

Diabetes

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Diabetes: A Serious Health Problem

Diabetes is the seventh leading cause of death in the United States, contributing to more than 193,000 deaths annually. Diabetes afflicts about 16 million people, over 5 million of whom do not know they have the disease. About 800,000 people are diagnosed with diabetes annually.

Diabetes is a costly, chronic disease that has no cure. Direct and indirect costs of diabetes to the nation are estimated at about \$100 billion annually. The prevalence of diabetes is rising with the aging of the U.S. population, the growth in minority populations – those most susceptible to type 2 diabetes – and the increasing prevalence of obesity among Americans. Diabetes is the leading cause of adult blindness, end-stage kidney disease and nontraumatic lower limb amputations. In addition, diabetics are at increased risk of heart disease and stroke.

What Is Diabetes?

Diabetes is a metabolic disease in which the body does not produce or properly use insulin, a hormone necessary to move blood sugar into cells where it can be used for energy. Insulin is also needed to synthesize protein and store fats. Diabetes is characterized by high levels of blood glucose (sugar).

What Are the Main Types of Diabetes?

Type 1 – an autoimmune disease in which the body does not produce insulin. Type 1 diabetes accounts for 5 to 10 percent of diabetes and occurs most often in children and young adults. There are two forms of type 1 diabetes. **Immune-mediated diabetes** occurs as a result of an autoimmune disorder in which the body's immune system attacks and destroys the insulin-producing cells of the pancreas. Because glucose cannot enter the cells, it builds up in the blood and the body's cells starve to death. **Idiopathic type 1 diabetes** refers to rare forms of the disease. The body cannot control blood sugar levels without insulin. Therefore, type 1 diabetics must take daily insulin injections to live.



Type 2 – a metabolic disorder due to the body's inability to make enough or properly use insulin. Type 2 diabetes is the most common form of

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diabetes accounting for 90 to 95 percent of diabetes. It usually occurs in persons over age 45 and overweight. Type 2 diabetes can be controlled through weight loss, improved nutrition and exercise, but sometimes these treatment options must be used in combination with oral medications and/or insulin.

Gestational diabetes occurs in 2 to 5 percent of all pregnancies, but usually disappears after pregnancy. This is a temporary form of insulin resistance which occurs during pregnancy due to excessive hormone production or the inability of the pancreas to make the additional insulin needed during some pregnancies. Gestational diabetics are at increased risk for developing type 2 diabetes later in life.

Other less common types of diabetes may account for 1 to 2 percent of all diagnosed cases of diabetes and result from specific genetic syndromes, surgery, drugs, malnutrition, infections and other illnesses.

Warning Signs of Type 1 Diabetes

Type 1 diabetes may appear suddenly, although beta cell (the cells that make insulin) destruction can begin months, even years, earlier. Signs include the following:

- High levels of sugar in the blood
- High levels of sugar in the urine
- Frequent urination
- Unusual thirst
- Extreme hunger
- Unusual weight loss
- Blurred vision
- Extreme fatigue
- Irritability
- Nausea and vomiting

Those at Greater Risk for Type 1 Diabetes

- Siblings of individuals with type 1 diabetes
- Children of parents with type 1 diabetes

Problems of Type 1 Diabetes

Type 1 diabetics should be prepared for these three problems:

- **Hypoglycemia** or low blood sugar occurs when your blood sugar drops too low.
- **Hyperglycemia** or high blood sugar occurs when your blood sugar is too high.
- **Ketoacidosis** is a serious condition which can occur when you have dangerously high levels of ketones. Ketones are acids that build up in the blood. They appear in the urine when the body does not have enough insulin. Ketones can poison the body. Ketoacidosis can lead to diabetic coma or even death.

If you have type 1 diabetes, make sure you discuss these problems with your health care practitioner and diabetes educator. Learn the warning signs of these conditions and what to do if these problems should occur.

Warning Signs of Type 2 Diabetes

Type 2 diabetes often develops slowly. Signs include the following:

- Any of the type 1 symptoms
- Frequent infections
- Blurred vision
- Cuts/bruises slow to heal
- Tingling/numbness in hands or feet
- Recurring skin, gum or bladder infections
- Dry, itchy skin
- May have no symptoms

Those at Greater Risk for Type 2 Diabetes

- Persons over age 45
- Individuals with a family history of diabetes
- Overweight persons
- Inactive persons
- Individuals with low HDL or high triglycerides
- Certain racial and ethnic groups (African Americans, Hispanic Americans, Asian and Pacific Islanders and Native Americans)
- Women who had gestational diabetes during pregnancy or who gave birth to a baby weighing 9 or more pounds

Diagnosis of Diabetes

Doctors diagnose diabetes by measuring glucose in the blood. There are two types of tests – screening and diagnostic tests. Screening tests are done on individuals who have no symptoms of diabetes and persons at risk for developing diabetes. Screening tests are inexpensive and easy to do. They require a drop of blood from the fingertip and take only a minute or two to complete.

Diagnostic tests are used to confirm a diagnosis suspected from a patient's symptoms. Doctors order samples of blood drawn from a vein and sent to a laboratory for analysis. Types of tests used to diagnose diabetes include fasting plasma glucose, random plasma glucose and oral glucose tolerance tests.

The preferred way to diagnose diabetes is the fasting plasma glucose test. The test requires an overnight fast of at least 8 hours and a single blood sample drawn and sent to the laboratory for analysis. Normal fasting plasma glucose levels are less than

110 milligrams per deciliter (mg/dl). Fasting plasma glucose levels that exceed 126 mg/dl on two or more tests on different days indicate diabetes.

When symptoms are present, random blood samples (taken soon after eating or drinking) may be used to test for diabetes. A blood glucose level of 200 mg/dl or more indicates diabetes, but must be reconfirmed on another day with either a fasting plasma glucose test or an oral glucose test.

An oral glucose tolerance test requires an overnight fast (8 to 16 hours). Fasting plasma glucose is tested the next morning in a doctor's office or laboratory. You drink 75 grams of glucose (100 grams for pregnant women). Blood samples are taken up to five times within three hours to measure blood glucose.

Glucose tolerance tests may result in one of the following diagnoses:

- Normal response – glucose level is less than 140 mg/dl at the two-hour measure.
- Impaired glucose tolerance (IGT) – fasting glucose level is less than 126 mg/dl and the two-hour glucose level is between 140-199 mg/dl.
- Diabetes – person has diabetes when two diagnostic tests performed on different days show that the blood glucose level is high.
- Gestational diabetes – female has gestational diabetes when she has any two of the following: fasting plasma glucose of more than 105 mg/dl, a one-hour glucose level of more than 190 mg/dl, a two-hour glucose level of more than 165 mg/dl or a three-hour glucose level greater than 145 mg/dl.

To diagnose diabetes, the doctor needs test results. However, the doctor takes into account the patient's physical examination, symptoms and medical history to decide to test.

Once a patient has been diagnosed with diabetes, the doctor may order a blood test called glycated hemoglobin (GHb) or hemoglobin A1c. The doctor uses this test to monitor the patient's diabetes control. Hemoglobin is the protein in red blood cells that transports oxygen. GHb forms when glucose in the blood attaches to the hemoglobin. The more glucose there is in the blood, the more glucose attaches to hemoglobin. Blood cells remain in circulation for two to three months. Therefore, GHb is a good measure of a person's average blood glucose level over the prior two to three months. High percentages of hemoglobin A1c mean a person's blood glucose has been high over a period of time.

After the doctor has determined that a patient has diabetes, the doctor will consider many factors to determine which type of diabetes a patient has. Generally, persons with type 1 are diagnosed prior to age 30, are lean and have had diabetic ketoacidosis or high ketone levels in their urine. Type 2 individuals are diagnosed when they're over 30 years of age, obese and do not have urine ketones. However, there are exceptions to these categories.

Complications of Diabetes

About 193,000 people die annually due to diabetes and its complications. Many people only learn they have diabetes when one of the following complications develops.

- **Blindness** due to diabetic retinopathy. Diabetes is the leading cause of new cases of blindness in persons 20 to 74 years old.
- **Kidney disease** due to diabetic nephropathy, the most common cause of end-stage renal disease, a condition that requires dialysis or a kidney transplant.
- **Heart disease and stroke** – Diabetics are two to four times more likely to have coronary heart disease or stroke than people without diabetes.
- **Nerve disease and amputations** – About 70 percent of diabetics have mild to severe forms of diabetic nerve damage which may lead to lower limb amputations. Diabetics have a 15 to 40 times greater risk of leg amputation than nondiabetics.
- **Impotence** due to diabetic neuropathy or blood vessel blockage. The prevalence of impotence in diabetic men over age 50 has been reported to be 50 to 60 percent.

Diabetes Management

Diabetes is a self-managed disease that requires daily adherence to diet, physical activity, blood sugar self-monitoring and medicine regimens. Treatment for type 1 diabetes requires a strict regimen that typically includes a carefully calculated diet, planned physical activity, self-testing of blood glucose and multiple daily insulin injections.

Treatment for type 2 diabetes typically includes diet management, exercise, self-testing of blood glucose and, in some cases, oral medication and/or insulin. Research has confirmed that intensive treatment to control blood glucose levels can significantly prevent or delay the progression of diabetes complications.

Diabetes Care Plan

If you have been diagnosed with diabetes, it's important that you receive good medical care from a diabetes care team put together by your physician. Your diabetes care team will work with you to design your diabetes care plan. Your diabetes care plan should include:

- a list of your goals
- a list of medications you will use to help control your diabetes
- a healthy meal plan developed by a registered dietitian
- a list of lifestyle changes you plan to make
- an exercise program
- diabetes educational classes for you and your family
- a plan for seeing specialists – eye, foot, dental, others
- instructions for follow-up visits to the doctor
- a birth-control and pre-pregnancy plan, if appropriate

Patient education is vital. Diabetics can reduce their risk for complications if they are educated about their disease, learn and practice skills needed to better control their blood glucose levels and have regular checkups from their diabetes health care team.

Setting goals is important. Diabetics, with the help of their diabetes health care team, should set goals for better control of blood glucose levels as close to normal as is safely possible. There are two tests to measure your blood sugar:

- **The hemoglobin A1c test** is a simple lab test that measures the average amount of sugar that has been in your blood over the last

three months. It is the best test for your health care provider to know if your blood sugar is under control. This test is recommended at least twice a year and more often if your blood sugar stays too high. The hemoglobin A1c goal for diabetics is less than 7 percent. Research shows that maintaining hemoglobin A1c levels at less than 7 percent may reduce the risk of diabetes complications by 50 to 80 percent.

- **Finger-stick test** is a self-test you do using a blood glucose meter to measure your blood sugar at the time you test. Suggested goals for self-testing using a blood glucose meter are 80 to 120 milligrams per deciliter (mg/dl) before meals and 100 to 140 mg/dl at bedtime. Due to other factors, your doctor may set different target goals for you.

Diabetes health care team education is critical. Diabetes is a multi-system chronic disease. Therefore, diabetics are best monitored and managed by highly skilled health care professionals trained with the latest information on diabetes to ensure early detection and appropriate treatment of serious diabetes complications.

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