



Education

Diabetes Mellitus: Type 1

What is type 1 diabetes mellitus?

Type 1 diabetes is a disorder that happens when your body produces little or no insulin. The lack of insulin causes the level of sugar in your blood to become abnormally high.

When you digest food, your body breaks down much of the food into sugar (glucose). Your blood carries the sugar to the cells of your body for energy. The pancreas gland makes insulin, which helps move the sugar from the bloodstream into the cells.

When your body does not have enough insulin, it is hard for sugar to enter your cells. Sugar builds up in the blood. Too much sugar in your blood can cause many problems. These problems can be life-threatening if they are not treated. However, proper treatment can control your blood sugar level.

Type 1 diabetes is also called juvenile diabetes and was formerly called insulin-dependent diabetes. This type of diabetes usually starts in childhood or early adulthood.

How does it occur?

Type 1 diabetes occurs when most or all of the insulin-producing cells in the pancreas have been destroyed. Usually the cause of this type of diabetes is not known. Sometimes the diabetes may be the result of a viral infection or injury of the pancreas. Or it might result from an immune system disorder.

What are the symptoms?

Symptoms may develop suddenly. Or they may develop gradually over days to weeks. Symptoms vary widely from person to person. Common symptoms include:

- increased urination
- increased thirst and dry mouth
- increased appetite or loss of appetite
- unexpected weight loss
- blurred vision
- tiredness
- fruity odor to breath.

If diabetes is not treated, you could develop a life-threatening chemical imbalance called ketoacidosis and possibly go into a coma.

How is it diagnosed?

Your health care provider will ask about your medical history and your symptoms and examine you. He or she will test the level of sugar in your blood. Two blood tests may be done to diagnose diabetes:

- a fasting plasma glucose test (FPG), also called a blood sugar
 - the oral glucose tolerance test (OGTT).
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The FPG test is easier, faster, and less expensive to do. A sample of your blood is tested in the morning before you have eaten anything. If this test shows you have a fasting blood sugar of 126 milligrams per deciliter (mg/dL) or more, you may be diabetic.

For the glucose tolerance test, a sample of your blood is taken and tested when you have not eaten anything since the night before. Then you drink a sugar drink and your blood is tested again 2 hours later. If after 2 hours your blood sugar level is 200 mg/dL or higher, you are diabetic.

How is it treated?

Giving your body more insulin is the main treatment for type 1 diabetes. However, diet and exercise are also important parts of treatment. The goal is for you to keep your blood sugar level in a normal range.

- **Insulin therapy** You will start having insulin shots as soon as the diagnosis is confirmed. Insulin is available in different forms: for example, short-acting (regular), intermediate-acting (NPH, lente), and long-acting (ultralente). At first you may use short-acting insulin several times a day until your blood sugar is under good control. It is common to combine short-acting and some longer acting forms in 1 dose (in 1 syringe). Two new forms of insulin are rapid-acting or once-a-day. They are usually for people who have achieved good control of their blood sugars and have a special need for these types of insulin. Rapid-acting insulin lispro (Humalog) and insulin aspart (NovoLog) act very quickly to lower the blood sugar, but their effects wear off in 2 to 4 hours. Insulin glargine (Lantus) is long acting and was developed to allow just 1 shot a day. Shots of insulin may be given under the skin of the thigh or abdomen 1 to 4 times a day. You will learn how to measure your insulin dose, clean your skin, and give yourself shots. The insulin pump is a new way of giving the body insulin. The pump is worn at the waist like a pager. A tube connected to the pump is inserted under the skin. As your blood sugar level changes, you can adjust the amount of insulin pumped through the tube. Because you are using insulin to lower your blood sugar, you must carefully follow your health care provider's directions for checking your blood sugar. This will not only help you achieve good blood sugar control to prevent the complications of diabetes, but it will also help you prevent possibly life-threatening low levels of blood sugar (hypoglycemia). If the insulin does not seem to be working, your provider will try to find out why. Your provider will ask about your diet, changes in your lifestyle, other medicines you are taking, and how you use and store your insulin. You will also be checked for other medical problems, such as an infection. A new medicine, Symlin, is now available to help people whose present insulin dose is not controlling their blood sugars. It is injected just before mealtimes. Insulin doses may need to be adjusted because adding Symlin can cause very low blood sugars (hypoglycemia) up to 3 hours after a shot. Another newly approved diabetes medicine is Exubera, which is insulin in a form that can be inhaled rather than given as a shot. It cannot be used if you are a smoker or have recently quit smoking.
- **Diet** The main goal of your diet plan is to maintain a normal blood sugar level. Your health care provider will give you guidelines about which foods you should eat and how many calories you should eat each day. The number of calories recommended for your daily diet is based on your weight and whether you need to maintain, lose, or gain weight. You will also learn how to space your meals so you avoid going too long without food. Your provider may refer you to a dietitian for help with diet planning and meal management. A dietitian can help you design a meal plan that fits your lifestyle. Your prescribed diet will include a lot of lean protein, complex carbohydrates (such as pasta, breads, and cereals), and foods with high fiber. Your diet should not include sugar-rich food such as soft drinks, candy, and desserts.
- **Exercise** Exercise is very important. A good activity plan can help control your blood sugar level. Talk to your health care provider about making an activity plan for you.
- **Sick-day plan** Diabetes is harder to control when you are sick. Blood sugar can get very high during an illness and become a medical emergency. Be prepared for illness with a sick-day plan. Your health care provider will work with you to develop a plan designed specially for you.
- **Education** There is a lot you will need to learn. You should attend diabetes classes or talk to your health care provider about how you can learn all you need to know. You can also check with the local American Diabetes Association chapter, hospital, or health department about classes in your area. It's good for your family to also learn about diabetes.

You will learn how to check your blood sugar at home. You will need a glucometer, a small machine that tests your blood sugar. You will need some lancets (little blades or needles to prick your finger) and some test strips to put a drop of blood on. Your health care provider will tell you when and how often you need to check your blood sugar.

When you have just been diagnosed with diabetes you will need to check your blood sugar more often. After you have your diabetes under control, your health care provider will tell you how you can decrease your sugar checks.

Keep a log of your blood sugar measurements. Your health care provider will check the log at your appointments to see how well your treatment is working.

A blood test called hemoglobin A1c can show your average blood sugar control over the last 2 or 3 months. Your health care provider may do this test every 2 or 3 months to check your overall control of your blood sugar level. This is the best way to see if you are keeping your diabetes under control.

How long will the effects last?

Type 1 diabetes is a lifelong condition. Its symptoms increase or decrease depending on your response to the insulin and your new diet and on how well you are able to control your blood sugar level.

Taking good care of yourself to avoid complications is especially important with diabetes. Possible diabetic complications include heart disease, stroke, blindness, kidney failure, and nerve damage, especially to your feet and legs. Carefully controlling your blood sugar will delay or prevent these complications. Also make sure you get yearly tests to check your kidneys. For example:

- If you have had type 1 diabetes for at least 5 years, the urine protein test should be done every year to check for microalbumin, a type of protein.
- A blood test to check creatinine should be done at least once a year.

How can I take care of myself?

Guidelines for eating:

- Choose foods with lean protein, complex carbohydrates, and lots of fiber. Choose foods low in saturated fats. Read labels.
- Distribute your total calories evenly throughout the day.
- Time your meals to balance peak insulin effects and scheduled activities. Try to always have your meals and snacks at the same time each day.
- When you increase your activity, check your blood sugars more often. You may need to eat more or decrease the insulin you are taking. This will help prevent low blood sugar.
- Learn how to make proper food choices when you eat out.
- Ask for diabetic meals when you travel (for example, in hotels and on planes). Order your meals ahead of time.

Guidelines for managing calories:

- Avoid compulsive eating.
- Drink water or other noncaloric drinks when you feel an urge to eat between meals.
- Limit the amount of alcohol you drink.
- Buy only the types of food allowed by your diet plan.
- Eat on a regular schedule.
- Eat slowly and chew food thoroughly.

Guidelines for managing insulin:

- Follow your health care provider's instructions for giving yourself insulin.
- Ask your health care provider about the symptoms and causes of low blood sugar and what to do when you have low blood sugar.
- Know when and how to test your blood.
- Follow your health care provider's instructions for adjusting your insulin dosage according to the results of blood tests.
- Carry some form of sugar at all times, so you can treat low blood sugar quickly.
- Carry a protein snack, such as cheese and crackers, to make sure you eat as often as you should.
- Make sure your family members know what to do if your sugar is too high or too low.

Guidelines for seeing your health care provider:

- Follow your health care provider's recommendations for frequent follow-up visits until your diabetes is under good control.
 - When your diabetes is under control, see your health care provider every 3 to 6 months unless your provider
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- needs to see you more often.
- Eyes are affected by diabetes. You should have your eyes checked within 5 years of diagnosis if you are under 30 and right away if you are over 30. You will then need eye checkups at least every year. Women who become pregnant should have their eyes checked each trimester because diabetic eye problems can worsen quickly during pregnancy. Excellent blood sugar control can reduce the risk of worsening diabetic eye disease.

Other guidelines for managing diabetes:

- Learn how to do proper skin and foot care every day. Wear comfortable, well-fitting shoes to help prevent foot injury. Break in new shoes gradually.
- Exercise regularly according to your health care provider's advice. Exercise helps the insulin do its job better. It also helps you to maintain a normal blood pressure and a healthy heart. Wear well-fitting, supportive, and well-cushioned shoes when you exercise.
- Ask your provider if you need to check your urine for ketones. Ketones are chemicals that show that your sugar is too high. Your provider will tell you when and how to check for ketones, if you need to. It is usually necessary only if you are starting to come down with an illness or if your sugars have been running too high.
- Carry an ID (such as a card or bracelet) that says you have diabetes, in case of an emergency.

Learn about diabetes and its complications so you can make the correct decisions to control your blood sugar levels. Many hospitals have diabetes educators and dietitians who can help you. Ask your health care provider to refer you to these people.

You can get diabetic cookbooks and more information about diabetes from:

The American Diabetes Association
Phone: 800-DIABETES (800-342-2383)
Web site: <http://www.diabetes.org>.

How can I help prevent type 1 diabetes?

Type 1 diabetes cannot be prevented. However, many of the problems associated with the disease can be eliminated or reduced if you:

- Follow the guidelines your health care provider gives you.
- Maintain a normal blood sugar level.
- Learn how to inject insulin correctly, including where to inject it.
- Learn how to test your blood sugar.
- Know when to adjust your medication.
- Do not smoke. Smoking speeds up the damage to the heart and blood vessels.
- Have other medical problems treated, especially high blood pressure and high cholesterol.
- Keep your appointments with your health care provider.
- Call your health care provider if you have any questions.

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Pancreas

The top diagram shows the pancreas in the abdominal cavity, with labels for the Liver, Gallbladder, Stomach, Common bile duct, and Pancreas. The bottom diagram shows a cross-section of the pancreas with labels for Head, Body, Tail, Duodenum (first part of small intestine), Pancreatic duct, Common bile duct, and Sphincter of Oddi.

How to Give a Subcutaneous Injection

1. Use an alcohol swab to clean the skin where you will give yourself the shot.
2. Gently pinch up the skin and insert the needle into the skin at a 45° angle.
3. After you insert the needle, completely release your grasp of the skin.
4. Eject all of the solution by gently and steadily pushing down the plunger.
5. Withdraw the needle and syringe and press an alcohol swab on the spot where the shot was given.

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