pancreas.

Diabetes-related Complications

Over time, high levels of blood sugar can lead to the following:



Type 2 diabetes is much more common than type 1. Type 2 diabetes has been linked to **obesity**, inactivity, being over 45 years old and **gestational diabetes** (a temporary complication of **pregnancy**).

People with diabetes are at increased risk for health problems such as **heart attack** and **stroke**. Other long-term **consequences of diabetes** include permanent damage to the eyes, kidneys, nerves and blood vessels.

Diabetes affects more than 18 million Americans – about six percent of the population. Among

these 18 million are 5 million who are not aware they have the disorder. Symptoms of diabetes include frequent urination, excessive thirst and unexplained weight loss. Diabetes can be diagnosed with **blood test**.

Before the discovery of insulin in 1921, the long-term outlook for people with diabetes was poor. Today, type 2 diabetes can be managed and controlled with lifestyle modifications (e.g., weight loss and exercise), oral medications or insulin, or a combination of the three. Type 1 diabetes can be managed and controlled with insulin treatment.

For more information on diabetes and diabetes management, see the following Patient Guides:

Types of Diabetes

Consequences of Diabetes

Diabetes & African Americans

Diabetes & Women

Exercise for Diabetics

Recipes for Diabetics

About diabetes

Diabetes is a disorder of the body's ability to use **glucose**, the main source of energy for the human body. Glucose is manufactured by the body from the foods people eat and is carried throughout the body by the bloodstream.

Normally, the body's tissues absorb glucose and use it for energy with the help of **insulin**, a hormone produced by the pancreas (an organ behind the stomach). The pancreas secretes insulin in response to the natural increase in blood sugar after a meal. If the body does not have enough insulin or is unable to use insulin properly, glucose may build up to unhealthy levels in the bloodstream.

There are two **types of diabetes**: type 1 and type 2. Type 1 diabetes is also called insulin-dependent diabetes mellitus (IDDM). It is thought to be caused by a combination of genetic and environmental factors. For reasons largely unknown, the body's immune system attacks itself, destroying over 90 percent of its own insulin-producing beta cells in the pancreas.

Type 2 diabetes is also called non-insulin-dependent diabetes (NIDDM). People with type 2 diabetes do manufacture insulin, sometimes even more than necessary. However, for some reason, their bodies reject or do not detect it, resulting in what the body perceives as an insulin deficiency. Type 2 diabetes has been linked to **obesity** (a **body mass index** [BMI] of 30 or greater), inactivity and being over 45 years old. Women who develop diabetes during **pregnancy** (a temporary complication called **gestational diabetes**) are also at greater risk for developing type 2 diabetes.

Health consequences of diabetes

People with diabetes are at increased risk for health problems such as **heart attack** and **stroke**. Adults with diabetes have heart disease death rates about two to four times higher than adults

without diabetes. The risk for stroke is also two to four times higher among people with diabetes.

Diabetes can also cause blindness and kidney failure. People with diabetes are also at increased risk for nerve damage, which can lead to the need for amputations, primarily of the lower limbs.

Poorly controlled diabetes before conception and early in pregnancy can cause birth defects and spontaneous abortions. Poorly controlled diabetes during later pregnancy can result in excessively large babies, posing a risk to the mother and the child.

People with diabetes are more susceptible to many other illnesses and often have worse prognoses. For example, people with diabetes are more likely to die of pneumonia or *influenza* (flu) than people who do not have diabetes.

Diabetes can also lead to a potentially fatal condition called *ketoacidosis*. Ketoacidosis is the result of the body's breaking down fats into substances called *ketones*, which gradually build up in the bloodstream in the absence of enough **insulin**. This build-up causes the blood to become increasingly acidic, which can lead to coma or death. Ketoacidosis is more commonly a complication in type 1 diabetes. For more information, see [Consequences of Diabetes](#).

Signs and symptoms of diabetes

High blood **glucose** levels can lead to a variety of symptoms. Symptoms of type 1 and type 2 diabetes are similar, but there are differences.

Type 1 Symptoms

- Increased thirst
- Frequent urination
- Increased appetite
- Fatigue
- Weight loss
- Nausea
- Vomiting

Type 2 Symptoms

- Increased thirst
- Frequent urination
- Increased appetite
- Fatigue
- Blurred vision
- Slow-to-heal infections
- Impotence in men

If you think you have symptoms of diabetes, speak to your physician. A urine or **blood test** can screen for diabetes. Not everyone with diabetes will have symptoms, so it is recommended that everyone over 45 years old be checked for diabetes, especially people who are **overweight** (a **body mass index** [BMI] of 25 or greater). Diabetes screening is also recommended for people who are younger than 45, overweight, and have any of following risk factors:

- **Family history** (a parent or sibling with diabetes)
- Ethnic background (African-American, Hispanic, Asian or Native American)
- History of diabetes during **pregnancy** (a temporary condition called **gestational diabetes**)
- History of giving birth to a baby who weighed more than 9 pounds
- **High blood pressure**
- High **triglyceride** levels
- Abnormal **cholesterol** levels

- Physically inactive

Diagnosis methods for diabetes

Glucose that builds up in the bloodstream is flushed from the body in the urine, so a urine test can be used to screen for the possibility of diabetes. A **blood test**, however, is necessary to confirm a suspicion of diabetes.

Preparation for a **glucose blood test** varies according to which type of test is going to be done:

- *Random glucose testing* typically requires no preparation and may be done either by the patient at home or by a healthcare professional in a clinical setting.
- *Fasting glucose testing* typically is done after the patient has not eaten for 12 to 14 hours.
- *Two-hour postprandial glucose testing* typically is done after the patient has eaten a balanced meal containing at least 100 grams of carbohydrates and then fasted for two hours prior to testing (avoiding smoking and strenuous exercise during this period).
- *Glucose tolerance testing* typically is done after the patient has eaten a high carbohydrate diet for three days and then fasted for 10 to 16 hours.

If blood glucose levels are higher than normal, but not high enough for a diagnosis of diabetes, it is considered pre-diabetes. People with pre-diabetes are at increased risk for type 2 diabetes. They can reduce their risk by making lifestyle changes such as losing weight and engaging in regular physical activity.

For information on glucose blood tests, see the Patient Guide: **Glucose Test**.

Treatment options for diabetes

Before the discovery of **insulin** in 1921, the long-term outlook for people with diabetes was poor. Today, type 2 diabetes can be managed and controlled with lifestyle modifications, oral medications or insulin, or a combination of the three. Type 1 diabetes can be managed and controlled with insulin treatment.

Lifestyle modifications for managing and controlling diabetes include:

- Maintaining a balanced **diet** low in **fats and oils**, low in sweets, and high in **fiber**
- Eating regular meals and light snacks
- **Lowering cholesterol** levels
- Maintaining proper weight to avoid **obesity**
- Engaging in regular **exercise**

Oral medications for managing and controlling diabetes include:

- *Sulfonylureas*. Medications that help the pancreas make more insulin and help the body

use the insulin it makes.

- *Biguanides*. Medications that decrease the amount of **glucose** made by the liver and lower the amount of insulin in the body.
- *Alpha-glucosidase inhibitors*. Medications that block the enzymes the body uses to digest food starch.
- *Thiazolidinediones*. Medications that increase the body's sensitivity to insulin and help the insulin move glucose from the blood into the cells for energy.
- *Meglitinides*. Medications that help the pancreas make more insulin right after meals.
- *D-phenylalanine derivatives*. Medications that help the pancreas make insulin quickly.

Insulin is typically administered using a needle and syringe, although other methods are available, such as insulin pens, jet injectors and external pumps. Methods for administering insulin currently under research include implantable pumps, nasal sprays and skin patches.

Insulin may be either natural or synthetic. Natural insulin comes from the pancreas of animals. Synthetic insulin is created using *human recombinant DNA technology* (genetic engineering). There are five categories of insulin:

- *Rapid-acting*. Insulin that begins to work within 5 to 20 minutes after injection and continues to work for 3 to 5 hours.
- *Short-acting*. Insulin that begins to work about 30 minutes after injection and continues to work for 5 to 8 hours.
- *Intermediate-acting*. Insulin that begins to work within 1 to 3 hours after injection and continues to work for 16 to 24 hours.
- *Long-acting*. Insulin that begins to work about 4 to 6 hours after injection and continues to work for 24 to 28 hours.
- *Very long-acting*. Insulin that begins to work about 1 hour after injection and continues to work for 24 hours.