

Diagnosis

Type 2 diabetes is usually diagnosed using the:

- **Glycated hemoglobin (A1C) test.** This blood test indicates your average blood sugar level for the past two to three months. Normal levels are below 5.7 percent, and a result between 5.7 and 6.4 percent is considered prediabetes. An A1C level of 6.5 percent or higher on two separate tests means you have diabetes.

If the A1C test isn't available, or if you have certain conditions — such as an uncommon form of hemoglobin (known as a hemoglobin variant) — that interfere with an A1C test, your doctor may use the following tests to diagnose diabetes:

- **Random blood sugar test.** Blood sugar values are expressed in milligrams per deciliter (mg/dL) or millimoles per liter (mmol/L). Regardless of when you last ate, a blood sample showing that your blood sugar level is 200 mg/dL (11.1 mmol/L) or higher suggests diabetes, especially if you also have signs and symptoms of diabetes, such as frequent urination and extreme thirst.
- **Fasting blood sugar test.** A blood sample is taken after an overnight fast. A reading of less than 100 mg/dL (5.6 mmol/L) is normal. A level from 100 to 125 mg/dL (5.6 to 6.9 mmol/L) is considered prediabetes. If your fasting blood sugar is 126 mg/dL (7 mmol/L) or higher on two separate tests, you have diabetes.
- **Oral glucose tolerance test.** This test is less commonly used than the others, except during pregnancy. You'll need to fast overnight and then drink a sugary liquid at the doctor's office. Blood sugar levels are tested periodically for the next two hours. A blood sugar level of less than 140 mg/dL (7.8 mmol/L) is normal. A reading between 140 and 199 mg/dL (7.8 mmol/L and 11.0 mmol/L)

indicates prediabetes. A reading of 200 mg/dL (11.1 mmol/L) or higher after two hours suggests diabetes.

The American Diabetes Association recommends routine screening for type 2 diabetes beginning at age 45, especially if you're overweight. If the results are normal, repeat the test every three years. If the results are borderline, ask your doctor when to come back for another test.

Screening is also recommended for people who are under 45 and overweight if there are other heart disease or diabetes risk factors present, such as a sedentary lifestyle, a family history of type 2 diabetes, a personal history of gestational diabetes or blood pressure above 140/90 millimeters of mercury (mm Hg).

If you're diagnosed with diabetes, the doctor may do other tests to distinguish between type 1 and type 2 diabetes — since the two conditions often require different treatments.

After the diagnosis

A1C levels need to be checked between two and four times a year. Discuss your target A1C goal with your doctor, as it may vary depending on your age and other factors. For most people, the American Diabetes Association recommends an A1C level below 7 percent.

An elevated A1C level may signal the need for a change in your medication, meal plan, or activity level.

In addition to the A1C test, your doctor will measure your blood pressure and take blood and urine samples periodically to check your cholesterol levels, thyroid function, liver function, and kidney function. Regular eye and foot exams also are important.

Treatment

Management of type 2 diabetes includes:

- Weight loss
- Healthy eating
- Regular exercise
- Possibly, diabetes medication or insulin therapy
- Blood sugar monitoring

These steps will help keep your blood sugar level closer to normal, which can delay or prevent complications.

Weight loss

Losing weight can lower your blood sugar levels. Losing just 5 to 10 percent of your body weight can make a difference, although a sustained weight loss of 7 percent or more of your initial weight seems to be ideal. That means someone who weighs 180 pounds (82 kilograms) would need to lose a little less than 13 pounds (5.9 kilograms) to make an impact on blood sugar levels.

Controlling portions and eating healthy foods are simple ways to start taking the weight off.

Healthy eating

Contrary to popular perception, there's no specific diabetes diet. However, it's important to center your diet around:

- Fewer calories
- Fewer refined carbohydrates, especially sweets

- Fewer foods containing saturated fats
- More vegetables and fruits
- More foods with fiber

A registered dietitian can help you put together a meal plan that fits your health goals, food preferences, and lifestyle. He or she can also teach you how to monitor your carbohydrate intake and let you know about how many carbohydrates you need to eat with your meals and snacks to keep your blood sugar levels more stable.

Physical activity

Everyone needs regular aerobic exercise, and people who have type 2 diabetes are no exception. Get your doctor's OK before starting an exercise program. Choose activities you enjoy, such as walking, swimming, and biking, so that you can make them part of your daily routine.

Aim for at least 30 to 60 minutes of moderate (or 15 to 30 minutes of vigorous) aerobic exercise most days of the week. A combination of exercises — aerobic exercises, such as walking or dancing on most days, combined with resistance training, such as weightlifting or yoga twice a week — offers more benefits than either type of exercise alone.

Remember that physical activity lowers blood sugar. Check your blood sugar level before any activity. You might need to eat a snack before exercising to help prevent low blood sugar if you take diabetes medications that lower your blood sugar.

It's also important to reduce the amount of time you spend on inactive activities, such as watching TV. Try to move around a bit every 30 minutes.

Monitoring your blood sugar

Depending on your treatment plan, you may need to check and record your blood sugar level now and then or, if you're on insulin, multiple times a day. Ask your doctor how often he or she wants you to check your blood sugar. Careful monitoring is the only way to make sure that your blood sugar level remains within your target range.

Diabetes medications and insulin therapy

Some people who have type 2 diabetes can achieve their target blood sugar levels with diet and exercise alone, but many also need diabetes medications or insulin therapy. The decision about which medications are best depends on many factors, including your blood sugar level and any other health problems you have. Your doctor might combine drugs from different classes to help you control your blood sugar in several different ways.

Examples of possible treatments for type 2 diabetes include:

- **Metformin (Glucophage, Glumetza, others).** Generally, metformin is the first medication prescribed for type 2 diabetes. It works by lowering glucose production in the liver and improving your body's sensitivity to insulin so that your body uses insulin more effectively.
Nausea and diarrhea are possible side effects of metformin. These side effects may go away as your body gets used to the medicine or if you take the medicine with a meal. If metformin and lifestyle changes aren't enough to control your blood sugar level, other oral or injected medications can be added.
- **Sulfonylureas.** These medications help your body secrete more insulin. Examples include glyburide (DiaBeta, Glynase), glipizide (Glucotrol), and glimepiride (Amaryl). Possible side effects include low blood sugar and weight gain.

- **Meglitinides.** These medications — such as repaglinide (Prandin) and nateglinide (Starlix) — work like sulfonylureas by stimulating the pancreas to secrete more insulin, but they're faster acting, and the duration of their effect in the body is shorter. They also have a risk of causing low blood sugar and weight gain.
- **Thiazolidinediones.** Like metformin, these medications — including rosiglitazone (Avandia) and pioglitazone (Actos) — make the body's tissues more sensitive to insulin. These drugs have been linked to weight gain and other more-serious side effects, such as an increased risk of heart failure and anemia. Because of these risks, these medications generally aren't first-choice treatments.
- **DPP-4 inhibitors.** These medications — sitagliptin (Januvia), saxagliptin (Onglyza), and linagliptin (Tradjenta) — help reduce blood sugar levels, but tend to have a very modest effect. They don't cause weight gain but may cause joint pain and increase your risk of pancreatitis.
- **GLP-1 receptor agonists.** These injectable medications slow digestion and help lower blood sugar levels. Their use is often associated with weight loss. Possible side effects include nausea and an increased risk of pancreatitis. Exenatide (Byetta, Bydureon), liraglutide (Victoza) and semaglutide (Ozempic) are examples of GLP-1 receptor agonists. Recent research has shown that liraglutide and semaglutide may reduce the risk of heart attack and stroke in people at high risk of those conditions.
- **SGLT2 inhibitors.** These drugs prevent the kidneys from reabsorbing sugar into the blood. Instead, the sugar is excreted in the urine. Examples include canagliflozin (Invokana), dapagliflozin (Farxiga), and empagliflozin (Jardiance).
Medications in this drug class may reduce the risk of heart attack and stroke in people with a high risk of those conditions. Side effects may include vaginal yeast infections, urinary tract infections, low blood pressure, and a higher risk of diabetic ketoacidosis. Canagliflozin, but not the other drugs in the class, has been associated with increased risk of lower limb amputation.

- **Insulin.** Some people who have type 2 diabetes need insulin therapy. In the past, insulin therapy was used as a last resort, but today it's often prescribed sooner because of its benefits. Low blood sugar (hypoglycemia) is a possible side effect of insulin.

Normal digestion interferes with insulin taken by mouth, so insulin must be injected. Depending on your needs, your doctor may prescribe a mixture of insulin types to use throughout the day and night. There are many types of insulin, and they each work differently.

Often, people with type 2 diabetes start using insulin with one long-acting shot at night, such as insulin glargine (Lantus) or insulin detemir (Levemir). Discuss the pros and cons of different drugs with your doctor. Together you can decide which medication is best for you after considering many factors, including costs and other aspects of your health.

In addition to diabetes medications, your doctor might prescribe low-dose aspirin therapy as well as blood pressure and cholesterol-lowering medications to help prevent heart and blood vessel disease.

Bariatric surgery

If you have type 2 diabetes and your body mass index (BMI) is greater than 35, you may be a candidate for weight-loss surgery (bariatric surgery). Dramatic improvements in blood sugar levels are often seen in people with type 2 diabetes after bariatric surgery, depending on the procedure performed. Surgeries that bypass a portion of the small intestine have more of an effect on blood sugar levels than do other weight-loss surgeries.

Surgery drawbacks include its high cost and risks, including a small risk of death. It also requires drastic lifestyle changes. Long-term complications may include nutritional deficiencies and osteoporosis.

Pregnancy

Women with type 2 diabetes may need to alter their treatment during pregnancy. Many women will require insulin therapy during pregnancy. Cholesterol-lowering medications, aspirin, and some blood pressure drugs can't be used during pregnancy.

If you have diabetic retinopathy, it may worsen during pregnancy. Visit your ophthalmologist during the first trimester of your pregnancy and at one year postpartum.

Signs of trouble

Because so many factors can affect your blood sugar, problems sometimes arise that require immediate care, such as:

- **High blood sugar (hyperglycemia).** Lots of things can cause your blood sugar to rise, including eating too much, being sick, or not taking enough glucose-lowering medication. Watch for signs and symptoms of high blood sugar — frequent urination, increased thirst, dry mouth, blurred vision, fatigue, and nausea — and check your blood sugar if necessary.
- **Hyperglycemic hyperosmolar nonketotic syndrome (HHNS).** This life-threatening condition includes a blood sugar reading higher than 600 mg/dL (33.3 mmol/L). Your blood sugar meter may not provide an accurate reading at this level or it may just read "high." HHNS can cause dry mouth, extreme thirst, drowsiness, confusion, dark urine, and convulsions. HHNS is caused by sky-high blood sugar that turns blood thick and syrupy. It tends to be more common in older people with type 2 diabetes, and it's often preceded by an illness or infection. Call your doctor or seek immediate medical care if you have signs or symptoms of this condition.
- **Increased ketones in your urine (diabetic ketoacidosis).** If your cells are starved for energy, your body may begin to break down fat. This produces toxic acids known as ketones, which occur more commonly in people with

type 1 diabetes.

Watch for thirst or a very dry mouth, frequent urination, vomiting, shortness of breath, fatigue, and fruity-smelling breath, and if you notice these signs and symptoms, consult your doctor right away or seek emergency care.

- **Low blood sugar (hypoglycemia).** If your blood sugar level drops below your target range, it's known as low blood sugar (hypoglycemia). Your blood sugar level can drop for many reasons, including skipping a meal, unintentionally taking more medication than usual or getting more physical activity than normal.

Watch for signs and symptoms of low blood sugar — sweating, shakiness, weakness, hunger, irritability, dizziness, headache, blurred vision, heart palpitations, slurred speech, drowsiness, and confusion.

If you have signs or symptoms of low blood sugar, drink or eat something that will quickly raise your blood sugar level — fruit juice, glucose tablets, hard candy, regular (not diet) soda, or another source of sugar. Retest your blood in 15 minutes to be sure your blood glucose levels have normalized. If they haven't, treat again and retest in another 15 minutes. If you lose consciousness, a family member or close contact may need to give you an emergency injection of glucagon, a hormone that stimulates the release of sugar into the blood.

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High  Sugar

