

Diabetes

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What is it?

Diabetes mellitus (sugar diabetes or more commonly just *diabetes*) is a disease that affects the way the body uses food, causing sugar levels in the blood to go too high. Digestion breaks down most of our food into *glucose*, a kind of sugar that is the body's main source of energy. But before it can be used as energy, glucose must get inside all of the body's cells. *Insulin*, a hormone produced by the *pancreas*, acts as the "key" that opens the door to cells, letting the glucose in.

There are two types of diabetes mellitus – type 1 diabetes (previously known as juvenile diabetes) which accounts for about 10% of people with diabetes, and type 2 diabetes (previously adult diabetes) which includes over 90% of diabetics. In people with diabetes, either the body doesn't make enough insulin (type 1) or it can't effectively use the insulin it makes (type 2) due to *insulin resistance*. As a result, blood glucose rises.

What causes it?

No one knows the exact cause of diabetes. But we do know that certain behaviors and conditions, called risk factors, can make you more likely to get diabetes. In particular, type 2 diabetes mostly affects people who are overweight (the single most important risk factor), are sedentary, have other close family members with diabetes (2x risk), are over age 45, or are members of certain ethnic groups such as Native Americans (5x risk), Hispanic Americans (3x risk) or African Americans (2x risk). Women who had gestational diabetes during pregnancy or delivered a baby >9 pounds also are at higher risk of developing diabetes sometime later in life.

Who gets it?

Approximately 16 million Americans have diabetes, but only 1/3 have been diagnosed. In addition, approximately another 15 million Americans have *pre-diabetes* (formerly borderline diabetes). The lifetime risk of diabetes for US men is 33% and for women 39%.

Diabetes shortens the average lifespan 9-12 years. It is currently the fourth leading cause of death by disease in the United States.

What are the symptoms?

Very often the symptoms aren't obvious and come on very slowly. Sometimes there are no symptoms. But when there are symptoms, they usually include:

Symptoms

- Increased thirst
- Frequent urination
- Weight loss, even with increased appetite
- Weakness, fatigue
- Nausea, vomiting
- Blurred vision
- Slow healing of cuts and scratches
- Frequent skin, gum, or bladder infections
- Numbness in hands or feet

How do you prevent it?

Recent research suggests that diabetes might be preventable by maintaining a proper weight, along with regular exercise and a healthy diet. We already know these habits can delay the disease in people who have inherited the tendency to develop diabetes.

Can it be treated?

Although there is no cure for diabetes, it can be controlled. No matter which type of diabetes you have, it is important to understand that diet and exercise form the foundation of any successful treatment plan. Medications can be added if diet and exercise alone are not enough. The goal of treating diabetes is to control your blood sugar level by keeping it as close to normal as possible, which has been shown to prevent or delay many of the long-term complications of diabetes. In general, sugar levels before meals should be between 80 and 130 mg/dl and not more than 180 after meals. Follow the advice of your doctor. Take your medicine as directed. Keep track of your blood sugars and learn all you can about your diabetes.

DIET – The most important thing you can do is eat the right food, in the right amounts, at about the same time everyday. Eat plenty of fiber. Fiber helps slow down the release of sugar into your blood after eating, so it helps control your blood sugar level. Avoid high sugar foods. Switch to sugar-free foods and drinks. Use sugar substitutes if needed. About 10-20% of calories should come from protein, less than 10 % from saturated fats (which are solid at room temperature), up to 10% from polyunsaturated fats, and then 60-70% from carbohydrates. Daily cholesterol intake should be less than 300mg. And if you are overweight, losing even 5-10% of body weight can lower your blood sugar and cholesterol levels significantly.

EXERCISE – Exercise can lower blood glucose levels, help you lose weight, and improve your circulation, blood pressure, and heart health. It can also give you more energy, make you stronger, and help relieve stress. You can choose any nonstop activity that makes your heart and lungs work harder than normal. This is called *aerobic* exercise. Running, walking, swimming and cycling are all aerobic exercises. It is important to do some exercise nearly every day.

MEDICATION – With type 1 diabetes you will need to take insulin. With type 2, treatment starts with helping your body more effectively use the insulin it does make by reducing insulin resistance. In time, most people with type 2 diabetes produce less and less insulin. Therefore, treatment will change over time.

- **Biguanides** - Metformin (Glucophage) works on the liver to keep it from releasing too much glucose, particularly at night when you sleep. The liver has stored glucose that normally is released between meals.

- **Sulfonylureas**- Glyburide, glipizide, glimepiride (Micronase, Glynase, Glucotrol, Amaryl) are the oldest class of medications available and primarily work on the pancreas to make and release more insulin.

- **Meglitinides** (Prandin) and **d-phenylalanine derivatives** (Starlix) are similar to the sulfonylureas by primarily working on the pancreas to release more insulin. However, they are quicker acting and quicker peaking to more closely mirror the release of glucose after a meal which helps to prevent the blood sugar from dropping too low between meals.

- **Alpha-Glucosidase Inhibitors** (Glyset, Precose) work in your intestines to delay how fast your body absorbs carbohydrates.

- **Thiazolidinediones**, also known as “glitizones” (Avandia, Actos) help your body use insulin more effectively by decreasing insulin resistance.

- **DPP-4 inhibitors** (Januvia) work only when blood sugar is elevated to release more insulin from the pancreas and control production of glucose by the liver.

- **Incretin mimetic** – (Byetta) stimulates insulin secretion only when blood sugar is high and not controlled with oral agents. It does not cause weight gain like many other agents. It is injected before meals. It is not for use with Type I diabetes or with insulin.

- **Insulin** works directly at the cell level to open the door for glucose to enter.

- **Amylinomimetic** – (Symlin) slows absorption of carbohydrate and suppresses glucose output from the liver. It is injected before meals at the same time as insulin. Nausea is the most common side effect.

Are there complications?

Diabetes can cause serious health problems, often without symptoms. These problems usually develop after many years of having constant or repeated high blood sugar levels. When blood sugar levels are high it causes damage to the small blood vessels in the body. Organs that are particularly dependent upon small vessels for nourishment are affected most often and most severely. Complications of diabetes include: *Nephropathy* – kidney damage in which the kidneys can no longer filter wastes as effectively and may eventually fail leading to dialysis; *Retinopathy* – eye disease leading possibly to blindness; *Neuropathy* – nerve damage which can cause numbness, tingling, or a burning feeling in the feet and legs; *Vasculopathy* – damage to the blood vessels to the brain or legs which can cause stroke or amputation; and *Cardiomyopathy* – blockages in the blood vessels of the heart known as *atherosclerosis* which can lead to heart attacks. The best thing to prevent these problems is to take good care of yourself and keep your blood sugars in control.

Most complications can be prevented. The American Diabetes Association targets several key areas in which good care makes a difference. You should have your long-term glucose control (A1C) checked by your doctor every 3-6 months with the goal being less than 7.0%. Your cholesterol (a risk for heart disease) and urine protein (a sign of kidney damage) should be checked yearly. You should have a complete eye examination yearly by your eye doctor. You should get into the habit of examining your feet everyday, and they should be checked for nerve damage by your doctor yearly. If you smoke, you should quit. And your blood pressure should be checked regularly, at least every 3-6 months, with the goal less than 130/80.

In summary

- Follow these steps to plan for success:
 - * Follow a healthy meal plan
 - * Exercise regularly
 - * Take your medication every day
 - * Test your blood sugar regularly
 - * Get regular care from your doctor
- For more information, contact the American Diabetes Association at (800) 232-3472, or at www.diabetes.org or the National Diabetes Education Program at ndep.nih.gov