

Diabetes

Goals for Good Health



written by Harvard Medical School



PR•MED
Patient Education Center

www.patientedu.org

Most people think of diabetes as an inherited disease. Indeed, genes do play a role. Still, your risk of getting diabetes depends more on how you live than on who your parents are. That means diabetes is a preventable disease. And even if you already have diabetes, the combination of good personal and medical care can prevent many of the complications that make diabetes the 6th leading cause of death in the United States.

For more information about diabetes from Harvard Health Publications, go to www.patientedu.org.

Your Sugar Metabolism

Glucose is the sugar that fuels your metabolism. After you eat, your digestive tract breaks down carbohydrates into sugar that's absorbed into your bloodstream. Glucose is a vital source of energy for your body's cells. But to provide that energy, glucose must travel from your blood into your cells.

Insulin is the hormone that unlocks the door to your cells. When your blood glucose level rises after you eat, your pancreas springs into action, pouring insulin into your blood. If you produce enough insulin and your cells respond normally, your blood sugar level drops as glucose enters your cells, where it is burned for energy or stored away for future use. All in all, insulin allows your body to turn food into energy and to store up extra energy to keep your engine running if fuel becomes scarce.

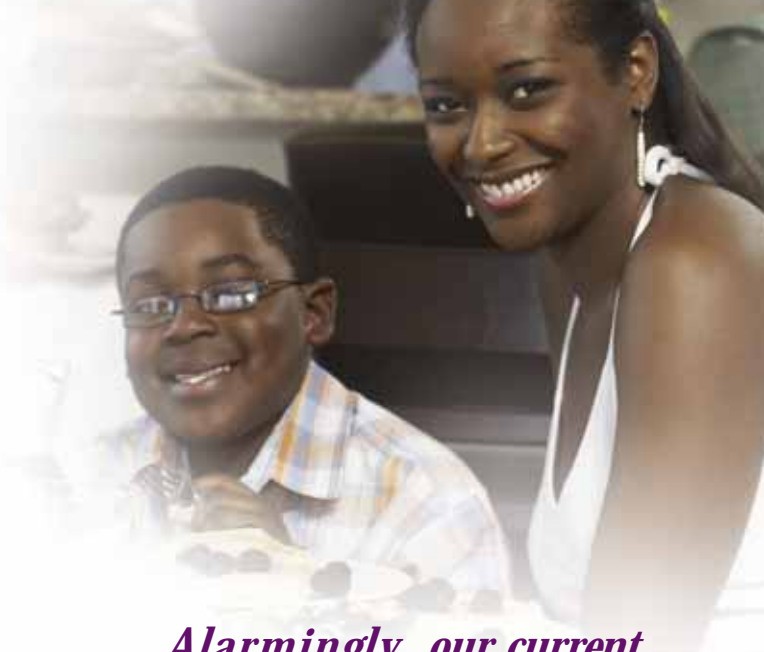


The Three Types of Diabetes

Diabetes is a single name given to three different disorders that are all marked by abnormally high blood sugar levels. All forms of diabetes develop when the pancreas is unable to supply enough insulin to meet the body's demands. In some cases, the problem is a low supply, in others it's a high demand, and in still others, it's both a low supply and a high demand.

Diabetes of pregnancy (gestational diabetes) increases the risk of complications for mother and child. Blood sugar levels return to normal after delivery, but the mother has a high risk of developing type 2 diabetes later in her life.

Type 1 diabetes usually begins abruptly before age 20, often with a critical rise in blood sugar levels. The disease is caused by a combination of genetic abnormalities and a viral infection or some other event that triggers the body's immune system to attack the pancreas, destroying its ability to produce insulin. Type 1 diabetes is the most severe form of the disease, but it accounts for only about 5% of diabetes cases in the United States. Lifelong insulin therapy is necessary.



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Type 2 diabetes usually begins gradually in adulthood. Alarminglly, however, our current diabetes epidemic features many cases in children. In most patients, the main problem is insulin resistance. The pancreas produces reasonable amounts of the hormone, but the body's tissues don't respond properly, so blood sugar levels are abnormally high. Oral medications can help many patients with type 2 diabetes, but over time, the ability of the over-taxed pancreas to produce insulin may run down, producing the need for insulin therapy.

More than 90% of America's 21 million people with diabetes have type 2 disease, and the numbers are soaring every year with the ongoing diabetes epidemic. That's because lifestyle is the major cause of type 2 diabetes, with obesity heading the list.



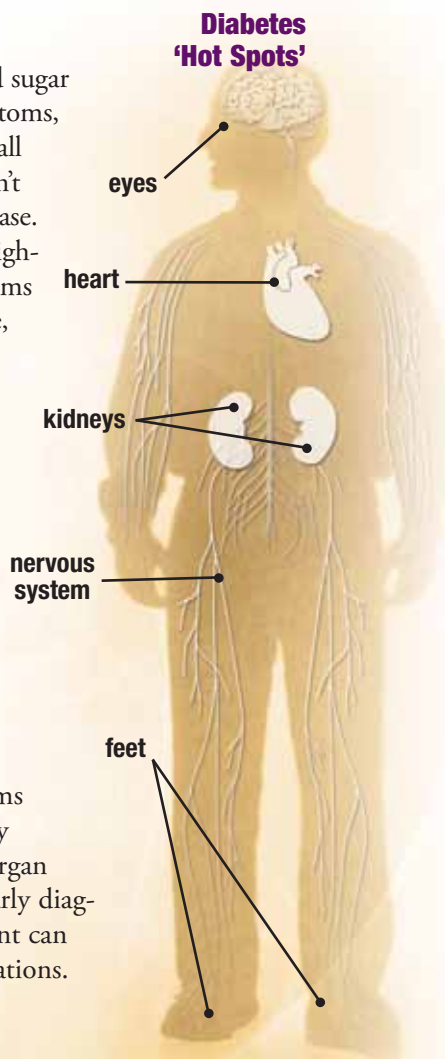
Does Diabetes Matter?

It sure does. Diabetes is a major cause of heart attacks, kidney failure, vision loss, peripheral artery disease, leg amputations, and nerve damage. All in all, diabetes shortens life expectancy by about 13 years, taking about 300,000 American lives annually. And diabetes also drains the U.S. economy of more than \$130 billion a year and consumes about one in four Medicare dollars.

Symptoms

Mild elevations of blood sugar don't produce any symptoms, which is why a third of all people with diabetes don't know they have the disease. When sugar levels get higher, they produce symptoms that may include fatigue, blurred vision, excess urination, and excessive thirst. Increased hunger is another symptom, and weight loss may develop despite a hearty appetite. While the blood has too much sugar, the cells don't get enough. Diabetes is starvation in the midst of plenty.

Over time, the symptoms of diabetes are joined by symptoms of diabetic organ damage. Fortunately, early diagnosis and good treatment can head off many complications.



Screening & Diagnosis

The simplest test is the best:

Fasting blood sugar (FBS) test	
FBS	Diagnosis
Below 100 mg/dL	Normal
100–125 mg/dL	Pre-diabetes
126 mg/dL or above	Diabetes

The American Diabetes Association (ADA) recommends an FBS test every three years for people ages 45 and older. People younger than 45 should also be tested as often as every year if they have a body mass index of 25 or higher and one or more of the following additional risk factors:

- Have a mother, father, brother, or sister with diabetes
- Are physically inactive
- Are of African American, Asian American, Hispanic American, Native American, or Pacific Islander descent
- Have given birth to a baby weighing more than 9 pounds or had diabetes during pregnancy
- Have blood pressure of 140/90 mm Hg or higher
- Have abnormal blood lipid (fat) levels, such as high-density lipoprotein (HDL, or “good” cholesterol) levels below 35 mg/dL or triglyceride levels more than 250 mg/dL
- Have had impaired glucose tolerance or impaired fasting glucose when previously tested for diabetes
- Have polycystic ovary syndrome or a history of vascular problems

Another useful test is to see what percent of the oxygen-carrying hemoglobin molecules in a person's red blood cells have glucose attached to them. A single glycosylated hemoglobin (A1C) level reflects a person's average blood sugar during the preceding two to three months. In people without diabetes, it's usually about 5.0, but a reading higher than 7.0 usually leads to a diabetes diagnosis. Doctors use the test to see if their patients are under good control, and the ADA recommends that people with diabetes aim for A1C levels less than 7.0.

Understanding A1C

The A1C level reflects a glucose average that corresponds to the numbers in the following table, published by the ADA:

A1C (percent)	Plasma glucose (milligrams per deciliter)*
6.0	135
7.0	170
8.0	205
9.0	240
10.0	275
11.0	310
12.0	345

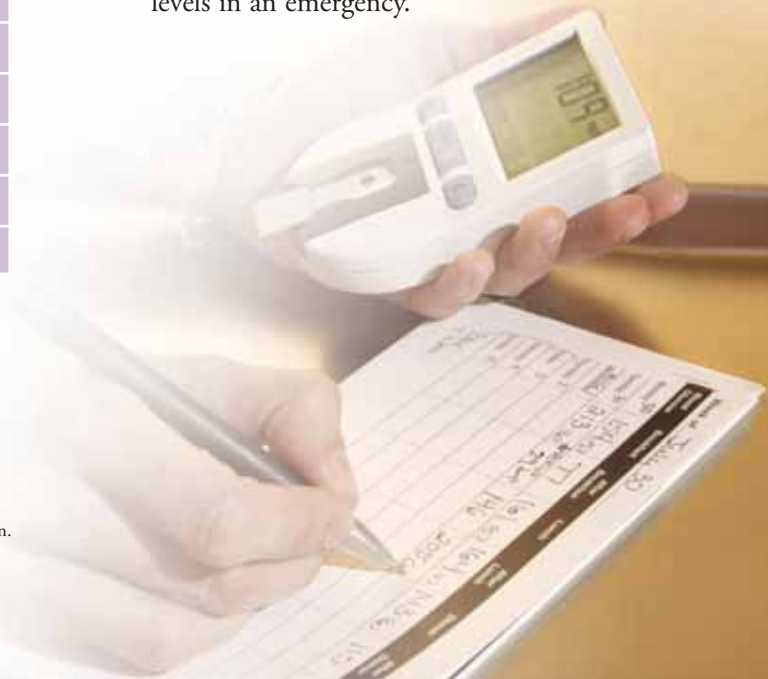
* The numbers here show sugar measurements in plasma, blood that has had its cells removed. This is the test that is done by your doctor when blood is drawn into a syringe or tube and tested in a laboratory. Most home glucose-monitor machines, by contrast, measure "whole-blood" glucose. Your numbers from a home glucose monitor should be slightly lower than the numbers that are shown here.

Source: American Diabetes Association.

Setting Goals and Monitoring Progress

In the past few years, scientists have discovered that good control of blood sugar goes a long way to preventing complications. Patients should aim for levels as close to normal as possible. Desirable results include FBS readings of 110 mg/dL or less, sugar levels below 140 mg/dL two hours after a meal, and A1C levels of 7.0 or less. These are tough standards, but the closer you get, the better.

Patients who take insulin should monitor their own blood sugar levels; and it's a good idea for other diabetics, too. It's also important to avoid lowering your sugar too far (hypoglycemia). Symptoms of low sugar include anxiety, sweating, a racing heart, trembling, and confusion. Without treatment, low blood sugar can even lead to coma, brain damage, and death. Diabetics should consider wearing a medical alert bracelet, and they should always carry candy to boost their sugar levels in an emergency.



Blood sugar gets all the press, but some other things are just as important. Here are five additional goals; in many cases, your doctor will have to prescribe medication to help with the first three:



1 Control your blood pressure; aim for readings below 130/80 mm Hg.



2 Control your cholesterol; aim for an LDL (“bad”) cholesterol below 100 mg/dL.



3 Protect your kidneys; get tested for tiny amounts of protein in your urine (*microalbuminuria*) and get treatment if you need it.



4 Protect your vision with regular eye care.



5 Protect your feet with good care. Sensible, well-fitted shoes, good nail care, and daily inspection of your feet will get you started.

Good control of blood sugar goes a long way to preventing complications.



Treating Diabetes: Lifestyle

Healthy living can prevent many cases of diabetes, and it will help lower blood sugar levels and prevent complications for everyone with the disease. Here are the big three:

1 Weight control. Shed as much excess fat as you can, especially from around your middle. Every little bit will be a big help.



2 Exercise. It's crucial for weight loss and lowers blood sugar by making your tissues more responsive to insulin. Walking for 30 minutes nearly every day is a great way to start—and it will also help with your blood pressure and cholesterol.



3 Diet. Special “diabetic diets” are a thing of the past, but healthy eating is as important as ever. To lose weight, reduce calories. Avoid sugar, sugary drinks, and other sweets. Limit refined grain products such as white bread and white rice as well as white potatoes. Eat lots of high-fiber foods—whole grain products, brown rice, beans, fruits, and veggies. Choose low-fat dairy products. Get your protein from fish, poultry, and small portions of lean meat. Avoid processed meats, snack foods, and other high-salt items. Use olive and canola oils, but not animal fat or partially-hydrogenated oils that show up in fried foods, stick margarine, and snack foods. If you chose to drink, use alcohol moderately and responsibly.



Tips for Healthy Eating Away from Home

For people with diabetes, eating out—whether at a restaurant, a function, or a friend’s home—is always a challenge. Portions can be hefty and packed with calories and saturated fat. When you eat out, it may help to follow these simple guidelines:

- Ask how entrées are prepared, and avoid fried foods or dishes served with heavy sauces or gravies.
- Choose skinless chicken, fish, or lean meat that’s broiled, poached, baked, or grilled.
- Get the server’s advice in selecting healthy, low-fat dishes. Restaurants are used to dealing with specialty diets.
- Don’t feel obligated to clean your plate. Eat a reasonable portion, and take the remainder home.
- Choose steamed vegetables and salads to accompany your meals. Request low-calorie dressings and toppings, and if they’re not available, ask for all dressings, butter, and sauces to be served on the side so you can use them sparingly.
- If you take insulin and know your meal will be delayed, time your dose appropriately. You may need to eat a roll or piece of fruit to tide you over.
- If you crave a dessert, share it.



Treating Diabetes: *Medication*

If diet and exercise are not enough, your doctor will prescribe medication to keep your blood sugar under control. Today, many types of medication—oral, insulin, and other injectables—help manage your diabetes. Doctors have a wider range of drugs to choose from and can often use them more effectively in combinations. Be sure to talk with your doctor about how the medications act to treat your condition, whether they address insulin resistance, low insulin production, or are combined to treat both.

Some diabetes experts are now going a step further in promoting aggressive diabetes treatment. Many doctors prescribe medication, even insulin, in conjunction with a diet and exercise plan as soon as the patient is diagnosed with diabetes. Early, aggressive therapy may prevent blood sugar levels from worsening with time by saving some of the cells that create insulin (*insulin-secreting beta cells*).

Talk with your doctor about what therapies may be appropriate to help you reach the goals set to control your diabetes.

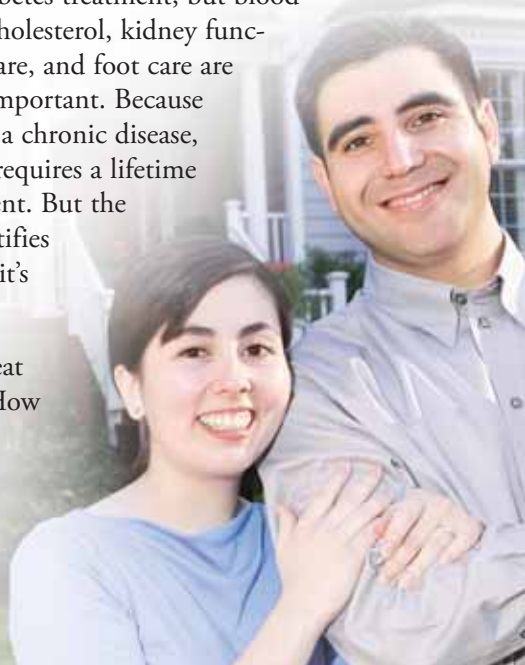
Beating Diabetes

Scientists are working hard to discover new ways to prevent and treat diabetes. Gene therapy and pancreas transplantation are among the hopes for the future, but they are still a long way off. Still, you can do your part to slow America's worrisome diabetes epidemic. Type 2 diabetes is a preventable disease. A balanced, healthful diet, regular exercise, and weight control really do work. In fact, a major Harvard study found that simple lifestyle changes can reduce the risk of diabetes by 91%.

These same health habits will lower blood sugar levels, reduce the need for medication, and cut the risk of complications in patients who have diabetes. Many will also need medication. A large number of excellent drugs are now available, and new ones are being developed. Drug treatment requires care and close cooperation between doctor and patient, but it produces major gains.

Tight control of blood sugar levels is the primary goal of diabetes treatment, but blood pressure, cholesterol, kidney function, eye care, and foot care are also very important. Because diabetes is a chronic disease, beating it requires a lifetime commitment. But the benefit justifies the effort: it's life itself.

You can beat diabetes. How sweet it is!





To learn more about diabetes, visit the **Pri-Med Patient Education Center** at www.patientedu.org/diabetes.

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