

# WHAT YOU SHOULD KNOW ABOUT TYPE 1 DIABETES



## WHAT IS TYPE 1 DIABETES?

Type 1 diabetes is a chronic autoimmune disease that damages the body's ability to use food properly. In a healthy person, glucose – a form of sugar produced when food is digested – is burned as fuel to supply the body with energy. To turn food into energy, the body requires insulin, a hormone produced by the pancreas. Insulin is essential to the metabolic process, because it allows glucose to move from the bloodstream into body cells to be used for energy. In people with Type 1 diabetes, the body's own immune system has attacked and destroyed its insulin producing beta cells, resulting in life-threateningly high levels of blood glucose. Type 1 diabetes can be controlled by testing blood sugar levels four to six times per day, injecting appropriate amounts of insulin or continuously infusing insulin through a pump, and monitoring diet and exercise.

## MAJOR TYPES OF DIABETES

### Type 1 (insulin-dependent or juvenile)

Type 1 diabetes can occur at any age, but is most commonly diagnosed before age 30. Research has shown that the trigger – an event or series of events occurring many months before the symptoms present themselves – is a combination of environmental and genetic factors that begin a process in which the body's immune system attacks and destroys the insulin-producing cells in the pancreas. To stay alive, people with Type 1 diabetes must monitor their blood glucose frequently, inject insulin several times a day or continuously infusing insulin through a pump, and coordinate physical activities with their meal plan and insulin intake.

### Type 2 (non-insulin-dependent or adult-onset)

Type 2 diabetes (a metabolic disorder) typically develops after age 40, but recent studies have identified Type 2 diabetes among children and adolescents who are obese and have a strong family history of the disease. In this form of diabetes, the pancreas still produces insulin, but the body does not produce enough or is not able to use it effectively. Treatment includes diet control, exercise, self-monitoring of blood glucose and, in some cases, oral drugs (to promote insulin usage or slow glucose absorption) or insulin. About 40 percent of people with Type 2 diabetes require insulin injections.

### Gestational Diabetes

About 2 to 5 percent of pregnant women develop high blood sugar during pregnancy. Although this type of diabetes usually disappears after the birth of the baby, women who have had gestational diabetes are at high risk of developing Type 2 diabetes later in life.

## SYMPTOMS OF DIABETES

You should consult a doctor if you or your child have any of the symptoms listed below.

**Type 1 diabetes:** These symptoms may occur suddenly.

- Extreme thirst
- Frequent urination
- Drowsiness, lethargy
- Sugar in urine
- Sudden vision changes
- Increased appetite
- Sudden weight loss
- Fruity, sweet, or wine-like odor on breath
- Heavy, labored breathing
- Stupor, unconsciousness

**Type 2 diabetes:** These symptoms usually develop gradually.

- Any of the symptoms listed for Type 1
- Recurring or slow-healing skin, gum, or urinary tract infections
- Tingling or numbness in hands or feet
- Itching of the skin or genitals

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## MANAGING TYPE 1 DIABETES

Diabetes management aims to maintain a proper balance of insulin and glucose in the body. The three variables involved in diabetes control are:

1. Food
2. Exercise
3. Medication (insulin or oral drugs)

The quick rule is: food makes glucose levels rise; exercise and medications make glucose levels fall. Blood glucose monitoring is the tool for managing rising and falling glucose levels.

Good diabetes control is a constant balancing act of medication, food, and exercise. If the balance is thrown off, there is danger of either of two diabetes-related emergencies: hypoglycemia (low blood sugar) or hyperglycemia (high blood sugar).

## INSULIN AND OTHER AGENTS

All people with Type 1 diabetes must take insulin by injection. Oral drugs are often used in the treatment of Type 2 diabetes. These drugs are designed to increase insulin production, slow the absorption of glucose, or help body cells use insulin more effectively. About 40 percent of those with Type 2 diabetes may also need insulin injections.

## DIET

People with diabetes do not need special foods, but they do need to follow a healthy diet tailored to their needs (a meal plan). It should be low in sugar, fat, and salt, and high in fiber such as beans, fruits, vegetables, and grains. It is important to eat regularly and to try not to skip meals.

## EXERCISE

Physical activity helps the body use glucose more efficiently and helps control weight. People who have not been very active, however, should consult a doctor before beginning an exercise program.

## BLOOD GLUCOSE MONITORING

### Self-Monitoring of Blood Glucose (SMBG)

People with all forms of diabetes must learn how to manage their blood glucose levels. SMBG is the tool that enables them to do this. SMBG helps in maintaining good control of blood glucose levels, helps prevent diabetes-related emergencies, and offers greater freedom to take part in any activity.

A national study, the Diabetes Control and Complications Trial (DCCT), has shown that improved control of blood sugar levels can reduce long-term diabetes complications affecting the eyes, nerves, and kidneys. (Results of the DCCT were reported in the *New England Journal of Medicine*, Vol. 329, No. 14, September 30, 1993.)

SMBG can be done at home or away from home using a small handheld machine called a blood glucose meter. People with diabetes who are taking insulin should test their blood sugar levels several times a day, usually before meals and at bedtime. They should also keep ongoing records of blood glucose tests to assess daily control and discuss results with their doctor.

### Hemoglobin A1c (HBA1c or A1c) Test

The HBA1c test shows glucose control over a period of time. It measures the amount of glucose attached to red blood cells (glycated hemoglobin). Because red blood cells have a lifespan of about three months, the test shows average blood glucose levels for a two- to three-month period.

The HBA1c test is usually performed in a doctor's office and results are analyzed by a laboratory. Doctors use results of HBA1c tests and SMBG records to determine whether the prescribed treatment regimen is working and to make adjustments in medication dosages or treatment schedules.

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## Urine Testing

Although a urine test using strips will indicate whether sugar has spilled into the urine at some point, this method does not measure the present level of blood sugar and is not recommended for blood glucose monitoring. Urine tests, however, are useful for monitoring the presence of ketones, a warning sign of ketoacidosis (see Hyperglycemia), which can lead to a diabetic coma.

## DIABETES-RELATED EMERGENCIES

The two most common diabetes-related emergencies are hypoglycemia (also called low blood sugar, insulin shock, or insulin reaction) and hyperglycemia (high blood sugar). These emergencies can happen in people with either Type 1 or Type 2 diabetes. People with diabetes should carry or wear a form of medical identification, such as a MedicAlert® bracelet, indicating they have diabetes, what medications they are taking, and the name of their health care professional.

### Hypoglycemia

Low blood sugar can occur if the person taking diabetes medication eats too little, doesn't eat frequently enough, takes too much insulin, or exercises too much. The condition is more common among people who take insulin injections. Low blood sugar can come on suddenly and lead to unconsciousness if not treated. Individual symptoms may vary, but include:

- Headache
- Pale, moist skin
- Extreme/sudden hunger
- Shakiness
- Fatigue/drowsiness
- Blurred/double vision
- Confusion/inattention
- Sweating
- Cold and clammy
- Weakness/dizziness
- Rapid pulse rate
- Shallow breathing
- Loss of coordination

Treatment for low blood sugar involves eating a fast-acting form of sugar such as glucose tablets, non-diet soda, juice, or sugar water. A person taking a diabetes medication that can result in low blood sugar should always carry a source of fast-acting sugar. If necessary, glucose gel, cake icing from a tube, jam, or syrup can be rubbed on the inside of the cheek or on the gums with a finger. To prevent an immediate recurrence, once the reaction subsides, the person should eat some type of complex carbohydrate such as milk, or half of a meat, cheese, or peanut butter sandwich. Keep glucagon – a prescription drug for emergency use to raise the level of sugar in the blood – on hand in case of emergency. If the person is unconscious or having a seizure, you should inject glucagon and call their doctor. Do not give anything by mouth. If you do not know how to give glucagon, do not have it available, or there is no response to glucagon, call 911 for an ambulance or emergency medical unit and get the person to the hospital immediately.

### Hyperglycemia

There are two emergency conditions associated with blood sugar that is too high: ketoacidosis and hyperosmolar non-ketotic coma. Ketoacidosis is more commonly associated with Type 1 diabetes, and hyperosmolar nonketotic coma occurs more commonly in older people with Type 2 diabetes. Both conditions can develop gradually, but are serious, life-threatening emergencies requiring medical treatment.

The symptoms of hyperglycemia are the same as for untreated diabetes. Some of these include: extreme thirst; frequent urination; drowsiness, lethargy; increased appetite; sudden weight loss; and heavy, labored breathing. Awareness of and prompt attention to the warning signs of hyperglycemia can avoid a serious problem.

## DIABETES EDUCATION

All people with diabetes need education in self-care. Classes are often offered by hospitals or clinics on an inpatient or outpatient basis and are taught by a Certified Diabetes Educator (CDE), who may be a nurse, dietitian, pharmacist, or other qualified health professional.

## SPECIAL CONSIDERATIONS FOR TYPE 1 DIABETES

People with Type 1 diabetes should maintain a balance between insulin, food intake, and physical activity. Many factors can upset this balance, including:

- Vigorous activity
- Illness or infection
- Fatigue
- Hormonal changes
- Change in eating habits
- Periods of growth
- Excitement or anxiety
- Stress

The doctor or diabetes educator can teach a patient how to manage unexpected events and how to make adjustments in insulin dosage based on glucose monitoring, activity levels, and food intake.

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## SPECIAL CONSIDERATIONS FOR TYPE 2 DIABETES

Since many people with Type 2 diabetes are likely to be overweight, weight loss and management of cardiovascular risk factors are major considerations in treatment. Cardio-vascular disease is the major cause of death in people with Type 2 diabetes.

People with Type 2 diabetes should develop a personal meal plan aiming for a low-fat diet and a fixed number of calories each day. Some form of exercise, approved by a doctor, should be included in the treatment plan. The doctor will also monitor a patient's blood pressure and blood fat levels and prescribe medications if necessary.

## A WORD ABOUT COMPLICATIONS

People with diabetes should be checked regularly for signs of complications. Long-term diabetes can lead to complications that affect the eyes, nerves, kidneys, and cardiovascular system, and that result in blindness, amputations, kidney failure, and premature heart disease. Diabetes also leads to complications in pregnancies.

Many of these complications can be reduced or delayed with good control of blood glucose and attentive medical care.

## HOPE FOR THE FUTURE

There is increasing hope that ongoing medical research will lead to cures for diabetes and its complications. Juvenile Diabetes Research Foundation plays a unique role in setting the global direction of diabetes research resources, to ensure that they are used as effectively as possible as a "cure enterprise" to bring about a world without diabetes and its complications. To that end, the organization has identified a set of cure therapeutic goal areas on which it will focus its research funding efforts. JDRF believes some combination of these areas of research focus currently holds the best potential to lead to breakthrough cures and treatments for Type 1 diabetes and its complications. JDRF will continue to actively pursue research within the framework of the following goals while remaining flexible enough to quickly respond to new opportunities as they arise:

- Stopping the immune system response that causes Type 1 diabetes and restoring autoimmunity in new-onset patients.
- Perfecting islet replacement strategies without chronic immunosuppression, including the creation of a renewable islet cell source.
- Creating novel therapeutics for predicting, preventing, and reversing complications.
- Regenerating the body's own beta cells without transplantation.
- Achieving metabolic control through mechanical intervention, including the development of a closed-loop artificial pancreas.

*The information in this brochure is not intended to take the place of medical advice. For guidance on topics discussed, consult your health care professional.*

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