

Definition

Diabetes mellitus is a condition in which the pancreas no longer produces enough insulin or when cells stop responding to the insulin that is produced, so that glucose in the blood cannot be absorbed into the cells of the body. Symptoms include frequent urination, lethargy, excessive thirst, and hunger. The treatment includes changes in diet, oral medications, and in some cases, daily injections of insulin.

Description

Diabetes mellitus is a chronic disease that causes serious health complications including renal (kidney) failure, heart disease, stroke, and blindness. Approximately 14 million Americans (about 5% of the population) have diabetes. Unfortunately, as many as one-half are unaware that they have it.

Background

Every cell in the human body needs energy in order to function. The body's primary energy source is glucose, a simple sugar resulting from the digestion of foods containing carbohydrates (sugars and starches). Glucose from the digested food circulates in the blood as a ready energy source for any cells that need it. Insulin is a hormone or chemical produced by cells in the pancreas, an organ located behind the stomach. Insulin bonds to a receptor site on the outside of cell and acts like a key to open a doorway into the cell through which glucose can enter. Some of the glucose can be converted to concentrated energy sources like glycogen or fatty acids and saved for later use. When there is not enough insulin produced or when the doorway no longer recognizes the insulin key, glucose stays in the blood rather entering the cells.

The body will attempt to dilute the high level of glucose in the blood, a condition called hyperglycemia, by drawing water out of the cells and into the bloodstream in an effort to dilute the sugar and excrete it in the urine. It is not unusual for people with undiagnosed diabetes to be constantly thirsty, drink large quantities of water, and urinate frequently as their bodies try to get rid of the extra glucose. This creates high levels of glucose in the urine.

At the same time that the body is trying to get rid of glucose from the blood, the cells are starving for glucose and sending signals to the body to eat more food, thus making patients extremely hungry. To provide energy for the starving cells, the body also tries to convert fats and proteins to glucose. The breakdown of fats and proteins for energy causes acid compounds called ketones to form in the blood. Ketones will also be excreted in the urine. As ketones build up in the blood, a condition called ketoacidosis can occur. This condition can be life threatening if left untreated, leading to coma and death.

Types of diabetes mellitus

Type I diabetes, sometimes called juvenile diabetes, begins most commonly in childhood or adolescence. In this form of diabetes, the body produces little or no insulin. It is characterized by a sudden onset and occurs more frequently in populations descended from Northern European countries (Finland, Scotland, Scandinavia) than in those from Southern European countries, the Middle East, or Asia. In the United States, approximately three people in 1,000 develop Type I diabetes. This form is also called insulin-dependent diabetes because people who develop this type need to have daily injections of insulin.

Brittle diabetics are a subgroup of Type I where patients have frequent and rapid swings of blood sugar levels between hyperglycemia (a condition where there is too much glucose or sugar in the blood) and hypoglycemia (a condition where there is abnormally low levels of glucose or sugar in the blood). These patients may require several injections of different types of insulin during the day to keep the blood sugar level within a fairly normal range.

The more common form of diabetes, Type II, occurs in approximately 3–5% of Americans under 50 years of age, and increases to 10–15% in those over 50. More than 90% of the diabetics in the United States are

Type II diabetics. Sometimes called age-onset or adult-onset diabetes, this form of diabetes occurs most often in people who are overweight and who do not exercise. It is also more common in people of Native American, Hispanic, and African-American descent. People who have migrated to Western cultures from East India, Japan, and Australian Aboriginal cultures are also more likely to develop Type II diabetes than those who remain in their original countries.

Type II is considered a milder form of diabetes because of its slow onset (sometimes developing over the course of several years) and because it can usually be controlled with diet and oral medication. The consequences of uncontrolled and untreated Type II diabetes, however, are the just as serious as those for Type I. This form is also called noninsulin-dependent diabetes, a term that is somewhat misleading. Many people with Type II diabetes can control the condition with diet and oral medications, however, insulin injections are sometimes necessary if treatment with diet and oral medication is not working.

Another form of diabetes called gestational diabetes can develop during pregnancy and generally resolves after the baby is delivered. This diabetic condition develops during the second or third trimester of pregnancy in about 2% of pregnancies. The condition is usually treated by diet, however, insulin injections may be required. These women who have diabetes during pregnancy are at higher risk for developing Type II diabetes within 5–10 years.

Diabetes can also develop as a result of pancreatic disease, alcoholism, malnutrition, or other severe illnesses that stress the body.

Causes

The causes of diabetes mellitus are unclear, however, there seem to be both hereditary (genetic factors passed on in families) and environmental factors involved. Research has shown that some people who develop diabetes have common genetic markers. In Type I diabetes, the immune system, the body's defense system against infection, is believed to be triggered by a virus or another microorganism to destroy the cells in the pancreas that produce insulin. In Type II diabetes, age, obesity, and family history of diabetes play a roll.

In Type II diabetes, the pancreas may produce enough insulin, however, cells have become resistant to the insulin produced and it may not work as effectively. Symptoms of Type II diabetes can begin so gradually that a person may not know that they have it. Early signs are lethargy extreme thirst, and frequent urination. Other symptoms may include sudden weight loss, slow wound healing, urinary tract infections, gum disease, or blurred vision. It is not unusual for Type II diabetes to be detected while a patient is seeing a doctor about another health concern that is actually being caused by the yet undiagnosed diabetes.

Individuals who are at high risk of developing Type II diabetes mellitus include people who:

are obese (more than 20% above their ideal body weight)

have a relative with diabetes mellitus

belong to a high-risk ethnic population (African-American, Native American, Hispanic, or Native Hawaiian)

have been diagnosed with gestational diabetes or have delivered a baby weighing more than 9 lbs (4 kg)

have high blood pressure (140/90 mmHg or above)

have a high density lipoprotein cholesterol level less than or equal to 35 mg/dL and/or a triglyceride level greater than or equal to 250 mg/dL

have had impaired glucose tolerance or impaired fasting glucose on previous testing

Several common medications can impair the body's use of insulin, causing a condition known as secondary diabetes. These medications include treatments for high

blood pressure (furosemide, clonidine, and thiazide diuretics), drugs with hormonal activity (oral contraceptives, thyroid hormone, progestins, and glucocorticoids), and the anti-inflammation drug indomethacin. Several drugs that are used to treat mood disorders (such as anxiety and depression) can also impair glucose absorption. These drugs include haloperidol, lithium carbonate, phenothiazines, tricyclic

antidepressants, and adrenergic agonists. Other medications that can cause diabetes symptoms include isoniazid, nicotinic acid, cimetidine, and heparin.

Symptoms

Symptoms of diabetes can develop suddenly (over days or weeks) in previously healthy children or adolescents, or can develop gradually (over several years) in overweight adults over the age of 40. The classic symptoms include feeling tired and sick, frequent urination, excessive thirst, excessive hunger, and weight loss.

Ketoacidosis, a condition due to starvation or uncontrolled diabetes, is common in Type I diabetes. Ketones are acid compounds that form in the blood when the body breaks down fats and proteins. Symptoms include abdominal pain, vomiting, rapid breathing, extreme lethargy and drowsiness. Patients with ketoacidosis will also have a sweet breath odor. Left untreated, this condition can lead to coma and death.

With Type II diabetes, the condition may not become evident until the patient presents for medical treatment for some other condition. A patient may have heart disease, chronic infections of the gums and urinary tract, blurred vision, numbness in the feet and legs, or slow-healing wounds. Women may experience genital itching.