

## Diabetes and You: Long Term Complications

Most people with diabetes today live full and healthy lives. However, diabetes can affect many parts of the body. People with diabetes are more likely to suffer certain health problems, such as eye, kidney, heart, and nerve damage. Long Term complications may not develop in every person with diabetes.

Certain things may increase your chances of developing long term complications. These may include:

- inheriting a genetic tendency
- how long you have had diabetes
- high blood sugar levels
- smoking
- sedentary lifestyle
- unhealthy diet

A study was conducted to determine whether blood glucose control has an effect in developing long term complications in people with Type 1 diabetes. The study reported that people with type 1 diabetes who maintained tighter glucose control experienced less kidney, eye, and nerve disease than those who had higher glucose levels.

For those with diabetes there are some risk factors that can be controlled and some that cannot. You cannot control how long you've had diabetes or your genes. You can control if you smoke, what you eat, and how often you exercise. Keep in mind with the best efforts to living a healthy lifestyle some people will develop these problems. If long term complications begin to happen, maintaining good blood sugar control can help to slow down the progression of these complications.

### Small Blood Vessel Damage

Small blood vessel damage is also called microvascular disease. Capillaries are tiny blood vessels that carry oxygen and nutrients to all the cells in the body. Diabetes can cause changes in the walls of these tiny blood vessels, especially in the eyes and kidneys.

## Eye Disease Associated with Diabetes

Diabetic retinopathy is damage to the blood vessels of the retina (back of the eye). Damage to the retinal blood vessels cause them to leak or become blocked which prevents them from carrying as much oxygen to the retina as they did before the damage. Retinopathy has several stages.

1. **Mild Nonproliferative Retinopathy:** At this stage microaneurysms occur. Microaneurysms are the areas of balloon-like swelling of the retinal blood vessels.
2. **Moderate Nonproliferative Retinopathy:** At this stage retinal blood vessels become blocked.
3. **Severe Nonproliferative Retinopathy:** The retina is becoming deprived of oxygen due to blocked blood supply. The lack of oxygen causes the retina to grow new blood vessels.
4. **Proliferative Retinopathy:** The new blood vessels are abnormal and fragile and grow along the retina and the vitreous gel that fills the inside of the eye. If the blood vessels do not break and bleed, no vision loss or symptoms will occur. However, if they bleed, severe vision loss or blindness may occur.

Since retinopathy does not cause any vision loss in its earliest stages, people with diabetes should have regular dilated eye exams by an ophthalmologist. Retinopathy may require treatment even if no symptoms are present. Treatment of retinopathy usually does not improve vision but it does help prevent further vision loss so early treatment (if needed) is important.

Controlling blood sugar and blood pressure is the most important way to prevent diabetes from causing retinopathy.

## Cataracts

A cataract is a clouding of the lens in the eye. The lens is clear and allows light to pass through to the retina. The light is changed into nerve signals that are sent to the brain. If the lens is cloudy, then a person will have blurry vision. Causes of cataracts include:

- aging
- eye surgery
- diabetes
- steroid use
- traumatic eye injury
- congenital cataract
- radiation

## Glaucoma

There are several types of glaucoma. Only a few types of glaucoma will be outlined in this handout. People with diabetes are twice as likely to develop open-angle glaucoma as are non-diabetics and the likelihood of someone with open-angle glaucoma developing diabetes is higher than that of a person without the eye disease. Open angle glaucoma occurs when the eye's

drainage canals become clogged over time. The inner eye pressure (also called intraocular pressure) rises because the correct amount of fluid can't drain out of the eye. Most people have no symptoms and no early warning signs. If open angle glaucoma is not diagnosed and treated, it can cause a gradual loss of vision. This type of glaucoma develops slowly and sometimes without noticeable sight loss for many years. It usually responds well to medication, especially if caught early and treated.

Secondary Glaucoma occurs as the result of an eye injury, inflammation, tumor, cataract, diabetes, or certain drugs such as steroids. The type of treatment will depend on whether it is open angle or angle closure glaucoma.

Neovascular Glaucoma is a rare type of glaucoma, is always associated with other abnormalities, diabetes being the most common. Neovascular glaucoma can occur if new blood vessels from proliferative retinopathy grow on the iris, closing off the fluid flow in the eye and raising the eye pressure. Neovascular glaucoma is difficult to treat. It is often treated with laser surgery to reduce abnormal blood vessels. Drainage implants may also be a treatment option.

## **Kidney Disease Associated with Diabetes**

The kidneys filter waste products and water from our blood to make urine. The filtering parts of the kidneys are called nephrons. Nephrons have many small blood vessels that can be damaged by high blood sugar and high blood pressure. In the early stages of kidney disease, the kidneys work harder to keep the blood filtered properly. When the kidneys are damaged by diabetes, they begin to spill protein into the urine in very small amounts. This is called microalbuminuria. A urine test for microalbumin can be done to detect kidney problems at an early stage. If kidney disease is caught early, treatments such as improving blood glucose and blood pressure control may decrease protein in the urine and improve kidney function. The microalbumin test should be repeated once per year.

If the kidney disease is advanced, the kidneys will spill large amounts of protein into the urine and will not filter the blood properly. If the kidneys fail, a person will need dialysis to filter the blood or a kidney transplant.

The signs of kidney problems include:

- increased blood pressure
- swelling
- protein in the urine
- high levels of waste products in the blood

## **Nerve Disease Associated with Diabetes**

Diabetes can damage the nerves. The nerves that are responsible for feeling temperature, pressure, pain, etc are called peripheral nerves. The nerves that are responsible for the automatic function of the body such as blood pressure regulation, bladder emptying, digestion, etc are called autonomic nerves. Nerve disease is called neuropathy.

## Peripheral Neuropathy

Peripheral neuropathy in the feet can cause numbness, burning pain, shooting pain, and tingling. Numbness in the feet can result in a sore or an injury that is not felt. Treatment of pain in the feet may be treated with oral or topical medications. Symptoms of neuropathy may improve with improved blood sugar control.

## Autonomic Neuropathy

Autonomic neuropathy is nerve damage of the autonomic functioning of the body parts. The following table outlines the common body systems affected by autonomic neuropathy and the problems it may cause.

| Affected Area                     | Problems / Causes  | Symptoms / Effects  |
|-----------------------------------|--|---|
| <b>Heart</b>                      | <ul style="list-style-type: none"> <li>• No pain with heart attack</li> <li>• No increase in heart rate with activity</li> </ul> Resting tachycardia (heart rate over 100) | “Silent heart attack”   |
| <b>Blood Pressure</b>             | Blood pressure falls when going from a lying to a standing position  | - Dizzy<br>- Faint<br>- Pass out  |
| <b>Bladder</b>                    | <ul style="list-style-type: none"> <li>• Unable to empty bladder completely</li> <li>• Unable to feel urge to urinate</li> </ul>   | - Bladder infections<br>- Kidney infections   |
| <b>Stomach / Intestines</b>       | Slow digestion   | - Feeling full after eating<br>- Nausea and/or vomiting<br>-Diarrhea<br>-Constipation<br>- Difficulty controlling blood sugar |
| <b>Sexual functioning</b>         | Men: impotency<br>Women: vaginal dryness   | - Sexual problems<br>- Impotency  |
| <b>Unaware of low blood sugar</b> | No early warning symptoms of low blood sugar   | Passing out   |
| <b>Feet</b>                       | Increased drying and cracking of the feet  | Infections  |

## Large Blood Vessel Problems Associated with Diabetes

Diabetes can damage the large blood vessels or arteries that surround the heart and carry blood to the arms, legs and head. Large blood vessel damage occurs when the inner lining of the blood vessel wall narrows, thickens and hardens. Hardening of the arteries is called atherosclerosis. Atherosclerosis reduces the size of the vessel through which blood flows. Large blood vessel disease can include coronary artery disease, cerebral vascular disease and peripheral vascular disease. If a person had hardening of the arteries, the heart must work harder to pump blood. This can lead to heart attacks, strokes, high blood pressure and poor blood flow to the arms, legs and head.

Coronary artery disease is the hardening of the arteries that supplies the heart muscle with blood. A common symptom of coronary artery disease is angina. Angina causes pain or discomfort in

the chest, shoulders, arms, jaw, or back, especially during exercise. The pain may go away with rest. Some people take medicine for angina pain. People with angina have an increased chance of having a heart attack.

A heart attack occurs when the heart muscle does not receive enough blood and part of the heart muscle is damaged. Signs and symptoms of a heart attack include:

- chest pain or discomfort
- pain or discomfort in the arms, back, jaw, neck, or stomach
- shortness of breath
- sweating
- nausea
- light-headedness

Some people with diabetes may have a heart attack and not feel any chest pain. Some may have only very mild symptoms. They may not know they are having a heart attack. The lack of pain may be caused by nerve damage.

Factors that Increase the risk of a heart attack, stroke and peripheral vascular disease includes:

- central obesity (around your stomach and abdomen)
- high blood pressure
- high blood cholesterol
- smoking
- lack of exercise

## **Cerebral Vascular Disease**

Cerebral vascular disease includes all disorders in which an area of the brain is transiently or permanently affected by ischemia (lack of blood flow) or bleeding. Brain tissue can die from the lack of oxygen if a person develops a blockage in the vessels carrying blood to the brain or the vessels bleed. When brain tissue dies, the person has had a stroke. A stroke that is caused by bleeding is called a hemorrhagic stroke. A stroke that is caused by a blockage is called an ischemic stroke.

Symptoms of a stroke include:

- sudden weakness or numbness of the face, arm, or leg on one side of yothebody
- sudden confusion, trouble talking, or trouble understanding
- sudden dizziness, loss of balance, or trouble walking
- sudden trouble seeing out of one or both eyes or sudden double vision
- sudden severe headache

## **Peripheral Vascular Disease**

Peripheral vascular disease is a group of diseases of blood vessels outside the heart and brain. It's often a narrowing of vessels that carry blood to the legs, arms, stomach or kidneys. Peripheral

Artery Disease (PAD) occurs when fatty deposits build up in the inner linings of the artery walls. These blockages restrict blood circulation to the kidneys, stomach, arms, legs and feet. In its early stages a common symptom is cramping or fatigue in the legs and buttocks during activity that goes away with rest. This is called "intermittent claudication." People with peripheral artery disease have a higher risk of death from heart attack and stroke.

Peripheral artery disease is diagnosed through a medical history, physical exam, ultrasound, X-ray angiography and magnetic resonance imaging angiography (MRA). It is treated with lifestyle changes, medications, surgery, or a combination.

Lifestyle changes to lower your risk include:

- Quitting smoking
- Controlling your blood sugar
- Controlling your blood pressure.
- Being physically active
- Eating a low-saturated-fat, low-cholesterol diet.

Medications to treat peripheral artery disease may include:

- Medicines to help improve walking distance (cilostazol and pentoxifylline).
- Anti- platelet agents.
- cholesterol-lowering agents (statins).

Surgery

- angioplasty
- bypass