

Be a Health Scientist!

Be a Dietitian

Educator Guide

Big Question: How can dietitians recommend food choices to improve a patient's health?

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Be a Health Scientist! Big Ideas

These are the themes you'll find running through all five *Be a Health Scientist!* activities.

► *Health Science is all about finding ways to keep people healthy and helping them get better when they are sick.*

- *What are some ways people can stay healthy?*
- *How can we learn more about the spread of germs and diseases?*
- *What are some ways to help people get better when they are sick?*

► *The human body is complex. There are many parts that work together to protect us from sickness and work to keep us healthy. When those parts are unable to do their job, health scientists can help in a variety of ways:*

- *Finding the cause of the problem through tests and identifying ways to fix it.*
- *Using specially designed equipment to help our body work.*
- *Making sure our body has what it needs to stay healthy.*

Core Four Strategies

Use the Core Four Strategies as you guide your learners through this activity.

- **Ask questions** to spark curiosity and encourage new ideas
- **Encourage scientific thinking** with chances to observe, make predictions, and test ideas
- **Cultivate rich dialogue** with chances to talk together, share ideas, and use science words
- **Make connections** between learners' experiences, science careers, and this activity



**Ask
Questions**



**Encourage
Scientific
Thinking**



**Cultivate Rich
Dialogue**



**Make
Connections**

Be a Dietitian

Big Question: How can dietitians recommend food choices to improve a patient's health?

MATERIALS:

Per group of 3–4 learners:

- Vitamin C drink packet
- Dilute iodine solution in a dropper bottle (30 ml)
- 2–4 samples of drinks to test, such as lemonade, orange juice, or apple juice (1–2 oz. each)
- Small paper cups (1 per drink + 1 for Vitamin C)
- Pipettes (1 per drink + 1 for Vitamin C)
- Clear plastic cups (1 per drink + 1 for Vitamin C)
- Gloves

Per class:

- For preparing the iodine solution:
 - 2% iodine solution
 - Large brown glass storage bottle
 - Tablespoon measure
 - Funnel
 - Water
 - Permanent marker
- Bin or bucket for waste
- Be a Dietitian career card
- Lab notebooks
- Pencils
- Science skills stickers



Safety note:

Iodine is poisonous in high doses and can be harmful to skin, eyes, and lungs. The diluted version learners will use is mild enough to use safely but can also stain skin and clothing.

- Learners should **wear gloves during the activity** for safety and to avoid stained fingers
- You should also wear gloves when using the 2% iodine solution and avoid contact with eyes or skin
- Learners should **not eat or drink anything** used in the experiment, in case of iodine contamination.

Prepare

1. Make diluted iodine solution:
 - In the large bottle, add 2 tablespoons of iodine to 2 cups of water. Stir or swirl to mix.
 - Use the funnel to fill dropper bottles with the diluted iodine solution.
2. Prepare test drinks:
 - Add 1–2 oz. (or about 1" in the cup) of each test drink to separate, labeled paper cups for each group.
 - Make 1 cup of Vitamin C drink for demonstration: Add the packet to a paper cup and fill 2/3 with water. Stir or swirl until it is fully dissolved.
 - (Optional) To save time, you could pre-make the Vitamin C drink for all groups along with your demonstration cup.
3. Add 3–4 dropperfuls of diluted iodine solution to a clear plastic cup. Have it ready with the prepared Vitamin C drink and a clean pipette to use for demonstration.

Engage (~10min)

1. Introduce the dietitian career by showing the group the career card and asking questions to encourage learners to think about what a dietitian might do: :
 - ▶ *What do you notice about this picture? What do you think this person is doing?*
 - ▶ *What does the name “dietitian” make you think of? What do you think a dietitian might do or study?*
2. Explain that “diet” just means “what you eat.” Dietitians are experts in the nutrition of food. They use scientific research to help people make food choices to keep their bodies healthy.
3. Invite learners to think about the importance of food.
 - ▶ *Why do people (and animals!) need to eat food?*
 - ▶ *What are some foods that are good for our bodies? What is in those foods that makes them good for us?*
 - ▶ *Have you heard of vitamins before? What have you heard about them?*

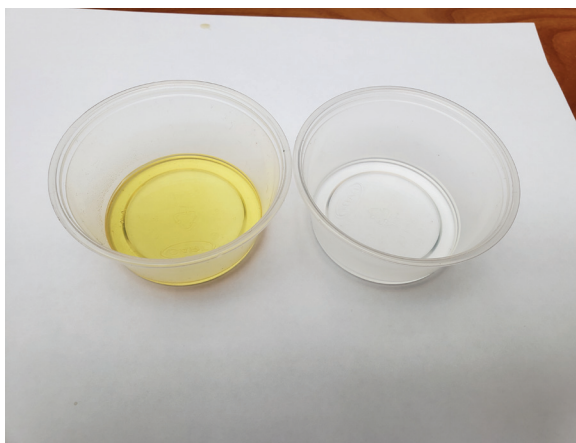


4. Introduce the storyline:

- We are dietitians working with a patient who is sick. Their doctor says their sickness is caused because they aren't getting enough Vitamin C in their diet. Our job is to help them find ways to get more Vitamin C in their meals.
- One easy way to get Vitamin C is in drinks, so we want to recommend drinks our patient can add to their meals to get more Vitamin C—but we need to know which drink is best!
 - ▶ *How can we find out how much Vitamin C is in different drinks?*
- **We're going to test some different drinks to find out which one has the most Vitamin C, so we know what to recommend to our patient.**

5. Demonstrate the iodine reaction:

- Show the group the iodine in the sample cup and explain that it is a chemical that can help tell us when a drink has Vitamin C in it.
- Introduce the Vitamin C drink. Use the pipette to add a large squirt of the drink to the cup with the iodine. Ask the group to observe the results:
 - ▶ *What happened to the iodine when it mixed with the Vitamin C?*
 - ▶ *How could this help us tell if a drink has Vitamin C in it?*



Explore (~40min)

Part 1: Control

1. Point out that we also want to know how much Vitamin C is in the drinks and be able to compare them. One way to do this is to **count how many drops of the drink it takes** to make the brown color of the iodine disappear.
 - A drink with lots of Vitamin C will remove the brown quickly (a small number of drops)
 - A drink with a little Vitamin C will take longer to remove the brown (a bigger number of drops)
 - A drink with no Vitamin C will not remove the brown (even with a lot of drops)
2. Explain that we will try this first with something we know has a lot of Vitamin C—the Vitamin C drink.
 - ▶ *Do you think this drink will clear the brown away quickly or slowly? Will it take a few drops or a lot of drops?*
 - ▶ *How many drops do you think it will take?*
3. Divide the group into teams of 3–4. Each group should receive a squirt bottle of diluted iodine, pipette, a clear cup, a Vitamin C drink packet, and a paper cup about 2/3 full of water.
4. Invite groups to make their Vitamin C drinks by adding the packet to the cup of water and swirling it gently until the powder is dissolved.
5. Introduce the testing process and demonstrate or model the steps as needed:
 - Put 4 full dropperfuls of iodine into a clear sample cup. (**Note:** this amount should be enough to create a layer about 1/8" thick on the bottom of the cup; if not, adjust the number of dropperfuls, but try to ensure that everyone uses the same amount for every test.)
 - Use a clean pipette to add 1 drop of the drink to the iodine in the cup.
 - Swirl the cup gently to mix it and observe if the liquid is still brown.
 - Add a second drop, swirl, and observe.
 - Repeat, **adding one drop at a time and swirling after every drop**, until the brown color is completely gone.
6. Highlight that each person in the team will have a job (but they will do more than one test so people can switch jobs later). Assign starting jobs or allow teams to choose their own jobs:
 - **Iodine Adder:** Put iodine into the sample cup
 - **Drink Dropper:** Use the pipette to add the drink, one drop at a time
 - **Swirler:** Hold the cup and swirl gently after every drop to mix it
 - **Counter:** Counts the drops and writes down the total number needed to clear the iodine
7. Encourage teams to begin their test. Remind them to swirl after every drop and stop as soon as they don't see any brown color left.

For younger learners, you may want to demonstrate each job and have them practice each one with empty pipettes and cups first.

8. Briefly discuss and compare teams' results.
 - ▶ *How many drops of Vitamin C drink did it take to clear the iodine color?*
 - ▶ *If our results weren't all the same, what could be some reasons for the difference?*
 - ▶ *Do you think the other drinks we test will have more Vitamin C than this or less? Will they take fewer drops to clear, or more drops?*

Part 2: Drink Testing

1. Introduce the other drinks available for testing.
 - ▶ *Which drink do you think will have the highest amount of Vitamin C? Why?*

For younger learners, you could simplify the activity by limiting the number of drinks to one or two.

2. Encourage teams to test each of the drinks using the same process as they did before, switching jobs between each test if they want to. Point out that for a fair test, they should be careful to start with the same amount of iodine in the cup for each test. Remind them to record how many drops of each drink they used on page 14 of their lab notebooks.
3. Ask questions that encourage them to make observations and draw conclusions:
 - ▶ *How can you tell when you're getting close to clearing all the brown color? What do you look for?*
 - ▶ *How did the different drinks compare? Did anything surprise you?*

Reflect (~10min)

1. Compare the teams' data and discuss the results of your research:
 - ▶ *Which drink had the most Vitamin C? (Remember, it's the one that took the fewest drops to clear the iodine!)*
 - ▶ *If teams got different results, what could be some possible reasons for the difference? What could we do to find out more?*
 - ▶ *What should we recommend for our patient who needs more Vitamin C?*
2. Encourage the group to reflect on how they were like dietitians during the activity. Refer to the career card and the science skills stickers:
 - ▶ *What are some of the things we did today as dietitians?*
 - ▶ *How did we think like scientists? What science skills did we use?*
 - ▶ *What did you do today that made you feel like a scientist?*
3. Allow time for learners to draw or write their reflections on page 15 of their lab notebooks. Invite them to choose a science skills sticker that reflects a skill they used and add it to their notebooks.

Background

- Nutrients that can be provided by the foods we eat help maintain our brain, muscles, bones, nerves, skin, blood circulation, and immune system. The two main classes of nutrients are macronutrients, which are carbohydrates, protein, and fat, and micronutrients, which are vitamins and minerals.
- Vitamin C is essential to the human body. Humans, unlike most animals, can't produce Vitamin C on their own, so they must get it through the foods they eat and drink. Vitamin C has many jobs in the human body. It is an antioxidant, helps wound healing by making collagen, assists the body with iron absorption, and helps the immune system work properly to protect the body from disease.
- Many fruits and vegetables are good sources of Vitamin C, including citrus fruits, strawberries, broccoli, bell peppers, and potatoes. Some drink manufacturers also add extra Vitamin C to drinks that don't have it naturally.
- Iodine is a chemical with a dark color used for a variety of purposes. When it reacts with Vitamin C, it loses its brownish color. This color change can be used to measure the amount of Vitamin C in a liquid using a testing technique called **titration**. For a fixed amount of iodine, a certain amount of Vitamin C is needed to remove all the brown color. The number of drops of drink needed to reach that tipping point tells how concentrated the Vitamin C is in the drink. A drink with high Vitamin C will take fewer drops to reach the tipping point; a drink with low Vitamin C will need more drops to reach the same point.

Acknowledgments

Authors: Tiffany Allen, Rachel Castro-Diephouse

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Sponsor: This program is made possible with the generous support of GSK and the contributions of their dedicated team.

Host Organizations: Thank you to the many organizations who host and support GSK Science in the Summer™ programs across the country. GSK Science in the Summer™ reaches thousands of children each summer thanks to your ongoing commitment and invaluable contributions.

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Be a Dietitian Quick Guide



EDUCATORS DO:	EDUCATORS ASK:	LEARNERS DO:
ENGAGE		
Introduce Career <ul style="list-style-type: none"> • Use career card • Ask discussion questions • Explain what dietitians do 	<p><i>What do you notice about this picture?</i></p> <p><i>What do you think this person is doing?</i></p> <p><i>What do you think a dietitian might do or study?</i></p> <p><i>What are some foods that are good for our bodies? What is in those foods that makes them good for us?</i></p>	<ul style="list-style-type: none"> • Make observations about the image • Make connections to their own experience • Share their ideas
Introduce Story <ul style="list-style-type: none"> • We are helping a patient that needs more Vitamin C in their diet • We want to find a drink to add to their diet that has the highest amount of Vitamin C 	<p><i>How can we find out if a drink has a high level of Vitamin C?</i></p> <p><i>Why is it important to get Vitamin C in the foods and drinks we eat?</i></p>	<ul style="list-style-type: none"> • Imagine being an dietitian • Share ideas about the importance of Vitamin C and how to test for it
Demonstrate Iodine Reaction <ul style="list-style-type: none"> • Introduce iodine • Add Vitamin C drink • Ask the group to observe the results 	<p><i>What happened to the iodine when it mixed with the Vitamin C?</i></p> <p><i>How could this help us tell if a drink has Vitamin C in it?</i></p>	<ul style="list-style-type: none"> • Make observations about iodine-Vitamin C reaction

***Quick Guide continues on the following page.*

Be a Dietitian Quick Guide



EDUCATORS DO:	EDUCATORS ASK:	LEARNERS DO:
EXPLORE		
Part 1: Control <ul style="list-style-type: none"> Distribute Vitamin C packets and testing materials Review testing process and roles. Demonstrate techniques as needed 	<p><i>Do you think this drink will clear the brown away quickly or slowly? Will it take a few drops or a lot of drops?</i></p> <p><i>How many drops did it take?</i></p> <p><i>If our results weren't all the same, what could be some reasons for the difference?</i></p> <p><i>Do you think the other drinks we test will have more Vitamin C than this or less?</i></p>	<ul style="list-style-type: none"> Add drops of Vitamin C drink to iodine Record how many drops are needed to clear the brown iodine color
Part 2: Test <ul style="list-style-type: none"> Distribute drinks for testing Encourage learners to switch roles between tests Remind groups to keep iodine amounts the same between tests 	<p><i>How can you tell when you're getting close to clearing all the brown color? What do you look for?</i></p> <p><i>How did the different drinks compare? Did anything surprise you?</i></p>	<ul style="list-style-type: none"> Test different drinks for Vitamin C levels Switch roles for each juice test Use data to determine which drink has the highest Vitamin C levels
REFLECT		
Share Group Results	<p><i>Which drink had the most Vitamin C?</i></p> <p><i>If teams got different results, what could be some possible reasons for the difference?</i></p> <p><i>What should we recommend for our patient who needs more Vitamin C?</i></p>	<ul style="list-style-type: none"> Share results Draw conclusions
Make Career Connections	<p><i>What did you do today that made you feel like a dietitian?</i></p> <p><i>How did we think like scientists?</i></p> <p><i>What science skills did we use?</i></p>	<ul style="list-style-type: none"> Use skill stickers Draw/write reflections

