

Diabetes - Lesson

Goal

To educate students on the three types of diabetes, their symptoms and management, and on behaviors that can reduce the risk of contracting the disease.

Objectives

At the end of this lesson, students will be able to:

- Know the relationship between glucose, the pancreas, and insulin.
- Identify the three types of diabetes (type 1, type 2 and gestational)
- Describe the effect diabetes has on the body
- Describe factors that increase the risk of getting diabetes
- Describe the health problems associated with diabetes
- Explain what kids can do to help avoid getting diabetes

A. Introduction

- In the US in 2017-2020, the CDC (Center for Disease Control and Prevention) reported over 22% of 12-19 year-olds have obesity.
- About 1.5 million more people are diagnosed with diabetes each year.
- When you eat food, it gets converted into glucose.
Glucose is the scientific word for sugar when it is inside the body, and we use glucose for energy.
Glucose enters the bloodstream so that it can be carried throughout the body.
- The pancreas is an organ that creates a hormone called insulin, which, in a healthy person, helps the body use glucose as energy.
When it is working correctly, insulin allows glucose to enter inside our cells to be used as energy.
When a person has diabetes, there is a problem getting glucose inside the cells and they do not get enough energy to function.
- There are three different reasons why glucose might not be able to get inside the cells:
 1. The pancreas does not produce enough insulin.
 2. The cells do not “listen” to the insulin.
 3. Another hormone blocks the insulin from opening the cells to the glucose.
- Each of these three possibilities is one of the three types of diabetes.

B. Types of Diabetes

1. Type 1 Diabetes

- In type 1 diabetes, the pancreas cannot produce enough insulin.

- The immune system normally protects your body by attacking foreign particles like bacteria or other germs. When someone has type I diabetes, the immune system gets confused and attacks the cells in the pancreas that are supposed to produce insulin. Doctors are not sure why this happens.
- Factors that may influence the chance of getting type 1 include cold weather, bad eating habits in early childhood, and being breastfed.
- Type 1 diabetes is most common among children and young adults, but older adults can also get it.
- Symptoms include:
 - endless hunger
 - rise in thirst
 - chronic, frequent need to use the bathroom
 - sudden weight loss
 - impaired vision
 - exhaustion
- Only 5-10% of US diabetes cases are type I diabetes

2. **Type 2 Diabetes**

- Insulin is produced but cannot be used properly by the cells.
- This is called “insulin resistance,” because the insulin tries to move glucose inside the cells, but the cells do not let the glucose in.
- Factors that increase the risk of getting type II diabetes are:
 - older ages
 - obesity
 - physical inactivity
 - genetics
 - ethnicity ((It is unknown why, even beyond higher obesity rates, type II diabetes is more common in African Americans, Latinos, Native Americans and Asian Americans and Pacific Islanders than other ethnicities.)
- Type 2 diabetes, the most common diabetes, often exists without being detected.
- Symptoms include:
 - weight loss
 - extreme thirst
 - tiredness
 - nausea
 - impaired vision
 - slower healing time from injuries, increase in number of infections

3. **Gestational Diabetes**

- Pregnant women who have no history of diabetes but have high blood sugar levels during their pregnancy are said to have gestational diabetes.
- The exact cause is unknown, but three are clues to the process.

- A pregnant woman develops a placenta that produces hormones to help the baby develop.
- Researchers think those hormones block the action of insulin in the mother's body.
- Without enough insulin, cells do not use the glucose in the blood. Glucose levels can build up in the body and cause a condition called hyperglycemia.
- Gestational diabetes affects about 2-10% of all pregnant women in the US. It is more common among African Americans, Hispanic/Latino Americans and Native Americans, as well as women who are obese or have a family history of diabetes.
- Gestational diabetes can be dangerous for the mother and the unborn fetus but is treatable. It usually goes away after the baby is born.

C. Living with Diabetes

- How do people diagnosed with diabetes manage their condition? What tools do they use? What lifestyle changes do they make?
- The way current diabetics live with and manage their disease is through a combination of monitoring blood sugar, regulating blood sugar with insulin and other drugs and keeping blood sugar stable with appropriate diet.
- All management has the same goal: to keep blood sugar within the healthy range.
- Diabetics must monitor their blood sugar
 Many diabetics can feel when their blood sugar is getting low, but by the time they feel it, it may be too late. Also, many diabetics *cannot* feel the symptoms of high blood sugar, so using a monitoring device is crucial.
 Home-tests are common. The patient collects and tests a sample of their blood.
 Recently, devices have been made that collect and test the blood sugar level automatically every 5 minutes and release insulin as needed, back into the bloodstream
- Managing blood sugar with insulin
 Type 1 - Patients with type 1 diabetes require direct injection either by insulin pump or hypodermic needle.
 Type 2 - Patients with type 2 diabetes can control blood sugar levels with diet, exercise and weight loss. Type 2 diabetics with poor blood sugar control even after lifestyle changes are asked to take oral hypoglycemics, which are pills that lower blood sugar. If that is not enough, they may need type 1 insulin therapy by direct injection.
- Managing blood sugar with diet
 A diabetic who has low blood sugar can usually eat a snack of carbohydrates and protein. This might be apple slices with peanut butter or yogurt and a banana, or toast and hummus.
 For the most part, diabetics can improve management of the disease and lower the need for insulin by reducing carbohydrates intake.

D. Health Consequences of Diabetes

- Hypertension (this is the medical term for high blood pressure):
People with high blood pressure are at a much higher risk of heart disease and stroke.
The first steps in treating high blood pressure are weight loss and exercise but there are also many medications prescribed for more severe cases.
- Kidney failure:
The kidneys are organs that filter waste products out of the blood. Diabetes can lead to a loss in functionality of the kidneys which requires complicated and expensive medical treatment.
- Nervous system disease:
The nervous system is a coordination network within the body that controls muscles and organs, reacts to inputs from the senses and guides all actions. One example is neuropathy, a type of nervous system disease. Neuropathy creates numbness or pain like a “pins and needles” sensation.
- Blindness:
Sometimes diabetes patients develop “cataracts” which create spots on the eye that block vision. If untreated the cataracts will eventually make a person completely blind.
- Amputation:
If a person’s diabetes is not treated it can cause him or her to heal extremely slowly from cuts and wounds. This can cause injuries to become infected, sometimes requiring amputation.
- Complications of pregnancy:
Potential risks of diabetes for pregnant women include:
 - miscarriage
 - growth restriction
 - growth acceleration
 - fetal obesity

E. Preventative Behavior

- Since doctors do not know for sure what causes diabetes, how can you protect yourself from developing this disease?
- There are two ways you can use your behavior to reduce your risk of diabetes:
 - Eating Right
 - Maintaining an appropriate energy balance, i.e., not eating more calories than your body needs.
 - Learning to eat a wide variety of foods and learning to eat healthy sized portions at an early age.
 - Exercising
 - Keeps your heart strong.
 - Prevents you from gaining excess weight.

F. Wrap Up

- Summarize the objectives as follows:
There are three types of diabetes: Type 1, type 2 and gestational diabetes is a disease where the pancreas does not make enough insulin, the cells will not allow insulin to deliver glucose, or pregnancy hormones seem to not allow insulin to carry glucose (this is uncertain).
Factors that increase the risk of getting diabetes are older age, obesity, physical inactivity, family history and ethnicity.
To avoid getting diabetes, children must practice healthy eating habits and exercise regularly.
- Diabetes can be a dangerous disease with many health risks.
Diabetes is one of the leading causes of death in the United States.
The leading cause of death in diabetes patients is heart disease. If you have diabetes, the chance of having a stroke increases two to four times.
Diabetes also causes the following:
 - High blood pressure
 - Kidney failure
 - Nervous system disease
 - Blindness
 - Amputation of the limbs
 - Complications of pregnancy

Quiz

1. Glucose
 - a. is what food gets converted into in the body.
 - b. is a body organ that creates insulin.
 - c. is also called blood sugar.
 - d. travels around the body to give energy to cells.
 - e. All of the above.
 - f. a, c, and d

2. The pancreas
 - a. is what food gets converted into in the body.
 - b. is a body organ that creates insulin.
 - c. is also called blood sugar.

3. Insulin
 - a. travels around the body to give energy to cells.
 - b. is another word for high blood pressure.
 - c. helps the body use glucose as energy.

4. If you have type 1 diabetes
 - a. the pancreas does not make enough insulin.
 - b. the disease usually starts when you are a child.
 - c. neither a. nor b.
 - d. both a. and b.

5. If you have type 2 diabetes
 - a. you have enough insulin but the cells won't let it move glucose into the cells.
 - b. you are probably an adult OR obese OR do not get enough exercise.
 - c. neither a. nor b.
 - d. both a. and b.

6. If you have gestational diabetes
 - a. you are pregnant and you and your fetus are at-risk.
 - b. it is likely the diabetes will go away when the baby is born.
 - c. neither a. nor b.
 - d. both a. and b.

7. The main goal in managing diabetes is
 - a. to keep blood sugar within the healthy range.
 - b. to exercise twice a week.
 - c. to learn about the food groups and then plan healthy menus.

8. The health consequences of diabetes include

- a. high blood pressure, kidney disease, and amputation.
 - b. having more energy and not having to worry about your health.
 - c. being a little stiff and sore after a workout.
9. Healthy behavior for a diabetic includes:
- a. to keep blood sugar within the healthy range.
 - b. to exercise twice a week.
 - c. to learn about the food groups and then plan healthy menus.