



## Winning Experiment Procedures from the NIH LAB Challenge

### Dental Hygiene Eggsperiment

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**Suggested grade level:** 7<sup>th</sup> (middle school)

#### Background

The goal of this experiment is to compare immediate and long-range effects of personal health choices on dental hygiene. Eggs share similar qualities with human teeth, which makes them a good model for this experiment. The texture of the tooth enamel and the egg shell are similar; both are calcium-rich and have a protective function. Coca Cola, Hi-C, and water are common drinks that have different effects on teeth. In this experiment, students analyze the different effects of these drinks on eggs.

#### Objective

This experiment will help students determine the effects of sugary drinks on teeth.

#### Hypothesis

The eggs that are submersed in Coca-Cola and Hi-C will show significant changes in color, wear, and weight compared with the ones submersed in water.

#### Duration

Total actual in-class time: 2 days

Set-up time: 20 minutes

Experiment's run time: 1 hour 30 minutes

Take-down time: 20 minutes

#### Materials for each group (for a class of 30, working in groups of 5)

- 3 eggs
- 3 cups
- 1 can of Coca-Cola
- 1 can of Hi-C
- Water
- 3 beakers for measuring 200 mL of liquid and putting the eggs into
- Scale for weighing eggs
- Permanent marker

#### Procedure

1. Using a permanent marker, mark three eggs as W, C, and H for water, Coco- Cola, and Hi-C.

2. Label each of three cups with your group's initials. Place each egg in a cup, and weigh each one. Record the weight and observations about the texture, color, and anything else you notice in Table 1.
3. Pour 200 mL of each liquid (water, Coco-Cola, Hi-C) into three separate beakers.
4. Check the label of each egg, and place it into the appropriate beaker of liquid so that it is fully submerged.
5. Let the eggs sit in the beakers for 24 hours.
6. Remove the eggs and record all observations, including the color and texture of the eggshell, and the color of the water, in the data table.
7. Weigh the eggs again and record all observations (texture, color, color of water, etc.) in the data table (**Table 1**).

### Data Analysis

1. Why do you think the eggs changed color, texture, and weight, if they did?
2. What can you do to prevent this effect?
3. What do you think are some of the individual long-term effects of drinking each of these liquids?

### Conclusions

What did you learn from this lab? List any sources of error. How can you apply what you learned to your daily life?

### Teacher's Notes

You can substitute other sugary drinks or sodas for the Coke or Hi-C.

You can extend the lab for higher-level students by adding a segment about toothbrush and toothpaste, which demonstrates the beneficial effects of brushing your teeth.

You can introduce the lab by talking about good diet habits and transition into the long- and short-term effects.

### Helpful Resources

- National Institute of Dental and Craniofacial Research (NIDCR), Oral Health, <http://www.nidcr.nih.gov/oralhealth/>
- Child Dental Health, MedlinePlus, <http://www.nlm.nih.gov/medlineplus/childdentalhealth.html>
- Women in Dental Research (video), <http://science.education.nih.gov/home2.nsf/Educational+Resources/Grade+Levels/+Middle+School/Women+Are+Scientists/22F9264D1238F41B8525741E005706DD>

### Relevant NIH Curriculum Supplements

Open Wide and Trek Inside, <http://science.education.nih.gov/customers.nsf/ESDental.htm>

The Science of Healthy Behaviors, <http://science.education.nih.gov/customers.nsf/MSHealthy.htm>

Doing Science: The Process of Scientific Inquiry,

<http://science.education.nih.gov/customers.nsf/MSInquiry.htm>

### Relevance to the NIH Mission

The experiment ties in directly with the mission because it explores a health-related issue and then highlights how the knowledge gained can enhance the health of participants.

*[Updated 06/08/12]*

## Student Worksheet: Eggsperiment

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

**Table 1. Results of Eggsperiment: before and after submersion of eggs**

Treatment	Texture before	Texture after	Color before	Color after	Weight before	Weight after	Other Observations
Coca- Cola							
Hi-C							
Water							