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**Overhead 9: Acid in Drinks**

**Overhead 10: “Tooth” Experiment Report**

**Handout 16: Observations of “Tooth” Experiment**

**Overhead 11: Tricky Questions for Advanced Scientists**

**Teacher Assessment Rubric:**

**Observations of “Tooth” Experiment**

→ **Note to Teachers:** Overheads can also be idea-starters for drawing your own visuals. Resources are also available online at the Programs and Resources page of the BC Pediatric Society website [www.bcpeds.ca](http://www.bcpeds.ca). Click ***Sip Smart! BC™***.



# Lesson 4 Sip Smart!

## Key Messages

- The number and size of servings we drink affect the amount of sugar we consume.
- Knowing what's in drinks helps us to make healthy choices.
- Some ingredients in sugary drinks other than sugar, such as acid and caffeine, can damage our health.

## Objectives

- To compare the results of the **Sip Smart! BC™ Drink Diary** from the start of the program to the present.
- To discuss the results of the "Tooth" experiment.
- To recognize that acidic and sugary drinks are damaging to teeth.

## Activity Overview

### Level 1:

Drink Report III	5 minutes
"Tooth" Experiment Part II	25 minutes

**30 minutes**

### Level 2:

Drink Report III	5 minutes
"Tooth" Experiment Part II	25 minutes

**30 minutes**



# Activity 1. Drink Report III (5 mins)

## Key Messages

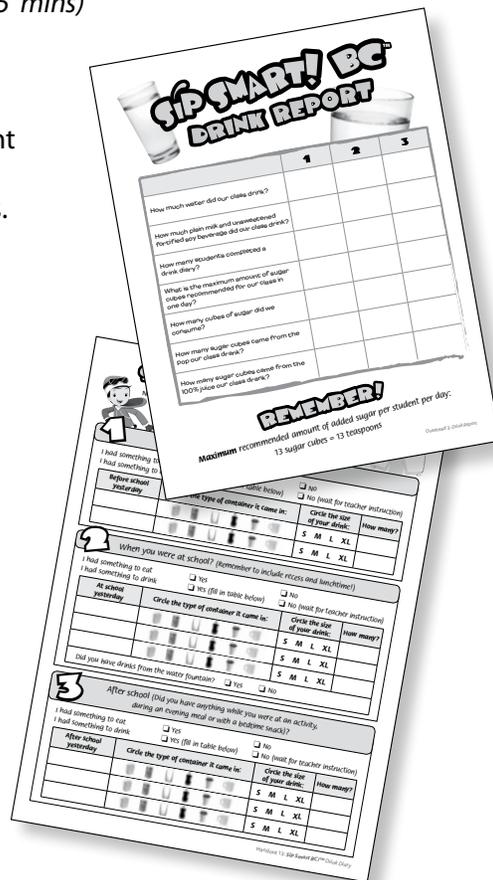
- The number and size of servings we drink affect the amount of sugar we consume.
- Knowing what is in drinks helps us to make healthy choices.

## Objectives

- To compare the results of the *Sip Smart! BC™ Drink Diary* from the start of the program to the present.

## Preparation

- Calculate the results of the third *Sip Smart! BC™ Drink Diary* using the *Drink Diary Calculator*. This calculates the added sugar in drinks, and the sugar in juice reported by students for 1 day.
- Fill in Overhead 3: *Drink Report*.
- Review Assessment: *Sip Smart! BC™ Drink Diary*.
- **Note:** This lesson assumes students will have completed 1 *Sip Smart! BC™ Drink Diary* and their reports have been summarized. For additional details see Lesson 1, Activity 3.



## Activity

Level 1 and Level 2

- Report results of the last *Sip Smart! BC™ Drink Diary* to the students using Overhead 3: *Drink Report*.
- Discuss results. Example: discuss that many factors may influence results, such as students becoming more aware of what they are drinking as compared to the beginning of the program, and are reporting more accurately as a result. Changes in weather or season may influence drink choices also; hot chocolate vs. lemonade and iced tea.
- Compare the results of *Sip Smart! BC™ Drink Diary* I, II and III.
- Discuss decreases in consumption of sugary drinks and/or any increases in healthy choices.

## Assessment

You can assess student completion of the third Handout 13: *Sip Smart! BC™ Drink Diary*, by using the assessment tool *Sip Smart! BC™ Drink Diary*.

### The Punchline!

Given what our class is drinking, it looks like we:

- generally have enough water to have healthy bodies.
- seem to be making different (healthier?) drink choices.
- may be choosing (or not) smaller sizes of drinks.
- could be reading labels before choosing a drink.

You will need to draw out learnings from the data on the report. The above are examples.

# Activity 2. “Tooth” Experiment Part II (25 mins)

## Key Messages

- Some ingredients in sugary drinks other than sugar, such as acid and caffeine, can damage our health.

## Objectives

- To discuss the results of the “Tooth” Experiment.
- To recognize that acidic and sugary drinks are damaging to teeth.

## Preparation

You need:

- Paper towels
- Sink to drain off liquid
- Overhead 9: *Acid in Drinks*
- Overhead 10: “Tooth” Experiment Report
- Containers with “teeth” from “Tooth” Experiment Part 1

Also:

- Make overhead transparency of Overhead 11: *Tricky Questions for Advanced Scientists*.
- Review Backgrounder: “Tooth” Experiment (page 120).
- Review Assessment: *Observations of “Tooth” Experiment*.

## Activity

Level 1 and Level 2

- Ask students to
  1. Drain off the liquid and place “tooth” on a paper towel.
  2. Find Handout 16: *Observation of “Tooth” Experiment*.
  3. Write down observations. Helpful cues are: change of colour, shape, texture, size.
  4. Draw a (coloured) picture of their “tooth.”
  5. Discuss in their group what happened to their “tooth” and write their conclusion.
  6. Compare results with “tooth” in water.
- Let each group share their observations and present them using Overhead 10: “Tooth” Experiment Report. Discuss if the hypothesis was supported by the observations.

Use the questions on Overhead 11: *Tricky Questions for Advanced Scientists* to check the students’ understanding. Show Overhead 9: *Acid in Drinks* again, while discussing results.

## Assessment

To assess this activity, please review the assessment tool *Observations of "Tooth" Experiment*.

## Activity Tips

After at least 2 weeks the students will probably have the following observations:

	Texture	Colour	Explanation
<b>Water</b>	No changes	No changes	• Neither acid, nor colour in water
<b>Apple Juice</b>	Softer texture, squishy, moldy	Light brown	• Teeth with some organic material on their surface make a great substrate for mold to grow, in the presence of moisture and sugar. • Acid causes dental erosion. Teeth soften and dissolve.
<b>Clear Pop</b>	Softer, holes, dissolves, squishy	Slight changes, yellow	• Food colouring in drinks stains and colours teeth. • Acid causes dental erosion. Teeth soften and dissolve.
<b>Diet Cola</b>	Softer, holes, dissolves, squishy	Dark, almost black (same colour as cola)	• Acid causes dental erosion. Teeth soften and dissolve. • Food colouring in drinks stains and colours teeth • There is no sugar in diet cola. It is the acid that causes erosion!
<b>Cola</b>	Softer, holes, dissolves, squishy	Dark, almost black	• Acid causes dental erosion. Teeth soften and dissolve. • Food colouring in drinks stains and colours teeth.
<b>Energy Drink</b>	Softer, holes, dissolves, squishy, shrinks	Dark, depending on brand: dark brown, red, yellow, green or black, white deposit	• Acid causes dental erosion. Teeth soften and dissolve. • Food colouring in drinks stains and colours teeth.

It is important to note that the *"Tooth" Experiment* is different from what occurs in our mouths when we drink sugary drinks because:

- 1) The bone or "tooth" sits in each acidic sugary drink for 2 weeks or more, but we don't usually hold drinks in our mouths for this long;
- 2) When we place the bone or "tooth" in different acidic sugary drinks, the only factor acting on the "tooth" is the acidity of the drink. Recall that when we sip a sugary drink, the sugar interacts with the bacteria in our mouths to produce acid. Once this acid is made, it lasts for about 20 minutes, after which the saliva in the mouth neutralizes the acid, and the "acid attack" ends.

**Dental Erosion:** the loss of the hard mineralized surface of the tooth structure due to chemical dissolution by acids

**Acids** that may be found in drinks:

- Ascorbic acid (also known as vitamin C)
- Phosphoric acid
- Citric acid
- Lactic acid

### The Punchline!

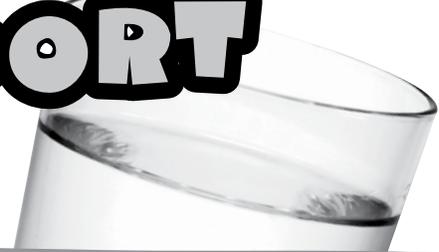
The ingredients in some drinks (sugar and acid), along with naturally occurring bacteria in your mouth, affect your teeth. The combination of bacteria and sugar in sugary drinks form acid which can lead to tooth decay.

## → Resources Lesson 4

→ **Note to Teachers:** Overheads can also be idea-starters for drawing your own visuals.

Resources are also available online at the Programs and Resources page of the BC Pediatric Society website [www.bcpeds.ca](http://www.bcpeds.ca). Click **Sip Smart! BC™**.

# SIP SMART! BC™ DRINK REPORT



	1	2	3
How much water did our class drink?			
How much plain milk and unsweetened fortified soy beverage did our class drink?			
How many students completed a drink diary?			
What is the maximum amount of sugar cubes recommended for our class in one day?			
How many cubes of sugar did we consume?			
How many sugar cubes came from the pop our class drank?			
How many sugar cubes came from the 100% juice our class drank?			

**REMEMBER!**

**Maximum** recommended amount of added sugar per student per day:  
13 sugar cubes = 13 teaspoons

**Teacher Assessment Tool**  
**→ Sip Smart! BC™ Drink Diary**

Level 1 and Level 2

Name: \_\_\_\_\_

	Always (2 pts.)	Sometimes (1 pt.)	Never (0 pt.)
Checks off food intake			
Checks off drink intake			
States specific drink category			
Circles type of container			
Circles size of drinks			
States number of drinks			
<b>Score</b>	_____ / 12		



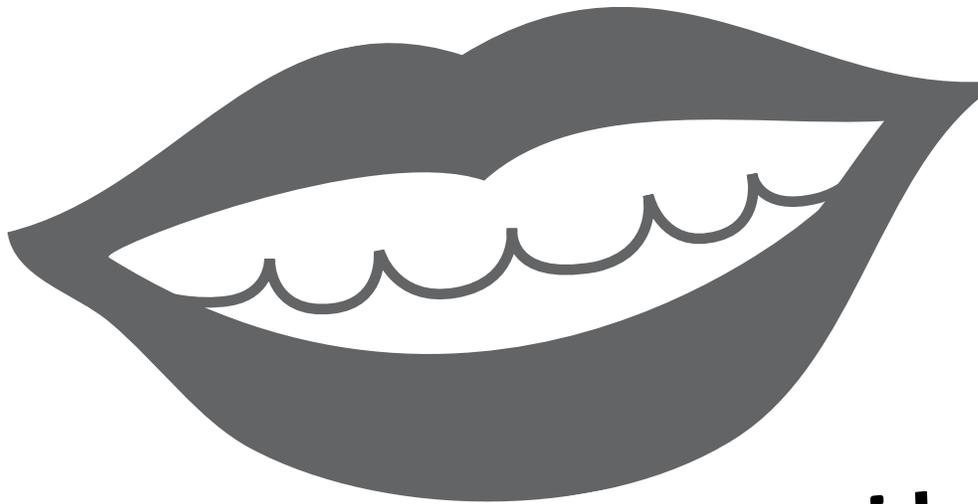
**Teacher Assessment Tool**  
**→ Sip Smart! BC™ Drink Diary**

Level 1 and Level 2

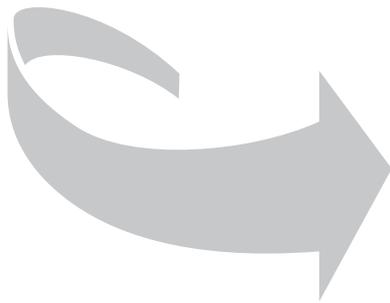
Name: \_\_\_\_\_

	Always (2 pts.)	Sometimes (1 pt.)	Never (0 pt.)
Checks off food intake			
Checks off drink intake			
States specific drink category			
Circles type of container			
Circles size of drinks			
States number of drinks			
<b>Score</b>	_____ / 12		

# SIP SMART! BC ACID IN DRINKS



bacteria + sugar = acid



**tooth decay!**



**SIP SMART! BC  
MEANS SIPPING WATER  
- NOT OTHER DRINKS!**



Drink	Hypothesis	Observation
Regular cola		
Diet cola		
Clear pop		
Energy drink		
Apple juice		
Water		

# SIP SMART! BC™

## OBSERVATIONS OF "TOOTH" EXPERIMENT

Name: \_\_\_\_\_

Drink being observed: \_\_\_\_\_

Use your senses to observe your "tooth". What does it look like? What colour is it? How big is it? What does it feel like? How does it smell?

### ➡ FIRST OBSERVATION:

What I observe: _____ _____ _____ _____ _____ _____	Drawing of "tooth" before the experiment:
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### Hypothesis:

Based on what I know, I think...

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### ➡ FINAL OBSERVATION:

What I observe: _____ _____ _____ _____ _____ _____	Drawing of "tooth" after the experiment:
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### Conclusion:

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# SIP SMART! BC™

## TRICKY QUESTIONS

### FOR ADVANCED SCIENTISTS



Drink	Conclusion (= explain what happened to your “tooth”)
Regular cola	
Diet cola	
Clear pop	
Energy drink	
Apple juice	
Water	

#### Tricky questions for advanced scientists:

1. Which drink damages our “teeth” the least?

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2. If we want a sugary drink once in a while, what can we do to reduce the “acid attack”?

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3. Diet Pop has no sugar. Why does the “tooth” in diet cola look exactly like the “tooth” in cola?

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## Teacher Assessment Rubric

### ➤ Observations of "Tooth" Experiment

Level 1 and Level 2

Name: \_\_\_\_\_

First observation addresses colour, texture and shape of "tooth"	8	6	4	2
First drawing matches first observation	8	6	4	2
Identifies ingredients of assigned drink in hypothesis (Does it contain sugar or acid?)	8	6	4	2
Predicts impact of ingredients on "tooth"	8	6	4	2
Second observation addresses clear differences in colour, texture and shape of "tooth"	8	6	4	2
Second drawing matches second observation	8	6	4	2
Conclusion demonstrates understanding of how the ingredients in the drink contribute to "tooth" erosion and theoretical decay	8	6	4	2
<b>Score</b>	_____ / 56			

#### Key:

- 8 = Exceeding expectations
- 6 = Meets expectations
- 4 = Approaching expectations
- 2 = Not yet meeting expectation



**SIP SMART! BC**  
**OBSERVATIONS OF**  
**"TOOTH" EXPERIMENT**

Name: \_\_\_\_\_  
Drink being observed: \_\_\_\_\_

Use your senses to observe your "tooth". What does it look like? What colour is it? How big is it?  
What does it feel like? How does it smell?

● **FIRST OBSERVATION:**

What I observe: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Drawing of "tooth" before the experiment: \_\_\_\_\_

**Hypothesis:**  
Based on what I know, I think... \_\_\_\_\_

● **FINAL OBSERVATION:**

What I observe: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Drawing of "tooth" after the experiment: \_\_\_\_\_

**Conclusion:**  
\_\_\_\_\_  
\_\_\_\_\_

Handout 16: Observations of "Tooth" Experiment