

Educator Resource

Interactive Experiment: The Effectiveness of Hand Hygiene Techniques

Older students can still benefit from learning the advantages of good hand hygiene too. Break out those microscopes and have students swab the same area before and after washing their hands and compare the number of germs from each swab. It's a great way to demonstrate the importance of hand hygiene and learn what common germs on hands look like in real life!

This experiment is best suited for groups of 3 students

Materials

- PURELL® Advanced Hand Sanitizer
- Bottled water
- Plain, non-antimicrobial soap
- Probiotic capsules containing live cultures of Lactobacillus and Bifidobacterium
- Permanent marker
- 3-TSA petri dishes per group of 3 students
- Timer
- ¼ teaspoon measuring spoon
- Mixing bowls
- Paper towels
- Tape

Getting Ready

- **Before performing the experiment**, prepare the inoculum by emptying three capsules of probiotic powder into a clean bowl and mixing with $\frac{3}{4}$ teaspoon of room temperature bottled water.
- Label petri dishes:
 - Plate 1 — Baseline
 - Plate 2 — Hand Sanitizer
 - Plate 3 — Soap
- **Complete Worksheet 1** to discuss the concept of germs on hands and effective methods for removing germs.



Procedure

1. Baseline Sample – To demonstrate hand contamination

- Prior to beginning the experiment have all participating students wash and dry hands following CDC standards.
- To measure baseline, apply ¼ tsp. of inoculum mixture onto one palm of student 1. Instruct student to rub inoculum over both hands until dry.
- Have student 1 press fingertips (excluding thumb) gently onto the surface of the petri dish labeled “Baseline” for 5 seconds.
- Have student 1 wash hands with soap to decontaminate.

2. 2 Pumps of Hand Sanitizer – To demonstrate sanitizer effectiveness

- Apply ¼ tsp. of inoculum onto one palm of student 2 and instruct student to rub inoculum over both hands until dry.
- Apply two pumps of hand sanitizer onto student 2’s hands. Instruct student to rub sanitizer over hands until dry. Apply a second pump of sanitizer and have student rub until dry.
- Have student 2 place fingertips (excluding thumb) gently onto the surface of the petri dish labeled “Sanitizer” for 5 seconds.
- Have student 2 wash hands with soap to decontaminate.

3. 1 Pump of Soap – To demonstrate handwashing effectiveness

- Apply ¼ tsp. of inoculum onto one palm of student 3 and instruct student to rub inoculum over both hands until dry.
- Apply one pump of soap onto student 3’s hands. Allow student to rub the plain, soap for 20 seconds and rinse for 30 seconds. Instruct student to pat hands dry with paper towels.
- Have student 3 place fingertips (excluding thumb) gently into petri dish holding for 5 seconds.
- Have student 3 wash hands with soap to decontaminate.

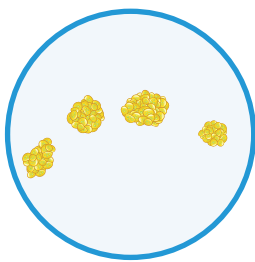
4. Tape petri dishes together and write group name on the tape.

5. Incubate plates with lids facing down in warm/dry place, such as a cabinet, for 48-72 hours.

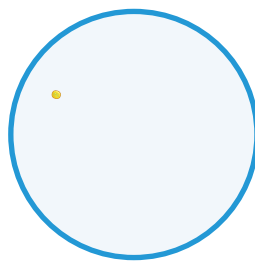
6. Following the incubation period observe plates for bacterial growth and discuss results.

7. Examples of plates are shown below.

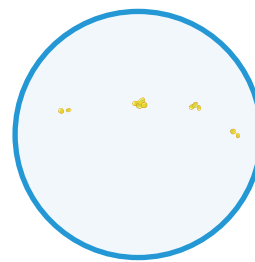
- Note: Bacteria from the probiotic inoculum will appear as small beige to yellowish colonies. Environmental contaminants, such as mold, should not be counted.



Baseline



Hand Sanitizer



Soap

Discussion Questions

- What product did you think would be most effective? Did this turn out to be true?
- Were you surprised by any of the results?
- Why are hand washing and hand sanitizing important in helping to eliminate germs from hands?
- When might you use hand sanitizer instead of soap and water?