What Is Diabetes?

Purpose

This section is intended to provide information on the disease known as diabetes mellitus and how it is treated.

Objectives

At the end of this section you will be able to:

- State diabetes is a chronic disorder of metabolism resulting in hyperglycemia (high blood sugar).
- Describe the role of insulin in blood sugar (glucose) use.
- List three types of diabetes.
- Identify three types of treatment for diabetes.
- State your role in the management of diabetes.

Outline

American Diabetes Association®

*The American Diabetes Association Recognizes this education service as meeting the National Standards for Diabetes Self-Management Education and Support.

These materials were adapted from Life with Diabetes: A Series of Teaching Outlines by the Michigan Diabetes Research and Training Center, 5th Edition. American Diabetes Association, 2014.

Description of diabetes

Diabetes is:

- A chronic disease, a serious lifelong condition
- A disorder of metabolism resulting in hyperglycemia (high blood sugar)
- Insufficient activity of the hormone insulin
- A progressive disease
- Not curable
- Manageable and treatable

Diagnosing diabetes

The American Diabetes Association established the current guidelines for the diagnosis of diabetes. Blood tests are needed to diagnose diabetes; two abnormal blood tests taken on ***two different days*** are recommended for the diagnosis, unless unmistakable symptoms of hyperglycemia are present. These blood tests are the same for males and females of all ages.

Blood Test	Diabetes Values	Prediabetes	Normal
Fasting glucose (FBS)	126 mg/dl or above	100 – 125 mg/dl	70 – 99 mg/dl
2 hour oral glucose tolerance test (OGTT)	200 mg/dl or above	140 – 199 mg/dl	Less than 140 mg/dl
Random glucose	Greater than 200 with symptoms		
A1C	Greater than 6.5%	5.7% – 6.4%	Less than 5.7%

Terms

A1C: A blood test that measures glucose attached to red blood cells; it evaluates the average blood glucose control over the previous 2 to 3 months (may also see abbreviated as HbA1C).

Fasting: No calorie containing food or beverage eaten or drank for at least 8 hours.

2-hour blood glucose: A blood sample taken 2 hours after starting a meal. Also known as a post-prandial glucose.

OGTT: (Oral glucose tolerance test) a test to diagnose diabetes. A fasting blood sample is obtained; the person drinks a beverage containing glucose. Blood samples are obtained at hourly intervals.

Pre-diabetes: A blood glucose level above normal but not high enough for a diagnosis of diabetes (100 – 125 mg/dl).

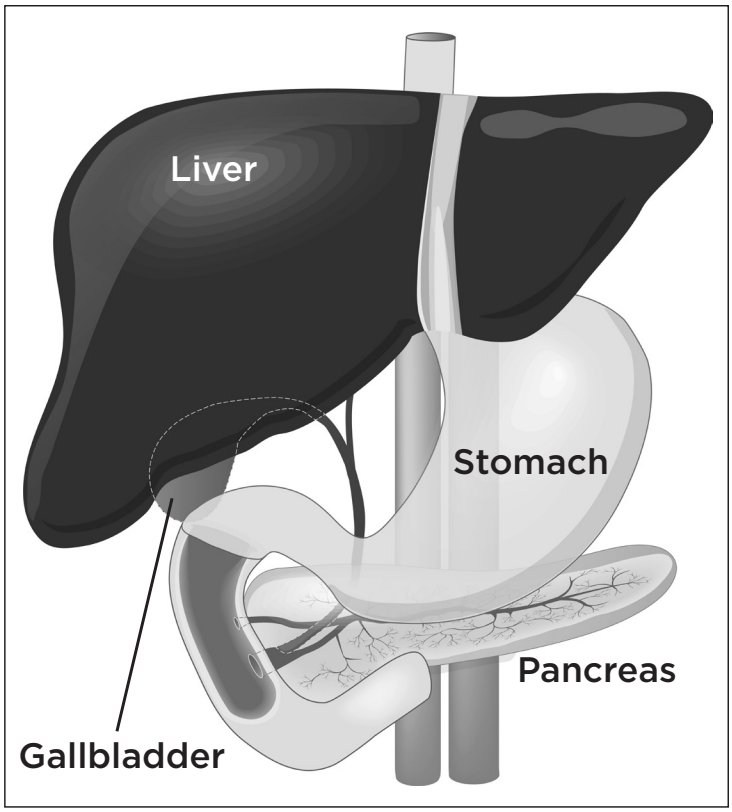
Sugar comes from food

When you eat, food is broken down into sugar called glucose. The glucose is then absorbed into the blood stream. This raises your blood glucose level. The rise of the blood glucose level triggers insulin to be released from the pancreas. The amount of insulin released is determined by the amount of glucose in the blood.

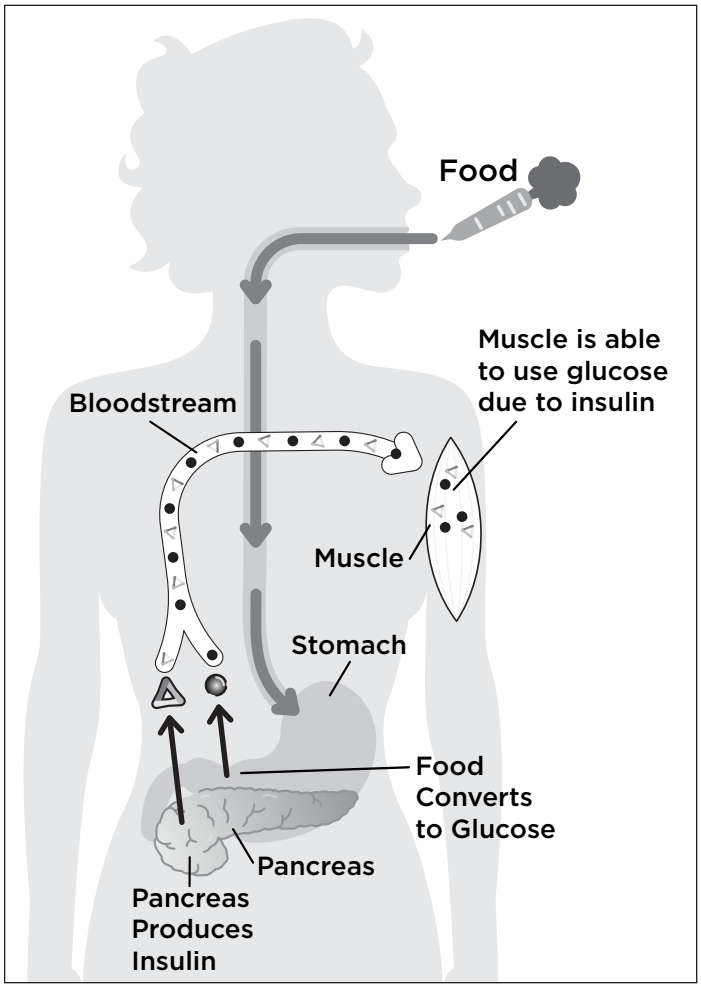
Insulin is a hormone made by the body. Specifically, the pancreas produces insulin. Insulin opens the cell wall to allow glucose to enter the cell

The Pancreas

- Is a large, elongated gland located behind the stomach
- The job (99%) of the pancreas is to create and release pancreatic juice, which helps break down food
- The remaining 1% of its role is to make and release insulin



Insulin and glucose working together



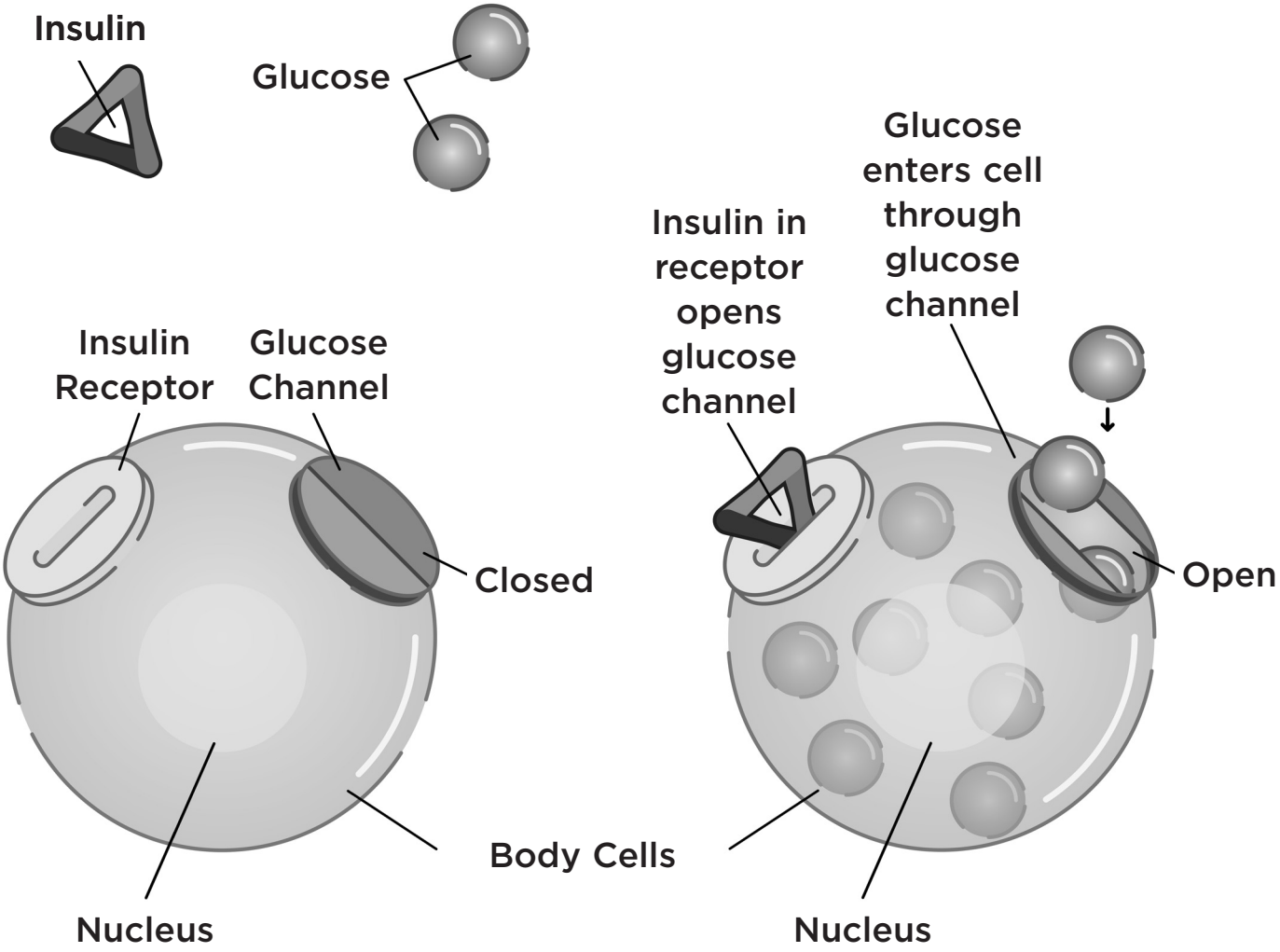
In order to be used as fuel to provide you with energy, the glucose in the blood stream must get inside the cells of the body. Insulin moves glucose through the cell's receptor sites into the cell. Insulin opens the doors (receptor sites) to your cells allowing the glucose to enter. Once the glucose moves into the cell, it can be used for energy. You then have the energy to think, talk, and walk!

Insulin also moves glucose to the liver for storage. This stored glucose is used in two ways. Your liver releases small amounts of glucose, as needed, all day to keep your blood glucose from going too low. Secondly, your liver releases larger amounts of glucose during periods when you have not eaten, like when you skip meals or overnight during sleep.

In people who do not have diabetes, the pancreas releases insulin as needed to maintain a normal blood glucose level all day and night. Generally, people with diabetes do not make enough insulin to maintain a normal blood glucose level throughout the day and night. Along with keeping your blood glucose down after you eat, insulin also helps manage the glucose released from the liver. If the body is not making enough insulin to move glucose (sugar) into the body cell, the cell signals it is low in energy. This signal causes the liver to release some of its stored glucose. This explains why you may have a normal blood glucose level before bedtime but have a high level in the morning.

What does insulin do?

- Insulin unlocks the cell and lets the glucose into the cell.
- Insulin lets the liver store glucose to use when the body needs it.
- Insulin stops your body from breaking down fat.



Insulin acts as a key to open the body cell's glucose channel, which allows glucose "blood sugar" to enter and refuel the cell. Without insulin, glucose remains in the bloodstream and can not enter the closed glucose channel.

Three types of diabetes

There are three main types of diabetes mellitus.

- Type 1 diabetes
- Type 2 diabetes
- Gestational diabetes

Type 1 diabetes

You may have heard this type of diabetes referred to as “Juvenile Onset” or “Insulin Dependent Diabetes” (IDDM). These are old names for type 1 diabetes. About one in ten people with diabetes have type 1 diabetes. With type 1 diabetes, the pancreas makes little or no insulin. This means people need to take insulin to stay alive. The risk of type 1 diabetes is higher for Caucasians. It most often occurs in young children, adolescents, or adults under the age of 30, but can occur at any age.

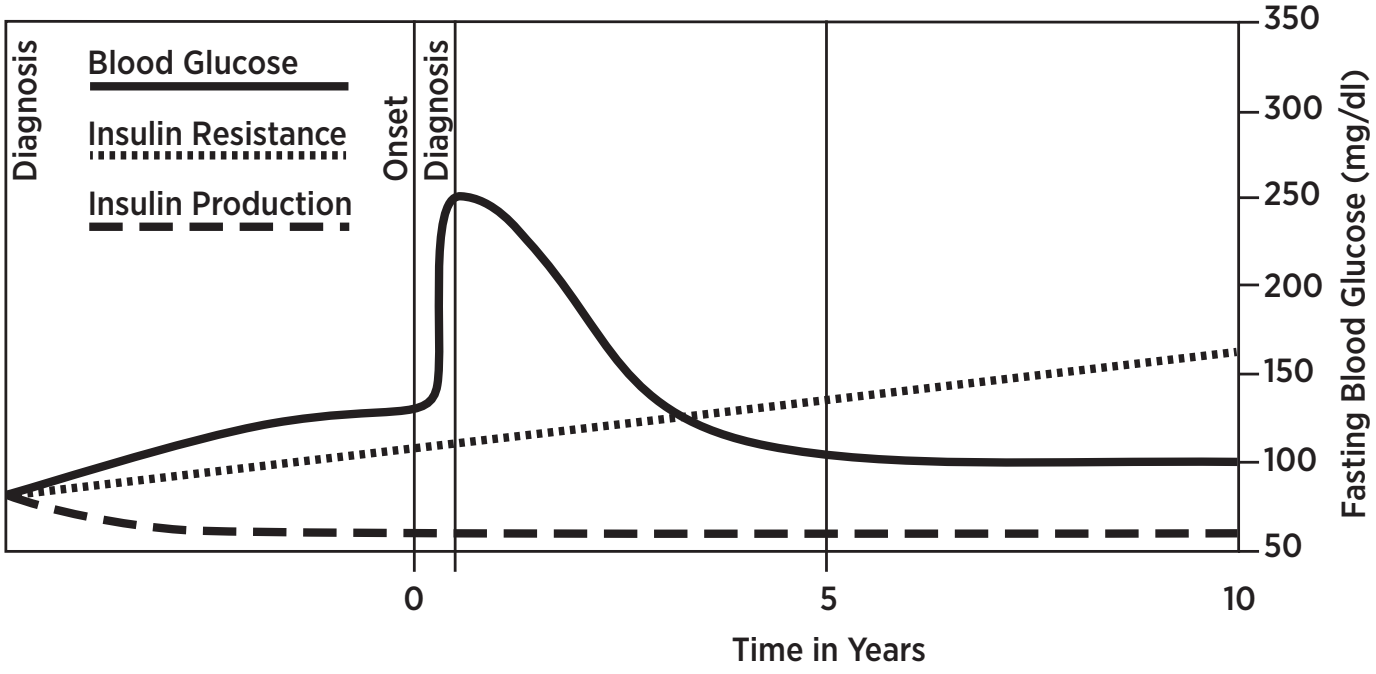
Common symptoms of type 1 diabetes

- Excessive thirst
- Excessive urination
- Excessive hunger
- Unexplained weight loss
- Dehydration

The causes of type 1 diabetes are not fully understood. It may be caused by:

- The body’s immune system destroying the cells in the pancreas that make insulin
- A virus causing injury to the pancreas and reducing its ability to create insulin
- A family history of type 1 diabetes; inherited genes increase the risk of pancreas damage (5 to 7% risk)

How type 1 diabetes changes over time



Type 2 diabetes

You may have heard this type of diabetes referred to as "Adult Onset" or "Non-Insulin Dependent" (NIDDM). These are old names for type 2 diabetes.

The risk of developing type 2 diabetes is higher for people:

- Who are overweight
- Who have an inactive lifestyle
- With a family history of type 2 diabetes
- With Hispanic, African, Asian, Pacific Islander, or Native American ethnic background
- With a prior history of gestational diabetes
- Who have had a baby weighing over 9 pounds
- Who are over 40 years old

Common symptoms of type 2 diabetes

- Fatigue
- Increased urination
- Blurry vision
- Irritability
- Increased thirst
- Tingling or numbness in hands, legs or feet
- Frequent infections
- Dry, itchy skin

Type 2 diabetes may be the result of low insulin production or insulin resistance. When the pancreas is producing enough insulin, but the cells are not responding to the insulin, this means the cells are "insulin resistant."

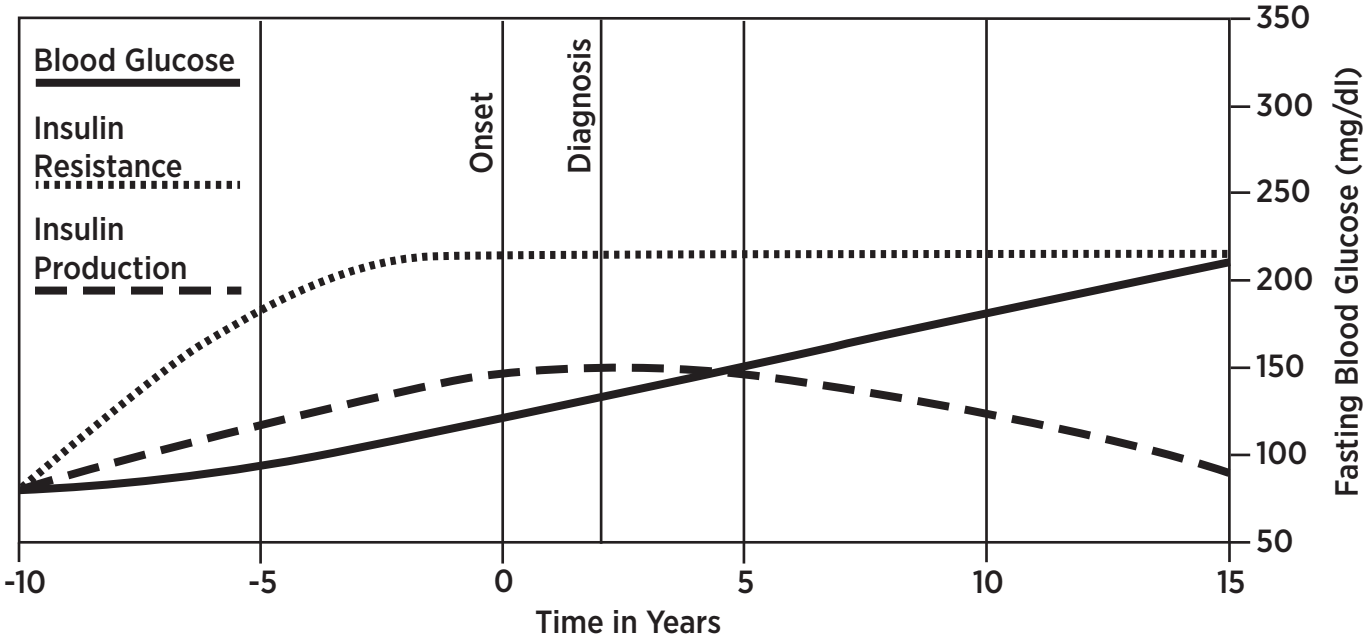
Remember insulin's role?

Insulin opens the cell's receptor sites so blood glucose can enter the cell. Once blood glucose enters the cell, the glucose level in the blood drops.

When cells are insulin resistant, it is more difficult for insulin to move the glucose from the blood into the cells. Therefore more insulin is needed. If there is not enough to move glucose into the cell or the cells are insulin resistant, it results in glucose staying in the bloodstream. The pancreas can be making large amounts of insulin, but not enough to keep blood glucose normal.

The insulin produced by the pancreas could be too low to meet the body's needs. Therefore, decreased amounts of insulin result in high blood glucose levels. More insulin may be needed to get the job done.

How type 2 diabetes changes over time



Gestational diabetes

This type of diabetes appears during pregnancy. The risk of developing gestational diabetes is higher for women who:

- Are older than 25
- Have had a baby weighing 9 pounds or more
- Have a family history of diabetes
- Are overweight

When a woman is pregnant, the placenta produces hormones. More hormones are released as the pregnancy progresses. Gestational diabetes occurs because these hormones increase insulin resistance, making the insulin less effective than usual. More insulin is needed by the body to maintain a normal blood glucose level. If the pancreas is unable to make enough insulin to meet the needs of the body, gestational diabetes occurs. Gestational diabetes is often diagnosed during the fifth or sixth month of pregnancy.

Women with gestational diabetes need to work closely with their diabetes team to keep blood glucose levels within normal range. Gestational diabetes may be treated with diet and exercise alone or in combination with diabetes medicine.

Other types of diabetes

Diabetes may be related to other medical reasons. Examples include diseases of the pancreas such as cystic fibrosis and pancreatitis, and drug or chemical induced diabetes such as in the treatment of some cancers, rheumatoid arthritis, AIDS, or organ transplants.

Treatment of diabetes

The goal of diabetes treatment is to maintain blood glucose levels as near normal as possible. The basis of all treatments is the meal plan and activity level. Food is the primary source of blood glucose. A meal plan will give you guidelines on when, how much, and which foods to eat. A meal plan helps control the amount of glucose that is released into the blood stream. Increasing physical activity increases the body's need for fuel (glucose) which helps lower the amount of glucose in the blood.

How your diabetes is treated depends on the type of diabetes you have, your blood glucose level, the symptoms you are experiencing, and what your personal blood glucose goals are.

Type 1 diabetes

- Always includes insulin therapy
- Needs a meal plan, glucose monitoring, and insulin injections to obtain personal glucose goals

Type 2 diabetes

There are more treatment choices for type 2 diabetes. In type 2 diabetes, the pancreas is making some insulin. Treatment choices depend on various factors such as blood glucose goals, current level of blood glucose, weight, and lifestyle.

- The first treatment choice is a healthy meal plan and activity plan.
- One or more oral medicines (pills) may be prescribed.
- Insulin therapy alone or in combination with non-insulin injectables or oral medicines may be prescribed.

Who needs to know

Your personal safety is the primary consideration when deciding who needs to know you have diabetes. It is recommended that you tell:

- Your spouse or other family member that may be contacted about your health history in case of a medical emergency.
- Your friends, employer, and co-workers, especially if you are taking any diabetes medicines that may cause your blood glucose to be too low; they need to know how to treat this situation.

Medical ID

You are encouraged to wear a medical ID that will alert emergency rescue workers you have diabetes. Medical ID's are available in many different styles and price ranges, so you will be able to find something that matches your budget and style preferences. You can find them at your pharmacy, and there are resources on the internet. See the "Resources for People with Diabetes" section at the end of this book.