

What You Should Know About Diabetes

Diabetes mellitus is a common disease, affecting 15.7 million Americans. However, 5.4% don't even know they have it. More ominously, as we exercise less and gain more weight, the incidence of diabetes has increased by fivefold over the past 40 years. Most individuals over age 40 will gain an average of 1/2 pound each year. In 1994, more than \$105 billion were spent caring for patients with diabetes. Sixty-five percent of that total was spent managing complications of diabetes such as heart attacks, strokes, kidney failure and loss of vision.

What is diabetes?

Diabetes affects your ability to produce or use insulin, a hormone that turns food into energy. Diabetes is a disorder of carbohydrate metabolism. The body converts carbohydrates into glucose, a sugar that fuels cell activity. Insulin is the "key" that allows glucose to enter the cells. If glucose can't enter the cells, it stays in the bloodstream, leading to high glucose levels known as "glucotoxicity." There are three main types of diabetes: type 1, type 2, and gestational. Patients with type 1 diabetes require insulin to maintain good glycemic control. Type 2 patients can be treated with oral medications, diet, and exercise. When diabetes becomes apparent during pregnancy, it is known as "gestational diabetes." Although gestational diabetes improves once the pregnancy is completed, nearly all patients eventually develop diabetes within 10 years.

This Patient Handout was prepared by Patricia L. Van Horn using materials from IntelliHealth (<http://www.intellihealth.com/IH/intIH>), the UpToDate Patient Resource Center (http://www.uptodate.com/patient_info/patient_info_index.asp), and Mayfield E. Diabetes: you can take control. The Female Patient. 2000;S19:S4-S8.

Type 1 diabetes accounts for 5% to 10% of cases. It usually develops before age 30, but can affect people of all ages. It's an *autoimmune* condition that destroys the beta cells of the pancreas where insulin is produced.

Type 2 diabetes accounts for almost 90% of cases; about 6% of Americans aged 20 to 74 have it. It usually affects older people, but its incidence is rising alarmingly in children because of the increase in childhood obesity and lack of exercise. In this disorder, one develops insulin resistance. High levels of insulin are produced at first, but the muscle, liver and fat cells lose their ability to bind insulin. Thus, insulin is unable to drive glucose into cells and blood glucose levels begin to rise. Insulin resistance occurs 7 to 10 years before the diagnosis of type 2 diabetes is made. By that time, 50% of the pancreas beta cells have stopped functioning and insulin levels begin to decline. Oral agents can be used to stimulate the release of insulin from the pancreas, reduce the level of resistance in the liver, and delay the absorption of carbohydrates by the gut, thereby improving blood glucose levels. Blood glucose control is difficult to maintain with oral agents after 5 to 7 years. Most type 2 patients must be switched to insulin.

Who is at risk for diabetes?

Heredity may play a role in the risk of type 1 diabetes, but otherwise it's very difficult to predict who will develop it. However, your risk of developing type 2 (or even type 1) diabetes as an adult is higher if you are over age 45; overweight; have had a baby weighing more than 9 lb; get little exercise; have a parent or sibling with type 2 diabetes; have hypertension, high cholesterol, or polycystic ovarian disease; or are African-American, Hispanic-American, Asian-American, or Native-American.

What are the symptoms of diabetes?

Symptoms of diabetes include:

- Persistent hunger or thirst
- Frequent urination
- Weight loss
- Blurred vision
- Persistent fatigue

Many people with type 2 diabetes have no symptoms until the disorder is advanced; Doctors recommend blood glucose testing every 3 years after age 45, or yearly if you have risk factors.

Diagnosing diabetes

The "gold standard" for diagnosing diabetes is the fasting blood glucose test. You fast for 8 to 12 hours, and then your blood glucose is evaluated. A result of 110 milligrams per deciliter (mg/dL) or less is normal; 111 to 125 mg/dL suggests the presence of "impaired fasting glucose"; and 126 mg/dL or above indicates that you have diabetes. Blood sugars can also be taken 2 hours after eating. Non-diabetic individuals have 2-hour "post-prandial" levels below

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140mg/dL. Blood sugars between 140 and 199 mg/dL indicate the presence of “impaired glucose tolerance (IGT),” and a blood sugar above 200 mg/dL suggests the presence of diabetes. Patients with impaired glucose tolerance are at risk for developing the same complications as seen with diabetes, including heart attacks and strokes. About 30% of individuals with IGT will progress to the diabetic state within 5 to 10 years.

How can I keep track of my blood glucose level?

Patients with diabetes must monitor their blood glucose at home. This generally involves pricking your finger to obtain a drop of blood and then “reading” the glucose level with a hand-held meter. Your doctor will tell you when and how often to do this, and may test your level of hemoglobin A1c (glycohemoglobin), which averages your blood glucose levels over the past 3 months. The American Diabetes Association recommends that glycohemoglobin levels be 6.5% to 7% to avoid developing diabetes-related complications.

How is diabetes treated?

Lifestyle modification is critical for managing all forms of diabetes. Patients should exercise by walking for 30 minutes a day, 4 days a week. Smoking should stop and alcohol intake minimized. Home blood glucose monitoring should be performed on a regular basis. Patients should join the American Diabetes Association (www.diabetes.org) to learn about the disorder. Patients who are overweight should lose 7 to 10 lbs to improve blood pressure and blood glucose levels. If one’s glycohemoglobin cannot be reduced to acceptable levels with lifestyle modification, medications should be initiated and aggressive disease management should be practiced.

Diet guidelines include eating regularly, so *don’t* skip any meals. Between 50% and 60% of calories should come from carbohydrates; 10% to 20% from protein; and less than 30% from fats and oils. You should get more fiber by eating grains, fruits, vegetables, and a fiber supplement if your doctor agrees; fiber can help decrease fluctuations in your glucose levels.

What about medications?

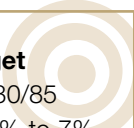
Treatment for type 1 diabetes requires daily insulin therapy, which can be administered by syringe or pen injections, or with an external insulin pump attached by a catheter under the skin, which is changed every 2 to 3 days. Today, most patients on insulin require 3 to 4 injections daily to maintain tight glycemic control. If you have type 2 diabetes and diet and exercise don’t lower your blood glucose enough, you may need medication. Combinations of 2 or 3 different drugs are usually necessary to improve glycemic control and reduce diabetes related symptoms. Lifestyle modification should always be practiced regardless of the type of medication one uses for diabetes.

What are the possible complications of diabetes?

Diabetes does not automatically lead to blindness and loss of a limb. However, poor blood glucose control can lead to infections (especially yeast infections), heart disease, stroke, kidney disease, visual impairment, and serious nerve damage. Preventing complications starts with good blood glucose control, regular eye and foot examinations, and frequent cholesterol, kidney, and hypertension testing. To avoid complications, physicians should regularly monitor patients’ metabolic parameters as listed below. If one’s numbers are not in “target” additional medication may be necessary to prevent complications.

Can I become pregnant if I have diabetes?

With careful blood glucose monitoring, most diabetic women can have normal pregnancies. The hemoglobin A1c value is especially important during the first trimester; high levels are associated with an 8% to 13% risk of birth defects, compared with a 2% to 4% risk in nondiabetic women. High blood glucose levels later in pregnancy can cause fetal



| Parameter | Target |
|---------------------|-------------|
| Blood pressure | <130/85 |
| Glycohemoglobin | 6.5% to 7% |
| Total Cholesterol | < 200 mg/dL |
| LDL Cholesterol | <100 mg/dL |
| HDL Cholesterol | >45 mg/dL |
| Urine protein level | < 30mg/dL |

complications such as stillbirth, prematurity, high birth weight, difficulty breathing, low blood sugar, low calcium levels, and heart problems. Risks to the mother include vision problems, kidney disease, hypertension, preeclampsia, and infection. Your doctor can perform maternal serum alpha-fetoprotein (MSAFP) testing and ultrasound to check for fetal problems. If you use drugs for type 2 diabetes, you’ll have to switch to insulin during pregnancy because oral hypoglycemic drugs can harm the fetus.

Many people think that a diagnosis of diabetes means a lifetime of deprivation and illness, and juggling diet, glucose checks, medication, and exercise can certainly be a major challenge. However, there’s no reason why you can’t lead an active and enjoyable life. Your doctor can help with a drug and glucose testing schedule, and a dietitian can plan a healthy diet that accommodates your tastes. Once you develop your new routine, you may find yourself feeling healthier and happier than you have in a long time.