Diabetes mellitus is one of the most common and serious chronic diseases in the United States. About 16 million Americans have diabetes, 5.4 million of whom do not know they have the disease. Each year, approximately 800,000 people are diagnosed with diabetes. The prevalence of diabetes has increased steadily in the last half of this century and will continue to rise with the aging U.S. population, the growth in minority populations most susceptible to type 2 diabetes, and the increasing prevalence of obesity among Americans.

WHAT IS DIABETES?

Diabetes is a metabolic disease in which the body does not produce or properly use insulin, a hormone that is needed to convert sugar, starches, and other food into energy needed for daily life. Diabetes is characterized by high levels of blood glucose (sugar).

WHAT ARE THE DIFFERENT TYPES OF DIABETES?

There are three main types of diabetes:

- Type 1 diabetes
- Type 2 diabetes
- Gestational diabetes

Type 1 diabetes, formerly called insulin-dependent diabetes mellitus (IDDM) or juvenile-onset diabetes, is an autoimmune disease that results when the body's immune system attacks and destroys its own insulin-producing beta cells in the pancreas. People with type 1 diabetes need daily injections of insulin to live. Type 1 diabetes develops most often in children or young adults and accounts for about 5 to 10 percent of diagnosed diabetes in the United States. Although risk factors are not well defined for type 1 diabetes, autoimmune, genetic and environmental factors are involved in its development.

Type 2 diabetes, formerly called noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes, is a disease that occurs when the body makes enough insulin but cannot use it effectively. This form of diabetes usually develops in adults over the age of 40. About 90 to 95 percent of people with diabetes have type 2; about 80 percent are overweight. Type 2 diabetes is more common among people who are older; obese; have a family history of diabetes; have had gestational diabetes; and are of African American, Hispanic American, Asian American, Pacific Islander, and Native American ethnicities.

Gestational diabetes develops or is discovered during pregnancy. This type usually disappears when the pregnancy is over, but women who have had gestational diabetes have a greater risk of developing type 2 diabetes later in their lives.

WHAT IS THE SCOPE AND IMPACT OF DIABETES?

Diabetes is widely recognized as one of the leading causes of death and disability in the United States. It was the seventh leading cause of death listed on U.S. death certificates in 1995 and contributed to 187,800 deaths that same year.

Both type 1 and type 2 diabetes are associated with long-term complications that threaten life and the quality of life. Diabetes is the leading cause of adult blindness, end-stage renal disease, and nontraumatic lower-extremity amputations (as a result of nerve disease). People with diabetes are 2 to 4 times more likely to have coronary heart disease and stroke than people without diabetes. In addition, poorly controlled diabetes can complicate pregnancy, and birth defects are more common in babies born to women with diabetes.

Diabetes costs the United States $98.2 billion each year. Medical costs for diabetes care -- including hospitalizations, medical care and treatment supplies -- total $44.1 billion. Indirect costs -- including disability payments, time lost from work and premature death -- total $54.1 billion.

HOW IS DIABETES DIAGNOSED?

Symptoms of type 1 diabetes usually develop over a short period of time, although beta cell destruction can begin months, even years, earlier. Symptoms include increased thirst and urination, constant hunger, weight loss, blurred vision, and extreme fatigue. If not diagnosed and treated with insulin, a person can lapse into a life-threatening coma.

The symptoms of type 2 diabetes develop gradually and are not as noticeable as in type 1 diabetes. Symptoms include feeling tired or ill, frequent urination (especially at night), unusual thirst, weight loss, blurred vision, frequent infections, and slow-healing wounds and sores.

In 1997 the Expert Committee on the Diagnosis and Classification of Diabetes published new guidelines for the diagnosis of diabetes. The guidelines lowered the blood sugar values for diagnosis and recommended use of the fasting plasma glucose test to diagnose diabetes, a simpler and faster test than the commonly used oral glucose tolerance test. Glucose levels greater than or equal to 126mg/dl with the fasting plasma glucose test, or greater than or equal to 200 mg/dl with the oral glucose tolerance test indicate a diagnosis of diabetes.[1]

HOW IS DIABETES MANAGED?

Diabetes is a self-managed disease because people with diabetes must take responsibility for their day-to-day care. Much of the daily care involves keeping blood glucose near normal levels at all times.

Management of type 1 diabetes: People with type 1 diabetes need daily injections of insulin because their bodies no longer produce insulin. Treatment requires a strict regimen that typically includes a carefully calculated diet, planned physical activity, self-testing of blood glucose, and multiple daily insulin injections.
Management of type 2 diabetes: Treatment for people with type 2 diabetes typically includes diet management, exercise, self-testing of blood glucose, and, in some cases, oral medication and/or insulin. Approximately 40 percent of people with type 2 diabetes require insulin injections.

The goal of diabetes management is to keep blood glucose levels as close to a normal range as safely possible, while avoiding blood glucose levels that are too high (hyperglycemia) or too low (hypoglycemia). Two major studies of diabetes among type 1 and type 2 patients provide important direction for managing diabetes.

The Diabetes Control and Complications Trial (DCCT) showed that intensive blood glucose control in people with type 1 diabetes delayed the onset and progression of eye disease, kidney disease, and nerve disease, reducing the risk by 35 to more than 70 percent by lowering hemoglobin A1c from 9 to 7 percent.[2] The United Kingdom Prospective Diabetes Study (UKPDS) showed that intensive blood glucose control in people with type 2 diabetes delayed the onset of eye and kidney disease, reducing the risk by 12 to 33 percent by lowering hemoglobin A1c from about 8 to about 7 percent.[3] These studies further showed that *any* sustained lowering of blood glucose helps, even if the person has a history of poor control. The degree of risk reduction for the change in hemoglobin A1c in the two trials was about the same.

Both the DCCT and UKPDS also shed light on the relationship between blood glucose control and cardiovascular disease. In both studies, there was a trend toward reduced cardiovascular disease with intensive blood glucose control. The UKPDS also showed that lowering blood pressure to normal significantly reduced the risk for all diabetes complications.[4]

WHAT ARE THE MAJOR DIABETES ADVANCES?

In recent years, advances in diabetes research have led to better ways to manage diabetes and treat its complications. Major advances include:

- New forms of purified insulin that are less likely to cause allergic reactions and are nearly identical to the insulin naturally produced by the body.
- Development of external and implantable insulin pumps that deliver appropriate amounts of insulin, replacing daily injections.
- New oral medications to improve control of type 2 diabetes.
- Better ways for patients, doctors and other health professionals to monitor blood glucose-- notably, new devices for self-monitoring of blood glucose, which is performed by the patient, and the hemoglobin A1c (also called H-b-A-one-c) laboratory test, which measures blood glucose control during the previous 3-month period.
- Effective treatment for diabetic eye disease.
- Better ways to manage diabetic pregnancies, improving chances of successful outcomes.
- Treatment strategies to reduce damage to the kidneys, eyes and nerves.
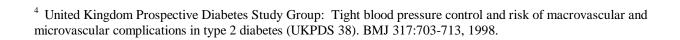
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Adapted from *Diabetes Overview*. National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, NIH Publication No. 96-3873, October 1995.

[1]Report of the Executive Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*. 1997 July; 20 (7): 1183-97.
[2]The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-Term Complications in Insulin-Dependent Diabetes Mellitus. *The New England Journal of Medicine*. 1993 September 30; 329 (14): 977-86.
[3] United Kingdom Prospective Diabetes Study Group: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet 352: 837-853, 1998.

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[4] United Kingdom Prospective Diabetes Study Group: Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes (UKPDS 38). BMJ 317:703-713, 1998.