



PATIENT RESOURCES

Diabetes Complications

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The high blood sugar of mismanaged diabetes can result in dangerous complications. **Diabetes** is the most common cause of blindness, kidney failure, and non-traumatic amputation of the toes, feet, or legs. Mismanaged diabetes can also lead to heart disease, stroke, nerve damage, and decreased blood flow, which could cause amputation. People with diabetes may have life-threatening reactions to extremely high blood sugar, as well as extremely low blood sugar caused by diabetes medications.

► Terms You Should Know

Cataracts: A condition in which the eye's lens becomes cloudy and blocks light.

Complication: A disease or health condition brought on by another disease or health condition.

Glaucoma: An excess of pressure in the eye, which causes damage to the retina and optic nerve.

Macula: A part of the retina that controls fine detail perception.

Non-proliferative retinopathy: The early stages of retinopathy where the blood vessels at the back of the eye swell up and form pouches.

Proliferative retinopathy: The later, more dangerous stage of retinopathy, in which blood vessels are so damaged that they shut off, and new, weaker blood vessels grow in the retina.

Retina: The back part of the eye, which is responsible for changing images the eye sees into electrical signals that are sent to the brain.

Retinopathy: Damage to the retina.

Vitreous fluid: The fluid in the eye's middle.

Vitrectomy: A surgical procedure in which cloudy fluid and scar tissue is removed from inside the eye.

▸ Diabetic Neuropathy

Diabetic neuropathy is nerve damage from high blood glucose (sugar) levels in people with diabetes. Nerves throughout the body can suffer damage. People with poor glucose control and who have had diabetes for a long time are at highest risk for nerve damage. Smokers are especially at risk. About 60–70% of people who have had diabetes for many years have some form of nerve damage, but not everyone has symptoms.

The most common types of diabetic neuropathy are those that affect the limbs and those that affect organs and muscles inside the body.

Peripheral Neuropathy

The first type (called peripheral neuropathy or distal polyneuropathy or DPN) affects the sensitivity of your feet, legs, hands, and arms. It also can affect the movement of your limbs. Symptoms of DPN include:

- Pain, tingling, and burning
- Numbness and loss of feeling
- Muscle weakness
- Skin ulcers (open sores)

About half of people who have DPN might not have symptoms, except for losing feeling in their feet. Because of this feeling loss, they could injure their feet and not know it. Untreated foot injuries can lead to ulcers and infection and, sometimes, amputation.

Autonomic Neuropathy

The second type (called autonomic neuropathy) affects your urinary tract, digestive system, sex organs, sweat glands, eyes, and heart. Symptoms of autonomic neuropathy include:

- › Bladder problems (loss of bladder control, not being able to fully empty the bladder, frequent urinary tract infections)
- › Digestive system problems (bloating, nausea, vomiting, diarrhea, constipation)
- › Erectile dysfunction in men and sexual problems in women
- › Too much or too little sweating
- › Dizziness when you stand up, from sudden drops in your blood pressure

Your doctor will do a physical exam and ask about your symptoms. You should be checked once a year for DPN, or more often if you have foot problems. The doctor will check for loss of feeling in your feet by seeing whether you can feel light touch, pinpricks, vibrations from a tuning fork, and the touch of a thin piece of nylon fiber against your foot. The doctor may also check the reflexes in your ankles and the position of your toes. You might have tests to see how well your nerves are working. Your doctor will also make sure you don't have other conditions, such as blood flow problems or vitamin deficiency.

See your doctor as soon as possible if you have:

- › Frequent numbness or pain in your feet, legs, hands, or arms
- › An ulcer (sore) on your foot or leg that isn't healing
- › A swollen foot or a leg infection
- › Digestive problems such as bloating, nausea, vomiting or constipation

- › Problems with urination or sexual function
- › Dizziness when you stand

Good blood glucose control (keeping blood glucose from being too high or too low) may prevent further nerve damage but usually can't reverse damage that's already happened. Your doctor may prescribe medicines for pain that occurs with some types of nerve damage and suggest certain vitamins if needed.

The most effective way to prevent damage is to keep your blood glucose level under good control. You can do so by eating a healthy diet, exercising regularly, and reaching a healthy weight. Avoiding smoking and limiting alcoholic beverages can also help. Your doctor or diabetes educator can help you plan your healthy lifestyle.

You also can do a lot to prevent leg ulcers and amputations. Protect your feet by:

- › Checking them every day (see the tips below)
- › Always wearing shoes (or slippers) and clean, dry socks
- › Choosing shoes that are comfortable and fit well
- › Seeing a podiatrist (foot doctor) regularly for foot care if you need help
- › Good foot care
- › Wash and dry your feet and check them every day. Choose a regular time, such as after your shower in the morning.
- › Look for blisters, calluses, bruises, redness, swelling, cracked skin, sores, or cuts
- › Cut your nails once a week or as needed.
- › Put lotion on dry skin but not between your toes.

► Diabetic Retinopathy

Diabetic retinopathy is a complication of diabetes where high blood glucose causes damage to the blood vessels in the light-sensitive part of the retina (the back part of the eye). The retina plays a vital role in vision, it records the images the eye takes in and converts them into electrical signals sent to the brain. The brain then interprets the electrical signals, so you understand what you are seeing. Diabetes is a major cause of retinopathy. More than 80% of people who have had diabetes 20 years or longer develop diabetic retinopathy.

Diabetic retinopathy occurs in both type 1 and type 2 diabetes; the likelihood of developing the condition increases with duration of disease and is higher in people with mismanaged blood glucose levels. Retinopathy means “diseases of the retina.” It is an broad term describing several conditions. The most common are:

- › Non-proliferative retinopathy an early stage sign of retinopathy where blood vessels swell or become blocked
- › Macular edema is when fluid leaks into the macula (center of the retina) causing vision to blur
- › Proliferative retinopathy is damage to the blood vessels depriving the retina of oxygen

Damage to the retina can occur without symptoms and can eventually cause vision problems that cannot be corrected by eyeglasses or contact lenses. It is critical for people with diabetes to get regular eye exams from an eye doctor.

Preventing Eye Problems

- › Smoking can increase chances of developing retinopathy. Talk with your doctor about ways to help you stop smoking
- › Control your blood sugar, blood pressure, and blood fats (triglycerides)
- › Be physically active for at least 30 minutes a day
- › Maintain a healthy weight
- › Limit carbohydrates and sugar, eat foods high in fiber, healthy fats and protein

Treatment depends on the type of retinopathy you have. Controlling blood pressure and blood sugar can prevent eye problems. The appearance of diabetic retinopathy is associated with the rapid increase of a protein called vascular endothelial growth factor (VEGF) in the retina. VEGF stimulates the production of new blood vessels in the retina to bring more oxygen to the tissue but because blood circulation is prevented due to diabetes. Blood vessel leakage from diabetic retinopathy can cause fluid to accumulate in the center of the retina, which is the most sensitive part of the retina that is responsible for vision. If macular edema is present, or complications have progressed to proliferative retinopathy the following treatment is most commonly used are:

- › Anti-VEGF, injection which help reduce the production of protein in the retina
- › Corticosteroids, medicine to reduce swelling or the amount of fluid present in the retina
- › Focal/grid macular laser surgery, laser treatment that helps to repair damage to the eye tissue by sealing the vessels that are leaking or eliminating damaged blood vessels all together

► Heart Disease and Diabetes

Cholesterol and triglycerides, known as lipids, are fatty substances that the body normally produces. Dyslipidemia means that lipid levels in the blood are too high or low. The most common types of dyslipidemia are:

- › High levels of low-density lipoprotein (LDL or “bad”) cholesterol
- › Low levels of high-density lipoprotein (HDL or “good”) cholesterol
- › High levels of triglycerides (fats in the blood)

Dyslipidemia contributes to atherosclerosis (“hardening” of the arteries), a disease in which fatty deposits called plaque buildup in the arteries over time. The arteries are blood vessels that carry blood from the heart to the rest of the body. If plaque narrows your arteries, you are more likely to have heart disease, heart attack, peripheral artery disease (reduced blood flow in the limbs, most often the legs), and stroke.

People with diabetes are more likely to develop atherosclerosis, heart disease, poor circulation, and stroke than people who do not have diabetes. Many people with diabetes have several risk factors that contribute to atherosclerosis and its complications. These include high blood pressure, excess weight, and high blood glucose (sugar) levels. Dyslipidemia further raises the risk of atherosclerosis in people with diabetes.

The most common dyslipidemia in diabetes is a combination of high triglycerides and low HDL cholesterol levels. People with diabetes may also have high LDL cholesterol.

Dyslipidemia has no symptoms (what you feel). Health care providers detect it by a blood test called a lipid profile. This test measures the amount of cholesterol, triglycerides, and other fats in your blood. People usually have a lipid profile after fasting overnight.

Many things can affect your lipid levels. They include:

- › Age, sex, and family history of heart disease
- › Lifestyle factors such as what you eat, level of physical activity, alcohol use, and smoking
- › High blood pressure
- › High blood glucose levels
- › Some medications

▶ **Preventing Heart Problems**

You can improve your lipid levels with a heart-healthy diet and weight loss, increased physical activity, and good blood pressure and blood glucose control. By limiting fat intake, especially animal fats and trans fats (artificial fats found in some foods), you can lower LDL cholesterol. Adding more fruits, vegetables, and fiber to your diet also helps reduce lipid levels. You may also need medication.

Among the drugs available to treat dyslipidemia, statins are often the first choice for lowering total and LDL-cholesterol levels. Pregnant women should never use statins.

Other drugs that lower cholesterol include cholesterol-absorption blockers (ezetimibe), bile acid sequestrants (cholestyramine, colestipol, and

colesevelam hydrochloride), and nicotinic acid (niacin). You may need to use these in combination if a single drug does not help reach target levels. Fibrates (gemfibrozil, fenofibrate, and clofibrate) and extended-release niacin may be used to lower triglycerides or raise HDL cholesterol levels.

Your doctor will decide what type of drug is right for you based on your lipid profile. Follow your doctor's advice about diet, exercise, and medications. Routine checkups and a yearly blood test to check your lipid levels will help you manage dyslipidemia and reach your goals.

► **Kidney Disease and Diabetes**

The **kidneys** are two fist-sized organs located in your back. To maintain life, you need at least one to work well. The work done by the kidneys is called renal function. The three major renal functions are to:

1. Remove waste and excess water from your body
2. Maintain the body's chemical balance
3. Produce hormones that regulate red blood cell production and blood pressure, and contribute to bone health

Diabetes is the most common cause of kidney failure in the United States. If your kidneys stop working, you will need special treatment such as dialysis (a method of filtering waste from the blood) or a kidney transplant to stay alive.

A frequent complication of diabetes is high blood pressure (hypertension). Constant high blood pressure also leads to gradual kidney damage and adds to the effects of diabetes. Advanced kidney disease is often

permanent. For this reason, high blood pressure and diabetes should be identified and treated early.

Anyone can develop diabetes, high blood pressure, or kidney disease. However, people who are obese and people with a family history of any of these conditions have a higher risk.

Kidney damage is diagnosed with urine and blood tests. The earliest sign of kidney problems in people with diabetes is the presence of small amounts of protein in the urine. If not treated, this condition leads to more protein in the urine, then to gradual loss of kidney function, and finally to chronic (permanent) kidney disease. A urine test can detect these conditions. Several blood tests can test the kidney's ability to filter and detoxify (clean) the blood. These include creatinine and blood urea nitrogen (BUN) tests.

► **Protecting Your Kidneys**

Protecting your kidneys begins by knowing if you have any of the risk factors for kidney disease—obesity, high blood pressure, and/or diabetes. Therefore, periodic check-ups of body weight, blood pressure, and blood glucose can help spot problems early.

Doctors use different types of medications to treat high blood glucose levels in people with diabetes, including oral medications (pills) and insulin. It is important to keep glucose levels as close to normal as possible. Recommended glucose levels are below 130 mg/dL in the morning and 180 mg/dL after meals. The hemoglobin A1C blood test evaluates how well you are controlling your blood glucose levels over time. This is done usually

every three to six months. A test result below 7% shows good glucose control.

In people with diabetes and hypertension, blood pressure should be less than 130/80 mm Hg. Several types of medications are used to lower blood pressure and protect kidney function.

If you have risk factors for diabetes, high blood pressure, and/or kidney disease, talk with your doctor. Preventing and treating kidney disease will depend on your particular condition. For example, if you have diabetes your doctor may recommend a urine test at least once a year to check for protein in your urine, and blood tests to check your kidney function.

You can also protect your health by eating a healthy diet, exercising most days of the week, not smoking, and avoiding abuse of alcohol and other drugs. These include over-the-counter medications such as aspirin, acetaminophen, and ibuprofen. If you have high blood pressure, you should limit your intake of salt. If you have diabetes, you should limit carbohydrates. People with weakened kidney function may need to adjust their diets to also limit protein, cholesterol, and potassium.

► **Questions to Ask Your Healthcare Provider**

- › Do I have nerve damage from diabetes?
- › What kind of nerve damage do I have?
- › Is the nerve damage permanent or temporary?
- › Do I need treatment for my nerve damage?
- › What are the risks and benefits of each of my treatment options?

