



Lesson #3: Diabetes Detectives

Chapter Three

In the Wellness Center, Nurse Heller takes Cristina's temperature. It is 101-degrees – more than two degrees above normal. She administers some acetaminophen for the fever and says, "You're going to have to go home, Cristina. I'm calling your parents."

Cristina is about to protest that everyone is at work, but the nurse raises her hand. "I think they'll understand. Anyway, you should have your doctor examine you if the fever continues."

Cristina closes her eyes but her head is still pounding. Nurse Heller invites Cristina to lie down on the cot. It is quiet in this office, and when she turns the lights off, Cristina feels a little better. As soon as she sees her father, Cristina blurts out, "Papi, I'm not feeling so well!"

But there's a different reason Papi has come to pick her up at school, one that is much worse! Her grandmother forgot to take her insulin and has gone into diabetic shock. Cristina is worried about her grandmother. She knows her abuela struggles with health issues and is overweight. She knows that the shots her grandmother takes help her body use the food she eats for energy, but she doesn't understand what it all means.

*Her papi calls it **diabetes**. Because her grandmother and mother suffer from similar symptoms, including increased thirst and urination, blurred vision, and numbness in their feet, Cristina's papi decides it is important for her to learn about diabetes, including risk factors, prevention, and treatment.*

Lesson Overview

In this lesson, students read Cristina's story and begin to look for clues about diabetes. They work together as Diabetes Detectives to gather information about the role of the pancreas and insulin, what happens when the pancreas and insulin don't work properly, how diabetes affects the body, and risk factors for developing diabetes. Students make connections to the first two lessons in this series and draw conclusions about the relationship between personal choices (including dietary choices) and diabetes.

Content Areas

Life Sciences and Health Education



Lesson #3: Diabetes Detectives

Lesson Duration

1-2 60-minute class periods

Essential Questions

- What is diabetes?
- What are the symptoms of diabetes?
- What body organs and systems are affected by diabetes?
- If someone in my family has diabetes, does that mean I will get it?
- What can I do to help prevent diabetes?

Materials

- Diabetes Detectives Clues with Solve the Mystery strip (one set per group, cut apart)
 - An abbreviated version is included as an option for younger students
- Internet access
- Paper and writing instruments (pens, pencils, markers)
- Overhead transparencies or student's "bodies" (from Activity #1: The Human Body – Miracle Machine!): skeleton (bones and muscles), organs, body structures

Objectives

Student will:

- Define diabetes
- Identify risk factors that contribute to the development of diabetes
- Evaluate the relationship between diabetes and personal choices



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Vocabulary

- Diabetes
- Glucose/Sugar
- Blood glucose
- Blood sugar
- Pancreas
- Insulin
- Symptoms

Background Information for the Teacher

In the United States alone, 29 million people suffer from diabetes (9.3 percent of the population).¹ One-in-four people do not know they have the disease. In many cases, diabetes may be controlled or even prevented through diet and weight loss, exercise, and lifestyle changes that lower stress and contribute to improved health.

Diabetes is a disease that occurs when your **blood glucose (blood sugar)** is higher than it should be. The pancreas makes insulin, a hormone that helps glucose from food get into your cells. Your body uses that glucose for energy or stores it to be used later. If the pancreas does not make enough (or any) insulin or does not use it well, glucose remains in the bloodstream and is not used by your cells. Over time, having high blood glucose levels can cause health problems. Diabetes has no cure, but treatment can be very effective when treated with medication, partnered with healthy dietary choices, exercise, and good stress management.

Type 1 diabetes. With Type 1 diabetes, the immune system destroys the cells in your pancreas that make insulin. Though it can appear at any age, type 1 diabetes is usually diagnosed in children and young adults. People with Type 1 diabetes must take insulin every day.

1. National Diabetes Statistics Report, 2014. Retrieved from <https://www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf>



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Type 2 diabetes. With Type 2 diabetes, the insulin produced by the pancreas does not work properly, but the pancreas initially makes more to try to force it to work. Eventually, the pancreas wears out and stops making insulin. It is possible to develop Type 2 diabetes at any age, though it occurs most often in middle-aged and older people and is the most common type of diabetes. People with Type 2 diabetes take medication to manage their disease. Symptoms of diabetes include, but are not limited to, the following:

- Increased thirst and urination
- Increased hunger
- Fatigue
- Blurred vision
- Numbness or tingling in the feet or hands
- Sores that do not heal
- Unexplained weight loss ²

Symptoms of Type 1 diabetes can start quickly, while symptoms of Type 2 diabetes can develop so slowly that they often go unnoticed.

Scientists think Type 1 diabetes is caused by genes and environmental factors. Type 2 diabetes is caused by several factors including obesity, poor dietary choices, a sedentary lifestyle, resistance to insulin, and genetics.

Procedure

1. Ask students to summarize what is happening in this piece of Cristina's story. (Cristina is still feeling unwell and she is very worried about her abuela's diabetes. She doesn't really understand what diabetes is or why it is making her abuela sick.
2. Ask, "Have you ever heard of diabetes or know what it is?"
3. In this lesson, you'll be learning more about diabetes. To help you do that, you will work together to analyze clues and get to the bottom of a real mystery as Diabetes Detectives!"

2. National Institute of Diabetes and Digestive and Kidney Diseases: Symptoms and Causes of Diabetes. Retrieved from <https://www.niddk.nih.gov/health-information/diabetes/overview/symptoms-causes>



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4. Divide students into groups of 4 and share the following directions:
 - a. Each person in your group will receive a clue about diabetes. You will learn about glucose, the pancreas, insulin, and diabetes. Your goal is to use the clues and your own knowledge to solve a mystery.
 - b. First, read your clue silently to yourself.
 - c. Then, take turns reading your clues aloud to your group. You may need to read it more than once or show it to your group. That is okay! You are working together!
 - d. Once all of the clues are shared, talk with your group about how they fit together. What story do they tell? What does it all mean?
 - e. Finally, work together to discuss all you have learned and solve the mystery. (Reveal the mystery question on the board or chart paper and read it aloud.) **Solve the Mystery: How are these ideas connected and what do they have to do with me?**
5. After about 15 minutes, regroup students and ask them to share their solutions to the mystery. After the group discussion, students should understand the following (though students may share some additional wonderful insights):
 - I can choose to do things that will help me feel healthy.
 - I can choose to eat foods that are low in sugar and high in nutrients.
 - I can choose to exercise and stay active.
 - I can choose to reduce the amount of unhealthy foods I eat.
 - Not everyone can control whether or not they get diabetes.
 - I can reduce my chances of getting Type 2 diabetes by eating healthy foods, exercising, and losing excess weight. ³
 - If I do get diabetes, I can help manage it by taking my medication, eating healthy foods, reducing sugar intake, and exercising. ⁴

3. Harvard School of Public Health: Simple Steps to Preventing Diabetes. Retrieved from https://www.hsph.harvard.edu/nutritionsource/diabetes-prevention/preventing-diabetes-full-story/#T2D_can_be_prevented

4. Mayo Clinic: Diabetes Management: How Lifestyle, Daily Routine Affect Blood Sugar. Retrieved from <http://www.mayoclinic.org/diseases-conditions/diabetes/in-depth/diabetes-management/art-20047963>



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6. Say, "Now that we know what diabetes is and why it happens, how might someone know they have it? Let's talk about some of the **symptoms** of diabetes. Symptoms are the signs that you may have a particular illness. Each illness has its own symptoms, but a lot of illnesses share symptoms. For example, let's say I have a runny nose and a sore throat. Those are symptoms, but it's not clear what illness I have. Maybe I have a cold. Maybe I have a sinus infection. Maybe I just came in from the cold. Maybe I swallowed my food the wrong way and I've just had a coughing fit! If the symptoms don't go away, I will have to go to my doctor to find out what my symptoms mean."
7. Ask, "Why might it be important to be able to recognize symptoms of illness?" Students' answers should include the importance of early treatment.
8. Ask, "What were some of the symptoms of diabetes mentioned in Cristina's story?" If necessary, reread that section of the story to students. (Answers: increased thirst and urination, blurred vision, and numbness in their feet)
9. Share the other symptoms of diabetes, including fatigue (being extremely tired often), increased hunger, sores that do not heal, and unexplained weight loss (losing weight without trying or knowing why).
10. To help students understand the difference between a momentary condition and ongoing symptoms, ask, "What are some other reasons you might be hungry and thirsty? Why might your feet be numb for a minute? Why might you be really tired?" Remind students that it is important for us to see a doctor when we think we are ill. We should not try to diagnose or treat ourselves.
11. To close, ask students to explain in their own words why it is important that they know about diabetes and the power of their own decision-making. Stress that, even if diabetes is not a health risk in their family, awareness of the disease and recommendations for prevention and health, can help everyone maintain overall health and wellness.



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Celebration Extension

Have students work in small groups to brainstorm ways they would communicate to friends and family members the important role of personal decision-making in one's health and wellness. Encourage students to use a creative approach. For example, they could choose to use music, the Diabetes Detective activity, video, poems, role play, illustrations, diagrams, or stories to share the information with others.

Suggested time for presentation: 5-10 minutes

Additional Resources

- [American Diabetes Association: Common Terms](#)
- [National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health](#)
- [Centers for Disease Control: National Diabetes Prevention Program](#)
- [KidsHealth: "Diabetes: What is It?"](#)
- [Wellness Worksheets, Insel and Roth, SAMHSA, 2012](#)

National Standards

NGSS

- LS3.A: Inheritance of Traits
- ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World

National Health Standards

- 1.5.1 Describe the relationship between healthy behaviors and personal health.
- 2.5.2 Identify the influence of culture on health practices and behaviors.

CCSS

- CCSS.ELA-Literacy.RL.3.4 Determine the meaning of words and phrases as they are used in a text.
- SL.4.1.D Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.



Lesson #3: Diabetes Detectives

Diabetes Detectives Clues with Solve the Mystery Strip

Directions: Cut strips apart to create one set for each group of four students.

Clue 1: Glucose and Insulin

- Glucose is a sugar.
- It is the body's main source of energy.
- We get it from the foods we eat.
- When we eat food, it travels from our mouths, down the esophagus, and through the stomach to the small intestine. There, glucose (sugar) from the food is released into the bloodstream.
- Glucose travels through the bloodstream and goes into the cells for energy in the presence of insulin.

Clue 2: Insulin and the Pancreas

- The pancreas is an organ in your body.
- One of the jobs of the pancreas is to make insulin.
- The pancreas releases insulin when the levels of glucose (sugar) in our blood rise after we eat.
- The insulin works like a key. It "unlocks" cells so glucose can get inside to provide us with energy.
- Glucose needs insulin to get inside our cells. Without it, glucose builds up in our bloodstream.

Clue 3: Pancreas Problems

- In some people, the pancreas cannot make insulin.
- These people have Type 1 diabetes.
- They need to inject insulin so their cells can unlock and let glucose in.
- In some other people, the pancreas usually can make insulin at first, but the lock doesn't work and glucose is not able to get into cells.
 - The insulin cannot unlock the cells to let in the glucose.
 - The glucose builds up in the bloodstream.
 - The pancreas makes more and more insulin to try to help unlock the cells.
 - After working so hard to make insulin, the pancreas eventually wears out and stops working.
 - These people have Type 2 diabetes.
 - They need to take medicine by mouth and may need to inject insulin.

Clue 4: Who Gets Diabetes?

- Anyone can get Type 1 diabetes, but scientists think it is caused by genes (someone in your family also has it) and environmental factors (like viruses) that might trigger the disease. Symptoms can show up quickly!
- Type 2 diabetes is also connected to genes (someone in your family has it). However, obesity and lack of physical activity can be risk factors, as well ⁵. It can take a long time before a person knows they have Type 2 diabetes!

5. National Institute of Diabetes and Digestive and Kidney Diseases: Risk Factors for Type 2 Diabetes. Retrieved from <https://www.niddk.nih.gov/health-information/diabetes/overview/risk-factors-type-2-diabetes>



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Solve the Mystery!

- i. In Lesson 1, you learned about the systems of your body and how they work together.
- ii. In Lesson 2, you learned about the power of personal decision-making.
- iii. In Lesson 3, you have learned about diabetes and its effect on the body.
- iv. Solve the Mystery: **How are these ideas connected and what do they have to do with me?**



Lesson #3: Diabetes Detectives

Diabetes Detectives Clues with Solve the Mystery Strip (option for younger students)

Directions: Cut strips apart to create one set for each group of four students.

Clue 1: Glucose and Insulin

- Glucose is a sugar that comes from food.
- Glucose is the body's main source of energy.
- After we eat, glucose travels all over our bodies in our bloodstream.

Clue 2: Insulin and the Pancreas

- Insulin is made in the pancreas.
- It releases insulin after you eat so the insulin can travel with the glucose.
- The insulin works like a key. It "unlocks" cells so glucose can get inside to provide us with energy.
- Glucose needs insulin to get inside our cells.

Clue 3: Pancreas Problems

- In some people, the pancreas cannot make insulin so they have to take insulin shots.
- In some other people, the body resists the insulin and it is not able to do its job. Eventually, the pancreas stops making insulin. These people will need to take medicine and may need to inject insulin.

Clue 4: Who Gets Diabetes?

- Anyone can get Type 1 diabetes, but usually it is genetic – it runs in the family. Symptoms can show up quickly!
- Type 2 diabetes is also connected to genes (someone in your family has it). However, obesity and lack of physical activity can be risk factors, as well. It can take a long time before a person knows they have Type 2 diabetes!

Solve the Mystery!

- i. In Lesson 1, you learned about the systems of your body and how they work together.
- ii. In Lesson 2, you learned about the power of personal decision-making.
- iii. In Lesson 3, you have learned about diabetes and its effect on the body.
- iv. Solve the Mystery: Think about everything you have learned in these three lessons. How are these ideas connected? How can you help take care of your own health?

6. National Institute of Diabetes and Digestive and Kidney Diseases: Risk Factors for Type 2 Diabetes. Retrieved from <https://www.niddk.nih.gov/health-information/diabetes/overview/risk-factors-type-2-diabetes>