

Preventing Type 2 Diabetes and Its Complications

What is Diabetes?

Diabetes is a chronic medical condition resulting in high blood sugar (glucose) levels in the blood. High blood sugar over years may cause damage to nearly every organ in the body. Blood sugar is controlled by insulin, a hormone produced by the pancreas. Insulin allows cells to absorb the sugar from your blood. Diabetes is not contagious, but it does run in families.

Different types of diabetes exist. The most common type of diabetes is called Type 2 diabetes. Type 2 diabetes begins when the body is unable to react appropriately to insulin. Type 1 diabetes occurs when the pancreas stops producing enough insulin and usually begins in childhood. Diabetes can also occur during pregnancy and is called gestational diabetes. Although this is temporary, mothers who have gestational diabetes are more likely to develop Type 2 diabetes later in life.

Who gets Type 2 Diabetes?

Type 2 diabetes is very common. It can occur at any age but most often affects people over age 40. Type 2 diabetes is occurring more frequently in the United States than in the past, especially among adolescents and children.

While anyone can develop diabetes, certain groups have an increased risk of developing the disease. These groups include overweight people, American Indians, Blacks, Hispanics, Asians, blood relatives of people with Type 2 diabetes and women who had diabetes during pregnancy.

How do I prevent diabetes?

Maintain a healthy weight and stay active! Controlling your weight with an appropriate diet and physical activity routine is the best way to lower your risk of developing diabetes. Your health care provider (physician, nurse practitioner, or physician assistant), a dietician, and/or a trainer may be helpful in creating an appropriate diet and exercise regimen. Regardless of your weight, most health care providers recommend at least 30 minutes of moderate physical activity (brisk walking or a similar/more strenuous activity) at least 5 days per week.

How do I know if I have diabetes?

You may not know. Some people with diabetes do not have any symptoms. Others may experience excessive thirst, frequent urination and hunger. Symptoms of lightheadedness, blurred vision, tiredness and weight changes may also occur.

Detecting diabetes requires a blood test to measure blood sugar level. It is still uncertain whether routine testing for early diabetes is necessary for all people. However, experts recommend testing people who have high blood pressure or high cholesterol. Certain at risk individuals such as those who are overweight, older than 40 years of age and/or ethnically at risk may be

considered for routine testing. If you develop any of the symptoms listed above, you should immediately visit a health care provider to be tested.

What are the common long-term complications of diabetes?

1. Heart Disease and Stroke

Heart disease and strokes are the leading causes of the death in the United States. People with Type 2 diabetes have two to four times the risk of dying from heart disease or strokes.

How does diabetes affect the heart and cause strokes?

Research is being conducted to better understand why people with diabetes have more heart disease and strokes than those without diabetes. A significant factor is the damage that occurs to the blood vessels that supply the heart and brain.

How do you know if you have heart disease or have had a stroke?

Most people with heart disease are not aware of it. Physical exam, electrocardiogram (EKG), and exercise testing are some ways that heart disease is diagnosed. Unfortunately, for many people the first sign that they have heart disease is a heart attack. Heart attacks generally feel like crushing chest pressure and may cause shortness of breath or pain in the left arm. In people with diabetes, chest pain may be minimal or not felt at all due to nerve damage from diabetes.

The symptoms of a stroke can vary. Often individuals may notice an area of their body that suddenly becomes weak or numb. Slurred speech, blurred vision or loss of consciousness may also occur.

If I have heart disease or if I have a stroke what should I do?

If you believe you may be suffering from a heart attack or stroke, you should call 911 and get to an emergency room right away. When in doubt, GO! The quicker you seek medical care, the better your chances of recovery.

If you have signs or indication of old heart damage, your health care provider will likely order other tests or consult a cardiologist to determine the nature and extent of the damage.

2. Kidney Disease

The kidneys help clean your blood of unneeded chemicals and salts. These substances are removed from the body in urine.

Diabetes can cause damage to the kidneys and is the most common cause of a serious condition called End Stage Renal (Kidney) Disease (ESRD). People with ESRD need to have their blood artificially cleaned (dialysis) or may even require a kidney transplant.

How does diabetes affect the kidneys?

High sugar levels in diabetes damage the small blood vessels in the kidneys. As these blood vessels are damaged, the kidneys begin to malfunction. The kidneys become ineffective at cleaning the blood stream and excreting the appropriate chemicals and salts in your urine. Having high blood pressure in addition to diabetes can worsen the kidney damage.

How do you know if your kidneys are being affected by diabetes?

Most people with diabetes who have kidney damage have no symptoms. A urine test should be done every year to look for a protein called albumin. Albumin in the urine usually is a sign of kidney damage.

If the urine test for kidney disease is not normal, what should happen?

This depends. If your blood pressure and blood sugar are not optimal then the goal should be to optimize them. If the blood pressure is elevated, two types of medications can be helpful in both reducing blood pressure and slowing the progression of kidney damage. These medications are called Angiotensin Converting Enzyme (ACE) Inhibitors and Angiotensin Receptor Blockers (ARBs). If your blood pressure is optimal, these medications may still be useful to protect the kidneys. Your health care provider can help you decide what option is best for you.

Lastly, if there is significant damage to the kidneys, then a low protein diet may be useful. This should be discussed with your diabetes care provider and dietician as to what foods are appropriate to eat.

3. Eye Complications

After having Type 2 diabetes for 20 years, more than 60% of people will have some degree of eye damage (called retinopathy). Diabetes causes more cases of blindness among adults than any other disease.

How does diabetes affect the eyes?

Diabetes damages the small blood vessels that supply the back of the eye (retina) with needed nutrients. These vessels begin to leak and become blocked with plaque buildup. In more severe forms of damage, new blood vessels can form on the back of the eye which can bleed and cause detachment of the retina.

How do I know if I have eye damage?

Eye damage can occur very gradually and you may not even know it is happening until it is too late. Therefore, it is important for all people with type 2 diabetes to have a dilated eye exam by an optometrist or ophthalmologist shortly after being diagnosed and every year afterwards. If retinopathy does develop, it will be detected early and further damage can be avoided.

If I have eye damage already what should I do?

Maintaining good control of your blood sugar and blood pressure is critical to prevent further damage. Laser surgery can be beneficial for those with eye disease due to diabetes. The type of surgery depends on the extent of the disease. There is a risk of vision loss with some forms of surgery so this should be discussed with an ophthalmologist. Surgery normally does not reverse loss of vision but can prevent further loss or slow the progression.

4. Nerve Damage

Over 50% of people with diabetes will suffer from nerve damage. This is referred to as diabetic neuropathy. Diabetic neuropathy can affect every part of the body but most commonly affects the feet/legs.

How does diabetes affect the nerves?

There are many factors that contribute to diabetic neuropathy. Reduced blood supply to the nerves from damaged blood vessels can lead to nerve death. Nerve damage may also occur from toxins generated in the blood of people with diabetes.

How do I know if I have nerve damage?

It usually takes many years of poor sugar control to develop a neuropathy. The first symptoms tend to appear in the hands and/or feet. At first, you may notice a slight numbness or tingling. Occasionally, pain may be felt. Your care provider may notice a decreased sensation during the physical exam.

While damage to nerves of the hands and feet is the most common neuropathy of diabetes, nearly all nerves in the body may be affected. Both men and women may notice sexual problems resulting from nerve damage. Men may have difficulty achieving and maintaining an erection while women may notice vaginal dryness.

If I have nerve damage already, what should I do?

You need to pay special attention to the condition of your feet. Because of nerve damage, injuries such as cuts and blisters may go unnoticed. These injuries also take longer to heal in diabetes. If left untreated, small cuts and blisters can progress and cause permanent damage to the skin, bones and muscles and may require amputation.

Daily foot care is an important routine and includes inspection for open sores, redness or blisters, washing with soap and water, drying, and using clean socks. Never go barefoot! You should pay particular attention to areas around calluses where ulcers are most likely to develop. Overweight individuals should begin diet and exercise to lose weight and reduce unnecessary pressure on the feet. If an open wound is found, you should visit your provider. If dry skin is noted, hydrating lotion should be applied to the feet. However, lotion should never be applied between the toes. Toenails should be kept short and routinely trimmed. Itchy, red feet may be the first sign of an infection and your provider should be notified. Your provider will examine your feet on a regular basis.

What are the short-term consequences of having high blood sugar?

For people with type 2 diabetes, having a consistently high blood sugar can trigger a Hyperglycemic Hyperosmolar Nonketotic (HONK) state or Diabetic Ketoacidosis (DKA). In these states people often become confused and tired. If the sugars remain high, seizures and, rarely, coma can occur.

If I have diabetes, how do I prevent complications?

It is important to understand that specific complications of diabetes have many causes and following just one strategy cannot prevent the complications. For this reason, it is important to follow all five of the preventive strategies discussed below. Following the recommendations may not eliminate all complications of diabetes, but it will significantly decrease your odds of developing them.

1. Sugar Control

When you are diagnosed with diabetes, it is important to monitor your blood sugar level. This can be done with a glucometer, an instrument that determines the sugar level in a sample of blood. Glucometers require a small drop of blood that can be obtained by pricking your finger with a lancet. Ideal levels are 70-120 mg/dl before meals and less than 160-180 two hours after meals. Some individuals are able to control their blood sugars with exercise and diet alone, while others require medications. There are different medications that your doctor may prescribe. Many medications such as sulfonylureas (glipizide/glyburide), metformin and glitazones (pioglitazone/rosiglitazone) are pills that can be taken orally. Insulin is currently available only as an injectable medication. Each of these medications can be used alone or in combination. Your health care provider will help determine which, if any, medication is right for you.

Your health care provider may also test your blood to determine the average control of your diabetes. This test is called A1C or glycosylated hemoglobin. A measurement of less than 7% indicates very good control.

2. Weight Control and Diet

Being overweight makes insulin less effective in delivering sugar (an energy source) to your body's cells. To control your weight, diet and exercise are critical. A healthy diet consists of fat, protein, and carbohydrates. Dietary fat should be low in saturated/trans fats found in fatty meats, high-fat dairy products, fried foods and highly processed snacks. Good sources of protein include fish, beans, poultry and lean meats. Carbohydrates come in many forms including sugars, starches, and fibers. While the amount consumed rather than the type affects blood sugar levels the most, carbohydrates such as whole grains (found in some breads and cereals), vegetables, fruits and foods high in fiber (beans, nuts) are better sources than highly refined sugars found in many snack foods. Discuss your food selection and portion size with your provider and/or dietician to individualize a program that is most appropriate for you. Participating in regular physical activity is equally important for weight control.

3. Physical Activity

Physical activity helps the body's cells respond better to insulin and lowers blood glucose levels. The recommendation for physical activity is no different for people with diabetes than those without diabetes. Moderate activity such as brisk walking, biking, running, aerobics or swimming for at least 30 minutes five times per week is recommended. You should always check with your health care provider before beginning physical activity. Exercise will decrease your blood sugar levels and your medication may need adjustment to ensure your blood sugar does not go too low.

4. Blood Pressure Control

Exercise, weight loss and diet can help lower blood pressure. However, blood pressure control may require use of a medication. ACE inhibitors and ARBs are particularly useful medications for people with diabetes because they not only lower blood pressure, but also protect the kidneys from damage.

5. Cholesterol Control

There are many types of cholesterol and all are fatty particles that circulate in the blood. LDL is typically called the "bad cholesterol." Reducing cholesterol can be done in three ways – exercise, nutrition and medication. Often, exercise and nutrition are sufficient to lower your cholesterol. However, you may require the addition of a cholesterol lowering medication to reach the target level. Your diabetes care provider can help you coordinate a plan in order to reach these goals.

6. Aspirin Therapy

Aspirin has been found to be effective in preventing heart disease and stroke. It prevents the blockage of blood vessels. However, aspirin can cause stomach irritation and bleeding, so discuss with your providers whether aspirin therapy is right for you.

7. Smoking Cessation

Quitting smoking is extremely important in preventing heart disease and stroke. There are a number of smoking cessation strategies that are effective and your provider can help you quit.

How often should I go to my diabetes care provider?

This depends on how well your blood sugar is controlled. Most people in the initial stages of diabetes require frequent visits to their provider and may need to be seen weekly until blood sugar levels are controlled. Once control is established, you should be seen every 3-6 months. The frequency of your visits can be discussed with your provider. At these visits you can expect your feet to be examined, your blood pressure measured and lab work done. Once per year you will need a dilated eye exam and a urine test. Below is a list of procedures that should be done and their frequency. Your diabetes care provider will perform and coordinate these tests and exams.

PROCEDURE	FREQUENCY	DESCRIPTION
Blood A1C	3-6 months	Average of sugar control over 2-3 month period (goal: < 7%)
Blood Cholesterol LDL HDL Triglycerides	Yearly	Measurement of fatty particles contributing to heart and blood vessel damage. (goal: fasting LDL < 100 mg/dl)
Urine Microalbumin	Yearly	Determines if kidneys are properly filtering. (goal: spot urine < 30 ug/mg creatinine)
Eye Exam	Yearly	Dilated exam by optometrist or ophthalmologist to look at the retina (back of eye).
Foot Exam	Every visit to your provider	Allows for early detection of nerve and blood vessel damage.
Blood Pressure	Every visit to your provider	High BP is a risk for heart, blood vessel, kidney and eye disease. (goal: < 130/80 mm Hg)

Summary

Diabetes is a common disease leading to significant complications of many organ systems. Current studies suggest that exercise and proper nutrition can prevent Type 2 diabetes from occurring. However, if you already have diabetes, there are strategies that help prevent or reduce the risk of complications. These strategies include being physically active, eating a healthy diet, taking your medications and regularly visiting your health care provider.

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