Chapter 1
Diabetes

What Is Diabetes?

Diabetes is a group of diseases marked by high levels of blood glucose, also called blood sugar, resulting from defects in insulin production, insulin action, or both. Diabetes can lead to serious complications and premature death, but people with diabetes can take steps to control the disease and lower the risk of complications.

Types of Diabetes

Type 1 diabetes was previously called insulin-dependent diabetes mellitus (IDDM) or juvenile-onset diabetes. Type 1 diabetes develops when the body’s immune system destroys pancreatic beta cells, the only cells in the body that make the hormone insulin that regulates blood glucose. To survive, people with type 1 diabetes must have insulin delivered by injection or a pump. This form of diabetes usually strikes children and young adults, although disease onset can occur at any age. In adults, type 1 diabetes accounts for 5 to 10 percent of all diagnosed cases of diabetes. Risk factors for type 1 diabetes may be autoimmune, genetic, or environmental. No known way to prevent type 1 diabetes exists. Several clinical trials for the prevention of type 1 diabetes are currently in progress or are being planned.

Type 2 diabetes was previously called non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes. In adults, type 2 diabetes accounts for about 90 to 95 percent of all diagnosed cases of diabetes. It usually begins as insulin resistance, a disorder in which the cells do not use insulin properly. As the need for insulin rises,
the pancreas gradually loses its ability to produce it. Type 2 diabetes is associated with older age, obesity, family history of diabetes, history of gestational diabetes, impaired glucose metabolism, physical inactivity, and race/ethnicity. African-Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Native Hawaiians or other Pacific Islanders are at particularly high risk for type 2 diabetes and its complications. Type 2 diabetes in children and adolescents, although still rare, is being diagnosed more frequently among American Indians, African-Americans, Hispanic/Latino Americans, and Asians/Pacific Islanders.

Gestational diabetes is a form of glucose intolerance diagnosed during pregnancy. Gestational diabetes occurs more frequently among African-Americans, Hispanic/Latino Americans, and American Indians. It is also more common among obese women and women with a family history of diabetes. During pregnancy, gestational diabetes requires treatment to normalize maternal blood glucose levels to avoid complications in the infant. Immediately after pregnancy, 5 to 10 percent of women with gestational diabetes are found to have diabetes, usually type 2. Women who have had gestational diabetes have a 40 to 60 percent chance of developing diabetes in the next 5 to 10 years.

Other types of diabetes result from specific genetic conditions, surgery, medications, infections, pancreatic disease, and other illnesses. Such types of diabetes account for 1 to 5 percent of all diagnosed cases.

**Treating Diabetes**

Diabetes can lead to serious complications, such as blindness, kidney damage, cardiovascular disease, and lower-limb amputations, but people with diabetes can lower the occurrence of these and other diabetes complications by controlling blood glucose, blood pressure, and blood lipids.

- Many people with type 2 diabetes can control their blood glucose by following a healthy meal plan and exercise program,
losing excess weight, and taking oral medication. Some people with type 2 diabetes may also need insulin to control their blood glucose.

- To survive, people with type 1 diabetes must have insulin delivered by injection or a pump.

- Among adults with diagnosed diabetes—type 1 or type 2—14 percent take insulin only, 13 percent take both insulin and oral medication, 57 percent take oral medication only, and 16 percent do not take either insulin or oral medication. Medications for each individual with diabetes will often change over the course of the disease.

- Many people with diabetes also need to take medications to control their cholesterol and blood pressure.

- Self-management education or training is a key step in improving health outcomes and quality of life. It focuses on self-care behaviors, such as healthy eating, being active, and monitoring blood glucose. It is a collaborative process in which diabetes educators help people with or at risk for diabetes gain the knowledge and problem-solving and coping skills needed to successfully self-manage the disease and its related conditions.

**Pre-Diabetes**

Pre-diabetes is a condition in which individuals have blood glucose levels higher than normal but not high enough to be classified as diabetes. People with pre-diabetes have an increased risk of developing type 2 diabetes, heart disease, and stroke.

- People with pre-diabetes have impaired fasting glucose (IFG) or impaired glucose tolerance (IGT). Some people have both IFG and IGT.
• IFG is a condition in which the fasting blood glucose level is 100 to 125 milligrams per deciliter (mg/dL) after an overnight fast. This level is higher than normal but not high enough to be classified as diabetes.

• IGT is a condition in which the blood glucose level is 140 to 199 mg/dL after a 2-hour oral glucose tolerance test. This level is higher than normal but not high enough to be classified as diabetes.

Prevention or Delay of Diabetes

• Progression to diabetes among those with pre-diabetes is not inevitable. Studies have shown that people with pre-diabetes who lose weight and increase their physical activity can prevent or delay diabetes and even return their blood glucose levels to normal.

• In the Diabetes Prevention Program, a large prevention study of people at high risk for diabetes, lifestyle intervention reduced the development of diabetes by 58 percent over 3 years. The reduction was even greater, 71 percent, among adults aged 60 years or older.

• Interventions to prevent or delay type 2 diabetes in individuals with pre-diabetes can be feasible and cost effective. Research has found that lifestyle interventions are more cost effective than medications.

Complications of Diabetes in the United States

• Adults with diabetes have heart-disease death rates about 2 to 4 times higher than adults without diabetes. The risk for stroke is 2 to 4 times higher among people with diabetes.

• In 2003 to 2004, 75 percent of adults with self-reported diabetes
had blood pressure greater than or equal to 130/80 millimeters of mercury (mm Hg) or used prescription medications for hypertension.

- Diabetes is the leading cause of new cases of blindness among adults aged 20 to 74 years. Diabetic retinopathy causes 12,000 to 24,000 new cases of blindness each year.

- Diabetes is the leading cause of kidney failure.

- About 60 to 70 percent of people with diabetes have mild to severe forms of nervous system damage. The results of such damage include impaired sensation or pain in the feet or hands, slowed digestion of food in the stomach, carpal tunnel syndrome, erectile dysfunction, or other nerve problems. Almost 30 percent of people with diabetes aged 40 years or older have impaired sensation in the feet—for example, at least 1 area that lacks feeling. Severe forms of diabetic nerve disease are a major contributing cause of lower-extremity amputations.

- More than 60 percent of nontraumatic lower-limb amputations occur in people with diabetes.

- Periodontal, or gum, disease is more common in people with diabetes. Among young adults, those with diabetes have about twice the risk of those without diabetes. Persons with poorly controlled diabetes (A1C > 9 percent) were nearly 3 times more likely to have severe periodontitis than those without diabetes. Almost ¼ of people with diabetes have severe periodontal disease with loss of attachment of the gums to the teeth measuring 5 millimeters or more.

- Poorly controlled diabetes before conception and during the first trimester of pregnancy among women with type 1 diabetes can cause major birth defects in 5 to 10 percent of pregnancies and spontaneous abortions in 15 to 20 percent of pregnancies. Poorly controlled diabetes during the second and
third trimesters of pregnancy can result in excessively large babies, posing a risk to both mother and child.

- Uncontrolled diabetes often leads to biochemical imbalances that can cause acute life-threatening events, such as diabetic ketoacidosis and hyperosmolar, or nonketotic, coma. People with diabetes are more susceptible to many other illnesses and, once they acquire these illnesses, often have worse prognoses. For example, they are more likely to die from pneumonia or influenza than people who do not have diabetes. Persons with diabetes aged 60 years or older are 2 to 3 times more likely to report an inability to walk a quarter of a mile, climb stairs, do housework, or use a mobility aid compared with persons without diabetes in the same age group.

Preventing Diabetes Complications

Diabetes can affect many parts of the body and can lead to serious complications such as blindness, kidney damage, and lower-limb amputations. Working together, people with diabetes, their support network, and their healthcare providers can reduce the occurrence of these and other diabetes complications by controlling the levels of blood glucose, blood pressure, and blood lipids and by receiving other preventive care practices in a timely manner.

Glucose Control

- Studies in the United States and abroad have found that improved glycemic control benefits people with either type 1 or type 2 diabetes. In general, every percentage point drop in A1C blood-test results—for example, from 8 to 7 percent—can reduce the risk of microvascular complications—eye, kidney, and nerve diseases—by 40 percent.
• In patients with type 1 diabetes, intensive insulin therapy has long-term beneficial effects on the risk of cardiovascular disease.

Blood-Pressure Control

• Blood-pressure control reduces the risk of cardiovascular disease—heart disease or stroke—among persons with diabetes by 33 to 50 percent, and the risk of microvascular complications—eye, kidney, and nerve diseases—by approximately 33 percent.

• In general, for every 10 mm Hg reduction in systolic blood pressure, the risk for any complication related to diabetes is reduced by 12 percent.

Control of Blood Lipids

• Improved control of LDL cholesterol can reduce cardiovascular complications by 20 to 50 percent.

Preventive Care Practices for Eyes, Feet, and Kidneys

• Detecting and treating diabetic eye disease with laser therapy can reduce the development of severe vision loss by an estimated 50 to 60 percent.

• Comprehensive foot-care programs can reduce amputation rates by 45 to 85 percent.

• Detecting and treating early diabetic kidney disease by lowering blood pressure can reduce the decline in kidney function by 30 to 70 percent. Treatment with angiotensin-converting enzyme
(ACE) inhibitors and angiotensin receptor blockers (ARBs) are more effective in reducing the decline in kidney function than other blood-pressure-lowering drugs.

- In addition to lowering blood pressure, ARBs reduce proteinuria, a risk factor for developing kidney disease, by 35 percent—similar to the reduction achieved by ACE inhibitors.

Source: National Institutes of Health

The Pancreas

The pancreas is located high up in the abdomen. It is about the size and shape of a banana and sits behind the stomach. The pancreas is a gland organ and produces pancreatic digestive juices. It also produces insulin and other hormones related to digestion. Insulin helps to keep sugar in the blood at a stable level.

Nutrition, Diet, and Exercise

Up to 80 percent of type 2 diabetes is preventable by adopting a healthy diet and increasing activity. Glucose control is key to preventing or developing complications of diabetes.

What Should a Person with Diabetes Eat?

A person with diabetes should eat a healthy diet similar to the healthy diet recommended for the general population. This would include lean protein sources such as meats, fish, poultry, nuts, eggs, beans, and soy. These protein sources should be low in total fat, low in saturated fat, and contain no or very little trans fat. The diet should also include healthy carbohydrates with fiber such as fruits, vegetables, and healthy whole grains. Low-fat or fat-free calcium sources are also important to include, such as milk, cheese, yogurt, and soy products. Naturally, all food choices need to be portion controlled.
Proteins

Protein comes from meats, poultry, fish and seafood, beans and nuts, dairy foods, and grains. Three to 6 ounces a day is the recommended amount of lean protein in the diet. Good lean choices include most fish and seafood and skinless poultry such as chicken and turkey. Remember, there’s about 5 times more fat in a piece of chicken with the skin on it compared to a skinless piece, so be sure to remove the skin. Use low-fat cooking methods for these foods, such as broiling, grilling, roasting, or baking, and trim excess fat beforehand or drain away the fat after cooking.

Eggs, beans, nuts, and soy are good protein sources, provided you exercise portion control. Beans, nuts, and soy provide heart-healthy fat benefits and also provide carbohydrates and fiber. It’s important to remember when using canned beans—or any canned vegetables—to rinse in a strainer under cool running water, to remove about 40 percent of the sodium.

Milk, Cheese, and Yogurt

Select fat-free or 1 percent milk and dairy products whenever possible, with little or no added sugars. I prefer to buy whole milk and dilute it with an equal amount of water when cooking or baking in order to cut the carbs and the price of milk in half. You must realize, however, that this also cuts the nutrients such as calcium in half, if this is important to your diet. Dairy is a major source of calcium in our diets. It is recommended that children have 3-4 servings a day; adults need a minimum of 3. Fortified soy beverages are a good alternative for those who do not care for or are allergic to dairy.

Fruits and Vegetables

Recommendations are to eat at least 2 servings of fruits and 3-5 servings of vegetables a day. Fruits must be eaten in moderation, as calories and carbs can be high. Fruits and fruit juices should be
unsweetened. Drain or rinse canned fruit. Fruit juices tend to spike blood glucose levels fast, so use in moderation and choose whole fruits over juices, as they contain fiber, are not as concentrated, and lead to lower spikes in blood glucose levels.

Most green vegetables are lower in carbohydrates and calories than other vegetables. These would include leafy green vegetables such as spinach, cabbage, Brussels sprouts, and greens as well as broccoli, celery, green beans, asparagus, artichokes, and peppers. All vegetables can be eaten, in moderation. Here again, canned vegetables should be rinsed before preparing. Potatoes and other vegetables should never be fried. Starchy vegetables such as potatoes and corn should be limited to \( \frac{1}{2} \) cup per serving. Cauliflower is lower in carbs and can be cooked and mashed with a little cream or milk in place of mashed potatoes. It can also be steamed and served in place of potatoes, rice, or pasta with your meals.

**Grains**

Grains include cereals, breads, rice, and pasta. They provide the body with carbohydrates for energy and also needed fiber. Whole grains are almost always the best choice: brown rice, whole oats, whole wheat, etc. Sourdough bread products may be tolerated very well by some individuals with diabetes. Personal testing is recommended. Many diabetics swear by the taste of Dreamfield’s Whole Grain Pasta®. Dietary recommendations state that at least half of one’s grain foods should be whole grains. Look for choices that do not contain added sugar, honey, or other sweeteners. Grain choices should contain a minimum of 3-4 grams a serving and should be portion controlled. A portion is 1 cup cereal, \( \frac{1}{2} \) cup cooked rice or pasta, or 1 ounce bread.

**Oils and Spreads**

Vegetable oils such as olive and canola oil are the healthiest choices for cooking and baking. Trans fats are to be severely limited.
Look for trans-fat-free shortening for baking. Some fat is necessary for good health, but make sure you are choosing heart-healthy fats whenever possible. Butter is fine in moderation—it should be used as a “discretionary food.” My recipe for Canola Butter in chapter 4 is a healthier alternative.

**Snacks and Sweets**

Limit snacks and sweets and always use portion control. This includes sugar-free and low-fat products, as they can be high in carbs and calories. Fruits are a good alternative to sweets, because they provide fiber and nutrients. Baked chips and pretzels should be selected. The dessert recipes in this book typically provide healthier and tastier alternatives than those you would get elsewhere. They challenge you to utilize better ingredients for healthier outcomes.

**Carb Counting**

A meal-planning technique many diabetics use for managing their blood glucose levels is known as “carb counting.” Carb counting should take into account how active you are and what, if any, medications you are taking. Generally diabetics should start with 45-60 grams of carbs per meal and adjust this according to their health. Food labels and carb counters can help in calculating carbs.

**The Plate Method**

The plate method is another technique for portioning meals. Visually divide your plate into 3 unequal sections. Half the plate should be filled with nonstarchy vegetables; a little over one-fourth with your protein source such as meat, seafood, or poultry; and the remainder with a starch and or whole grains such as bread or crackers. You can add to this an 8-oz. glass of milk and a piece of fruit.
Diets

There are many diets out there touted to be beneficial for diabetics. The Zone Diet, Atkins Diet, South Beach Diet, Raw Foods Diet, and Healthy Exchange Diet all come to mind. Many of these are limiting and monotonous. You’ll notice that many of these diets seem to contradict each other, yet people are both helped and harmed by them all. The safest way to diet is to follow the advice of your personal physician or other licensed healthcare provider, while being monitored. Also remember that moderation with all foods is healthier for your body and sanity. Know that certain oral diabetes medications may result in significant weight gain and may need to be substituted by your physician with other more weight friendly, effective medications.

Supplements

Supplements that can be beneficial to diabetics include cinnamon and cinnamon capsules, alpha-lipoic acid, and chromium.

Exercise

To maintain normal blood glucose levels, a combination of aerobic, strength-training, and flexibility exercises is recommended for 30 minutes a day, at least 5 days a week. If you’re trying to lose weight, you may want to exceed 30 minutes a day. My favorite indoor exercise is stepping or marching to dance music while swinging my arms.