A Case of Pesticide Poisoning
Please complete the “Participant Card”

Workshop Title _______________________________ Date ____________
Presenter(s) Name _______________________________
Your Name _______________________________________
Your email address (please print legibly):

Likelihood that you will use this Science Take-Out kit with your classes (circle one):

<table>
<thead>
<tr>
<th>Definitely Yes</th>
<th>Maybe Yes</th>
<th>Maybe No</th>
<th>Definitely No</th>
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Workshop Evaluation (circle one):

<table>
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<tr>
<th>Great</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
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Are you interested in field testing Science Take-Out kits? (circle one) Yes No

*Please write your comments regarding the Science Take-Out activity or the workshop below and/or on the back.*
Put your student hat on
Experience the kit

Put your teacher hat on
Envision classroom use
  * Curriculum integration
  * Support for students
A Case of Pesticide Poisoning
Student Handouts

Quick Guide

Safety

Student Instructions

Turn to this page

A Case of Pesticide Poisoning

Part 1: A Case of Bed Bugs

Samantha noticed bug bites on her legs. She also found bug bites on her baby Carly's arms and neck. A few days later she discovered spots of blood and tiny dead bed bugs on her bed and in Carly's crib.

She bought bed bug foggers and used bed bug spray. That evening, she set up the foggers in her bedroom and Carly's bedroom. She had heard bed bugs are very hard to get rid of so she sprayed all of the sheets and mattresses with the bed bug spray.

The next morning Samantha felt like she was coming down with the flu. Her face tingled and felt numb and warm. She had a cough, stuffy nose, headache, and mild nausea. Carly had the same symptoms and her asthma seemed worse. Samantha also needed to take her dog and cat to the vet because they were vomiting and drooling.

1. List 3 things that you think might be causing Samantha's, Carly's, or their pets' symptoms.
Part 1: A Case of Bed Bugs

Samantha noticed bug bites on her legs. She also found bug bites on her baby Carly’s arms and neck. A few days later she discovered spots of blood and tiny dead bed bugs on her bed and in Carly’s crib.

She bought bed bug foggers and cans of bed bug spray. That evening, she set up the foggers in her bedroom and Carly’s bedroom. She had heard bed bugs are very hard to get rid of so she sprayed all of the sheets and mattresses with the bed bug spray.

The next morning Samantha felt like she was coming down with the flu. Her face tingled and felt numb and warm. She had a cough, stuffy nose, headache, and mild nausea. Carly had the same symptoms and her asthma seemed worse. Samantha also needed to take her dog and cat to the vet because they were vomiting and drooling.
Part 2: What the Labels Say

Samantha took her dog and cat to the vet because she was worried that they had a disease carried by bed bugs. The vet reassured her that bed bugs do not carry cat, dog or human diseases. However, he explained that the pesticides often used to get rid of bed bugs are even more toxic for cats and dogs than they are for humans because their livers do not remove the pesticides quickly.

When Samantha told the vet that she had used bed bug foggers and sprays, he was concerned about not just the pets but also about Samantha and Carly. The vet told Samantha that it was important to go to the hospital emergency room because she and Carly might have pesticide poisoning too. He was most worried about Carly because a young child’s liver is not as efficient at removing pesticides as an adult’s liver.

When they got to the emergency room, Samantha told the doctors she and Carly might have been poisoned by bed bug pesticides. Luckily, Samantha had thought to bring the empty pesticide fogger and spray cans with her.
Part 3: Testing for Pyrethroid Metabolites

Pyrethroids may act as skin and respiratory allergens. Other symptoms include sneezing, nasal stuffiness, headache, nausea, incoordination, tremors, convulsions, facial flushing and swelling, and burning and itching sensations. Young children may have higher concentrations of pyrethroids because they are more likely to put contaminated hands and objects in their mouths.

The emergency room doctor explained that pyrethroid in the pesticide Samantha had used could enter the body by absorption through the skin, by inhalation, or by eating contaminated food. The doctor ordered medical tests to determine the concentration of pesticide metabolites in Samantha’s and Carly’s urine.

1. You will test urine samples from Samantha and Carly for the presence of pesticide metabolites. Pesticide metabolites are chemicals produced by the partial breakdown of pesticides.
Part 4: Pesticides Made From Flowers

**Pyrethrin pesticides are derived from flowers, but are they safe?**

Pyrethrins are natural insecticides that are harvested from chrysanthemum flowers. Pyrethroids are synthetic chemicals manufactured by changing the structure of the pyrethrin molecules to make them more stable in sunlight and more toxic for insects.

For at least a decade, pyrethrins and pyrethroids have been the insecticides of choice for consumers because they are safer for humans and the environment than previous pesticides such as DDT. Pyrethrins and pyrethroids are found in more than 3,500 pesticide products used to kill insects inside homes and on crops, yards, and gardens.

Both natural pyrethrins and synthetic pyrethroids paralyze and kill insects by interfering with nerve cell function. Insects are highly susceptible to these pesticides. Birds and mammals are less susceptible because they can break these chemicals down into less toxic substances.

Chemicals derived from flowers may sound safe. However, scientific research is needed to determine if pyrethrins and pyrethroids pose human health and ecological risks.

**Pyrethroid Effects on Human Health**

Pyrethroids enter humans when they inhale pesticides that linger in homes and yards or when they eat vegetable, fruit and grain crops sprayed with pyrethroids. Research has shown that 75 percent of urine samples from U.S. adults and children contained low levels of pyrethroid metabolites. The concentrations of pyrethroid metabolites in children were more than 50 percent higher than the amounts found in adolescents and adults.

Laboratory studies with mammals, such as mice and rats, have linked low levels of pyrethroid exposure to damage to the nervous system, endocrine system, excretory system, immune system, and reproductive system. Because humans are mammals, scientists are concerned pyrethroids may cause similar damage to these human systems.

Very little research has been done to evaluate the health effects of pyrethroids on human health. Since people are frequently exposed to low levels of these chemicals, it is critical that research be done to determine the health effects of pyrethroids on human body systems.
Part 5: Pyrethroids and Your Environment

**Pyrethroids and Biodiversity**

Pyrethroids are broad spectrum insecticides that kill most insects and spiders that come in contact with them. This includes not only pests such as ants, roaches, stinging insects, and bed bugs, but also beneficial insects. Pyrethroids kill honeybees and other insect pollinators that are essential for producing plant crops that are a food source for animals and humans. Pyrethroids also kill beneficial predators such as spiders that prey on crop eating pests and keep their population levels low.

**Pyrethroids and Aquatic Ecosystems**

Pyrethroids sprayed on lawns, gardens, and fields may be washed into aquatic ecosystems (streams and lakes). Even low levels of pyrethroids are toxic to insects that serve as a food source for fish. The diagram below illustrates a simple food chain in an aquatic ecosystem.

![Food Chain Diagram]

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<th>20</th>
<th>10</th>
<th>5</th>
<th>1</th>
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<tbody>
<tr>
<td>Producers</td>
<td>Primary Consumers</td>
<td>Secondary Consumers</td>
<td>Tertiary Consumers</td>
</tr>
<tr>
<td>Green Plants (green cubes)</td>
<td>Aquatic Insects (blue cubes)</td>
<td>Small Fish (yellow cubes)</td>
<td>Large (red cube)</td>
</tr>
</tbody>
</table>

20 Producers

10 Primary Consumers

5 Secondary Consumers

1 Tertiary Consumers
A Case of Pesticide Poisoning

Teacher Information

Summary
Students explore the case of a family poisoned by pesticides used to treat a bed bug problem. They conduct simulated blood tests to identify the presence of pesticide metabolites in the family members' blood. They interpret the pesticide labels to determine safe use practices. They explore research that suggests pesticides might be harmful to human health and the environment.

Core Concepts
- Pesticides sold to consumers are not safe unless they are used properly.
- Consumers should be aware of potential health and ecosystem problems that may result from pesticide use.
- Consumers should explore ways to control pests without using pesticides (optional extension).

Time Required
Two 40-minute class periods

Kit contains
- Simulated urine samples
- Pyrethroid Test Solution
- Pyrethroid Metabolite Test Sheet
- Pyrethroid Test Color Chart
- Labeled droppers
- Bag of colored cubes to model the impact of pesticides on a food pyramid

Teacher Provides
- Paper towel for clean-up
- Safety goggles
- Optional: Internet access for extension activity, or printed copies of several websites that provide information on how to get rid of bed bugs.

Teacher Suggestions
- Parts 1 and 3 may be done for homework.

Warning: Choking Hazard
This Science Take-Out kit contains small parts. Do not allow children under the age of seven to have access to any kit components.
Purchase kits from

www.sciencetakeout.com
Individual Assembled Kits  Fully assembled individual kits
Unassembled Packs  All supplies needed to make 10 kits
Refill Packs  All supplies needed to refill 10 kits
Become Involved as a Field Test Teacher

Help us make new Science Take-Out kits teacher and student friendly.

Indicate this on your card. Science Take-Out will contact you with further information.
Become Involved as a Workshop Presenter

Present a workshop to introduce colleagues to Science Take-Out kits

Visit the Science Take-Out website for further information
Thanks for being a GREAT group!!

Please turn in your participant card before you leave.