



## Winning Experiment Procedures from the NIH LAB Challenge

### “Egg”stra Healthy Teeth

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**Suggested grade level:** Elementary

### Background

In this experiment, students use eggs as a model to determine which liquids stain teeth the most. Even though eggs are not an exact representation of teeth, the similarities in coatings of an egg and a tooth make staining between them comparable.

Enamel is the visible tissue of the tooth where it covers the anatomical crowning and the nerve. Enamel consists of minerals that protect the tooth. The different amounts of minerals in enamel contribute to the strength as well as the brittleness of the tooth. Enamel is avascular, meaning it has no blood flow and it is not renewable, so keeping the teeth clean is vital. Drinking liquids with high acid and sugar contents, such as colas or fruit juices, should be done in moderation because staining and decay can occur. This makes the process for rejuvenating the tooth very hard. The usual color of enamel is a very light yellow to a grayish white.

Eggshells are similar to tooth enamel. They share the same coloring, ranging from a light yellow to white. In addition, the eggshell protects the egg from breaking, just as tooth enamel protects the tooth from decaying.

### Objective

Using eggshells as a model for teeth, students examine the extent of staining caused by three different liquids.

### Hypothesis

A dark-colored liquid will stain the enamel on an egg more than water will.

### Duration

Total actual in-class time: 45 minutes

Set-up time: 10 minutes

Experiment's run time: 30 minutes

Take-down time: 5 minutes

### Materials (per group of students)

- Beakers (3)
- Light-colored drink (for example, apple juice) (150 mL; \$1)
- Dark-colored drink (for example, a cola or coffee) (150 mL; \$1)
- Water (150 mL)
- Timer
- Eggs (3; <\$1)
- Labels for marking beakers

## Procedure

1. Label the three beakers: A. control (water), B. light-colored drink, C. dark-colored drink.
2. Fill each beaker with 150 mL of the appropriate liquid.
3. Gently place one egg into each of the beakers.
4. Set the timer to 30 minutes and press start.
5. After the 30 minutes are up, remove the eggs from the beakers.
6. Observe the eggs, noting any changes in coloration.
7. Record these observations in **Table 1**.
8. Clean up the lab.

## Data Analysis and Questions to Consider

1. How do the colors of the eggs differ from one another after soaking in the different liquids?
2. Over time, how do you think your teeth will hold up to the different liquids you drink? Which type of liquids do you think will be best for you?
3. How could this apply to your dental hygiene, and what have you learned from it to help maintain a healthy mouth?

## Conclusions

Describe what you concluded from your observations.

## Teacher's Notes

1. To prevent the egg from breaking, you can prepare hard-boiled eggs for your students.
2. To minimize cost, buy one carton of a dozen eggs and split the class into four groups.
3. Make sure you and your students handle the eggs carefully!
4. When choosing the liquids, make sure there is enough for your class and be aware of your budget.
5. A way to introduce the lab is to talk about dental health and the importance of keeping teeth clean. The lab is a demonstration of why people should take care of their teeth.

## 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>

\* Plus one submitter whose permission form we're waiting for.

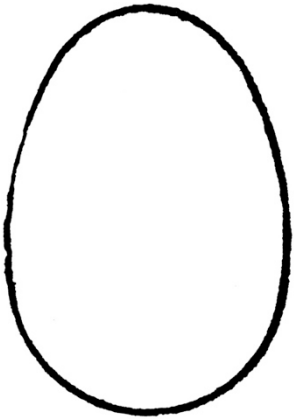
[Updated 06/11/12]

## Student Handout: "Eggs"tra Healthy Teeth Results

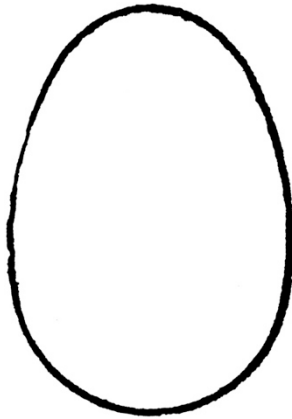
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Table 1. Draw your results here: How did the eggs look after soaking in the liquids?

Water



Dark Liquid



Light Liquid

