Complications of Diabetes Mellitus

People with diabetes mellitus have many serious long-term complications that affect many areas of the body, particularly the blood vessels, nerves, eyes, and kidneys.

Type 1, in which the body's immune system attacks the insulin-producing cells of the pancreas, and more than 90% of them are permanently destroyed

Type 2, in which the body develops resistance to the effects of insulin

In both types, the amount of sugar (glucose) in the blood is elevated.

People with either type 1 or type 2 diabetes are likely to have complications as a result of the elevated glucose level. However, because type 2 diabetes may be present for some time before it is diagnosed, complications in type 2 diabetes may be more serious or more advanced when they are discovered.

People with diabetes mellitus may experience many serious, long-term complications. Some of these complications begin within months of the onset of diabetes, although most tend to develop after a few years. Most of the complications gradually worsen. In people with diabetes, strictly controlling the level of glucose in the blood makes these complications less likely to develop or worsen.

Causes of Diabetes Complications

Most complications of diabetes are the result of problems with blood vessels. Glucose levels that remain high over a long time cause both the small and large blood vessels to narrow. The narrowing reduces blood flow to many parts of the body, leading to problems. There are several causes of blood vessel narrowing.

Complex sugar-based substances build up in the walls of small blood vessels, causing them to thicken and leak.

Poor control of blood glucose levels causes the levels of fatty substances in the blood to rise, resulting in atherosclerosis and decreased blood flow in the larger blood vessels.

Types of Diabetes Complications

Blood vessel complications in diabetes

Atherosclerosis leads to heart attacks and strokes. Atherosclerosis is between 2 and 4 times more common and tends to occur at a younger age in people with diabetes than in people who do not have diabetes.

Over time, narrowing of blood vessels can harm the heart, brain, legs, eyes, kidneys, nerves, and skin, resulting in angina, heart failure, strokes, leg cramps during walking (claudication), poor vision, chronic kidney disease, damage to nerves (neuropathy), and skin breakdown.

Infections in diabetes

People with diabetes often develop bacterial and fungal infections typically of the skin and mouth. When the levels of glucose in the blood are high, white blood cells cannot effectively fight infections. Any infection that develops tends to be more severe and takes longer to resolve in people with diabetes. Sometimes, an infection is the first sign of diabetes.

One such infection is a yeast infection called candidiasis. Candida yeast is a normal resident of the mouth, digestive tract, and vagina that usually causes no harm. In people with diabetes, however, Candida can overgrow on mucous membranes and moist areas of the skin causing rashes in those areas.

People with diabetes are also particularly likely to have ulcers and infections of the feet and legs because of poor circulation to the skin. Too often, these wounds heal slowly or not at all. When wounds do not heal, they typically become infected and this can result in gangrene (tissue death) and bone infection (osteomyelitis). Amputation of the foot or part of the leg may be needed

Eye problems in diabetes

Damage to the blood vessels of the eye can cause loss of vision (diabetic retinopathy). Laser surgery can seal the leaking blood vessels of the eye and prevent permanent damage to the retina. Sometimes, other forms of surgery or injectable medications may be used. Therefore, people with diabetes should have yearly eye examinations to check for early signs of damage.

Liver damage in diabetes

It is common for people with diabetes to also have steatotic liver disease (formerly called fatty liver disease), in which abnormal fat deposits collect in the liver. Steatotic liver disease can sometimes progress to more serious liver disease including cirrhosis. Doctors diagnose liver problems if the

results of blood tests that measure how well the liver is functioning or imaging of the liver is abnormal, and they confirm the diagnosis with a liver biopsy. Losing weight, maintaining good control of blood sugar levels, and treating high cholesterol can be helpful.

Kidney damage in diabetes

The kidneys can malfunction, resulting in chronic kidney disease that may require dialysis or kidney transplantation. Doctors usually check the urine of people with diabetes for abnormally high levels of protein (albumin), which is an early sign of kidney damage. At the earliest sign of kidney complications, people are often given medications that slow the progression of kidney damage, for example, sodium-glucose co-transporter-2 (SGLT2) inhibitors (medications that increase glucose secretion in the urine), angiotensin-converting enzyme (ACE) inhibitors, or angiotensin II receptor (blockers (ARBs.

Nerve damage in diabetes

Damage to nerves can manifest in several ways. If a single nerve malfunctions, an arm or leg may suddenly become weak. If the nerves to the hands, legs, and feet become damaged (diabetic polyneuropathy), sensation may become abnormal, and tingling or burning pain and weakness in the arms and legs may develop. Damage to the nerves of the skin makes repeated injuries more likely because people cannot sense changes in pressure or temperature.

Foot problems in diabetes

Diabetes causes many changes in the body. The following changes in the feet are common and difficult to treat.

Damage to the nerves (neuropathy) affects sensation to the feet, so that pain is not felt. Irritation and other forms of injury may go unnoticed. An injury may wear through the skin before any pain is felt.

Changes in sensation alter the way people with diabetes carry weight on their feet, concentrating weight in certain areas so that calluses form. Calluses (and dry skin) increase the risk of skin breakdown.

Diabetes can cause poor circulation in the feet, making ulcers more likely to form when the skin is damaged and making the ulcers slower to heal.

Because diabetes can affect the body's ability to fight infections, a foot ulcer, once it forms, easily becomes infected. Because of neuropathy, people may not feel discomfort due to the infection until it becomes serious and difficult to treat, leading to gangrene. People with diabetes are more than 30 times more likely to require amputation of a foot or leg than are people without diabetes.

Foot care is critical (see Foot Care). The feet should be protected from injury, and the skin should be kept moist with a good moisturizer. Shoes should fit properly and not cause areas of irritation. Shoes should have appropriate cushioning to spread out the pressure caused by standing. Going barefoot is ill advised. Regular care from a podiatrist (a doctor specializing in foot care), such as having toenails cut and calluses removed, may also be helpful. Also, sensation and blood flow to the feet should be regularly evaluated by doctors.