V*ectors and Disease

Contributors

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Intended Audience

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<table>
<thead>
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<tbody>
<tr>
<td>K-4</td>
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<tr>
<td>5-8</td>
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<tr>
<td>9-12</td>
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</table>

Activity Characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Classroom Setting</td>
<td>X</td>
</tr>
<tr>
<td>Requires special equipment</td>
<td>X</td>
</tr>
<tr>
<td>Uses hands-on manipulatives</td>
<td>X</td>
</tr>
<tr>
<td>Requires mathematical skills</td>
<td>X</td>
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<tr>
<td>Can be performed individually</td>
<td></td>
</tr>
<tr>
<td>Requires group work</td>
<td>X</td>
</tr>
<tr>
<td>Requires more than one (45 min class) period</td>
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</tr>
<tr>
<td>Appropriate for special needs student</td>
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</tbody>
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Introduction

Description

Students will simulate disease transmission by exchanging liquids (representing body fluids) with their classmates. Glow-germ powder will also be placed on desks around the classroom to help visualize how germs are spread.

Abstract

Students will exchange liquids (representing body fluids) with their classmates to simulate disease transmission. Then the teacher will come around and place a drop of “infection indicator” into each student’s cup. Students will figure out who was the original source of the infection by recalling which students they exchanged liquids with. Glow germ powder will be used in order to show how germs are spread. Glow germ powder will be placed strategically around the room and at the end of class, the teacher will turn out the lights and germ infested areas will glow in the dark.

Core Themes Addressed

<table>
<thead>
<tr>
<th>Microbial Cell Biology</th>
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<tbody>
<tr>
<td>Microbial Genetics</td>
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<tr>
<td>Microorganisms and Humans</td>
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<tr>
<td>Microorganisms and the Environment</td>
<td>X</td>
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<tr>
<td>Microbial Evolution and Diversity</td>
<td></td>
</tr>
<tr>
<td>Other –Vectors and disease</td>
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</tbody>
</table>

Keywords

Vector, pathogen, host

Learning Objectives

At completion of this activity, learner will:

1. List different ways germs/pathogens are transmitted.

National Science Education Standards Addressed

Standard F: Science in personal and social perspectives

-Spread of disease
Teacher Handout
Vectors

Student Prior Knowledge

Students should have the following knowledge prior to completing this activity:

- Understand how diseases are caused
- Name examples of diseases currently present

Teacher Background Information

In this lab students will simulate disease transmission by mixing clear liquid in plastic cups. The instructor will come around and place a drop of disease indicator (phenolphthalein) into each cup. Those infected with the disease will have their liquid change to bright pink color. Students will be able to identify the source of a disease outbreak by reviewing their liquid exchange partners. Students will also be exposed to glow germ powder (the powder should be dusted over all the desks so students can make contact). At the end of class, the instructor will hold a UV light over the students so students can visualize how germs and pathogens are spread.

Class Time

This activity will require a minimum of one 50-minute class period

Teacher Preparation Time

This lesson will require approximately 10 minutes of preparation time.

1. Fill plastic cups (4oz) with water for the class (fill one with NaOH solution)
2. Dust the classroom desks (or select a few desks around the room) with glow-germ powder

Safety Precautions

Students should wear safety goggles when working with liquids

Materials and Equipment

*Each individual will have:
- 1 cup filled with liquid
- 1 worksheet to record exchange partners
Methods

1. Pass out 4oz cups filled with liquid
2. Have students exchange liquids (by pouring liquid back and forth between cups so everything is thoroughly mixed).
3. At the end of class, turn out all the lights and pass a hand-held UV light over students’ hands. (This will allow the students to visualize how easily germs can be picked up.)

Tips/Suggestions

Clear cups rather than colored or designed cups would work best so students can visualize how the “infection” has spread.

Answers to Student Handouts

Lecture: Recent Infectious Diseases include AIDS, Ebola, West Nile Virus, and Mad Cow Disease. PATHOGEN is an organism that causes disease. BORRELIA BURGDORFERI is the pathogen that causes Lyme disease. HOST is the organism in which the pathogen lives. VECTOR is an organism that transmits the diseases to people. PATHOGENS are transferred by air, water, and vectors. Many ways in which we alter the environment can make us more vulnerable to DISEASE. Our actions cause pathogens to evolve resistance to ANTIBIOTICS that are used to kill them.
Introduction

Lecture: Recent Infectious Diseases include ____________, Ebola, West Nile Virus, and Mad Cow Disease. _______________ is an organism that causes disease. _______________ is the pathogen that causes Lyme disease. _______________ is the organism in which the pathogen lives. _______________ is an organism that transmits the diseases to people. _______________ are transferred by air, water, and vectors. Many ways in which we alter the environment can make us more vulnerable to _______________. Our actions cause pathogens to evolve resistance to _______________ that are used to kill them.

Student Background Knowledge

• Understand how diseases are caused
• Name examples of diseases currently present

Vocabulary

Vector: an organism, such as a mosquito or tick, that carries disease-causing microorganisms from one host to another.

Pathogen: an infectious agent

Materials Checklist

<table>
<thead>
<tr>
<th>4oz cup with liquid</th>
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</thead>
<tbody>
<tr>
<td>worksheet</td>
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</tbody>
</table>

Procedure

1. You will receive a small cup with liquid in it. (DO NOT DRINK IT!!!)

2. Exchange your liquid with the liquid of a partner. To do this, pour your liquid into his/her cup, then have him/her pour the liquid back into your cup, and then even out the amount of liquid between the two of you.

3. Record the name of your partner in the data table under exchange #1.
4. Repeat steps 2 and 3 with three different partners.

5. Return to your seat and wait to see who is infected with the disease. The teacher will test each liquid, checking for a reaction. Then, we will analyze the data (who was infected) as a class and trace the infection back to the original source.
Student Worksheet
Vectors

Name________________________
Date__________________
Period________________________

<table>
<thead>
<tr>
<th>Exchange</th>
<th>Name of Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
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<td>4</td>
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</tbody>
</table>

1. I was (circle one) infected not infected

2. The original source of “disease” in the classroom was:_______________.

3. How many people in the class ended up with the “disease” that started with just one person? _________

4. Can someone have a disease and still appear healthy? Explain the possible negative effects of this.

5. What are some ways that diseases can be prevented? (How can you keep yourself healthy?)