

Environmental Health Sciences Training-At-Home During a Pandemic

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Abstract

As SARS-CoV-2 infections quickly rose in Spring 2020, summer internship program directors were challenged with re-thinking conventional training activities. At Rutgers, the Summer Undergraduate Research Fellowship (SURF) program adapted their training to a virtual 6-week format that included mentored research projects conducted remotely with twice weekly career development activities over Zoom. We sought to develop an interactive session that informed 20 SURF students about lead toxicity. The training activity included four components: 1) didactic lecture on lead toxicity, drinking water sampling, and quantitation by ICP/MS, 2) community perspective on lead contamination and remediation, 3) a simulated test of unknown lead levels using a Science Takeout® kit, and 4) sampling of student's home drinking water and measurement of lead levels. Kits and sampling materials were mailed to participants prior to the session. The activity was held on Zoom and included interactive polling questions to ensure real-time comprehension. Samples from home testing were returned to Rutgers for ICP/MS quantitation. Four weeks later, students participated in a second session to review lead levels in their drinking water and compare to local and national drinking water standards. Instructors also discussed causes of variability in heavy metal concentrations. Engagement in this activity was high with 90% of participants submitting samples for measurement of lead concentrations. Pre- and post-program self-assessments using 5-point Likert rating scales were conducted online. The ability of students to 1) simulate experiments at home (means: pre- 1.4; post- 2.3, p=0.02) and 2) conduct field testing and analyze drinking water contamination (means: pre- 2.1; post- 3.1, p=0.004) was improved over the fellowship period. Similar increases were observed in students' understanding of the impact of environmental chemicals on the health of communities (p<0.0001) as well as the steps to test for heavy metal contamination in drinking water (p<0.0001). Taken together, this multifaceted training activity can improve understanding of environmental chemical toxicity as well as increase skills in field sampling.

Training Session Overview

Didactic Lecture on Lead Neurotoxicity and Measurement by Drs. Cody Smith and Cathleen Doherty (Rutgers University)

Community Perspective on Lead Contamination by Ms. Elise Pivnick (Isles, Inc in Trenton, NJ)

Simulated Test of Unknown Lead Levels with a Science Take-Out Kit®

Sampling of Student Home Drinking Water and Measurement of Lead at Rutgers University



Components of Interactive Training Session

Care Packages Sent to Students Homes Including Two Kits for Environmental Health Science Activities



Science Take-Out Kit on Lead Testing

Color Check for Lead Level (Lead Level: 0, 5, 10, 15, 30, 40, 50, 60)

NI DEP Standard for Drinking Water

Lead Test Paper

science take-out ... just add students™

Sampling Home Drinking Water and Discussion of Other Lead Sources in NJ Homes

Name: _____ Address: _____ Phone #: _____ Email: _____ SURF ID #: _____ Date: _____

Kit Includes:

- 2 sample vials
- 2 sample vials (sample & secondary)
- Water collection
- 20 ml tap water sample in the house for at least 8 hours (this also includes your shower drainwater, bathtub, etc.)
- Removes water filter from faucet if present (do not use water during sampling)

Kit #1:

- Place open **Kit #1** under kitchen faucet
- Open cold water faucet and fill to 40 ml mark. Turn tap off water.
- Tightly cap the bottle.

Kit #2:

- Using a filter, open the kitchen faucet and allow to run for 2 minutes.
- Then immediately place open **Kit #2** under faucet.
- Fill to 40 ml mark, then turn tap off water.
- Tightly cap the bottle.

Kit #3:

- Using a filter, open tap water.
- Allow to run for 2 minutes.
- Then immediately place open **Kit #3** under faucet.
- Fill to 40 ml mark, then turn tap off water.
- Tightly cap the bottle.

Place up samples

- Place 100 µL each in the 20 ml sample vial
- Place in the sealed bag and secondary bag.
- Include the instruction.

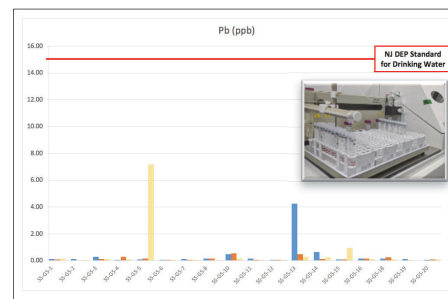
Return water for **Kit #1** before placing in collection

Return water for **Kit #2** before placing in collection

Return water for **Kit #3** before placing in collection

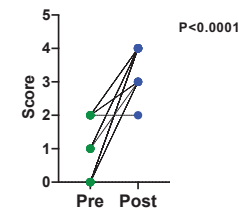
isles Self-Reliant Communities

Home Drinking Water Data

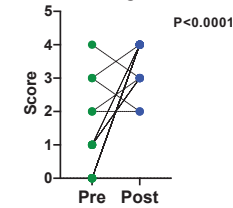


Assessment of Participant Knowledge

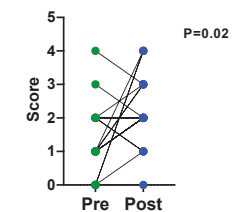
Entry of Lead and Other Environmental Chemicals into Drinking Water



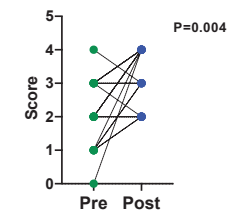
Steps to Test for Chemicals in Drinking Water



Simulate Experiments in the Absence of a Wet-Lab Experience



Conduct Field Testing of Drinking Water



Main Takeaway

An interactive training exercise can provide undergraduate students insights into the testing and toxicity of chemicals in our environment.

Acknowledgments

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<https://surf.rutgers.edu>