



Vaccines: Understanding How They Work

Please note: Notes and ideas for this exercise were aided by the use of the web site <http://discoveryschool.com>

Annotation

In this lesson students will learn about the biological processes that are involved in vaccine immunization. This understanding will be shown by creating a poster describing different types of vaccines.

Basis for Hypothesis: Based on your research why do you think vaccines are or are not needed for a person to live a long and healthy life?

Assessed GPS

SCSh5. Students will be able to communicate scientific ideas and activities clearly.

Time Duration

2 class periods

Materials

Internet access

Poster board (five pieces, one for each group), markers, colored pencils

Background Research

This may be done as background information a day before the class or the day of the class. Ask students:

What is a vaccine?

What are some common vaccines you know of or have received?

Are vaccines important?

- Review the basics of vaccines and how they work within the body
- Explain that the immune system is the body's way of self defense from infections. Vaccines work with our immune system to protect against measles, mumps, polio, and other diseases.
- A vaccine helps your body create antibodies, or cells that fight off foreign substances like bacteria or viruses.
- Sometimes your body creates antibodies by itself, but not enough to fight a serious disease like polio. This is why you need a vaccine. It will help raise your immunity against infections.
- Further explain how vaccines are made:

A vaccine is made from the antigen—either a bacteria or a virus—that causes the disease. Some vaccines use live but weakened versions of the antigen. Some are made from “killed” antigens, and others are made from parts of the antigen or one that closely resembles the targeted bacteria or virus. In any form, a vaccine does not contain enough of antigens to cause the disease or it uses an inactive (attenuated) form of the antigen. It has just enough to trigger the body's immune system to produce antibodies against that

disease. In most cases, these antibodies remain active and protective against the disease for a person's lifetime. This protection is called immunity. In some cases, a vaccine requires booster shots, doses given at regular intervals.

- Explain that children receive several vaccinations during the first 10 years of their lives, most of them before the age of one.

Polio

MMR (measles, mumps, rubella)

DTP (diphtheria, tetanus, pertussis)

Hepatitis B

Varicella (chicken pox)

Procedures

1. Divide the class into five groups and assign each group one of the vaccinations previously discussed in the background. Tell students that each group will create a poster to educate the public about a vaccine. Their poster should answer as many of the following questions as possible:

- What disease is this vaccine meant to prevent?
- Describe the disease this vaccine prevents: What are the symptoms? Who is most susceptible? Is the disease caused by a virus or bacteria?
- Who should be vaccinated? Who should not be vaccinated?
- How does the vaccine work? How often should a person be vaccinated?
- What are some possible side effects of the vaccine?
- What are some other interesting facts about this vaccine?

2. Ask students to research vaccines using the World Wide Web.

Websites for the Centers for Disease Control (www.cdc.gov) and the Food and Drug Administration (<http://www.fda.gov/cber/vaccines.htm>) are two sites that provide reliable information to the public.

3. Ask students to consider the audience of their poster (for example, parents, pregnant women, teenagers). Once they decide whom they are addressing, encourage them to use appropriate language and images. In addition, ask students to think about the most effective locations for their posters, such as a pediatrician's office or a bus stop.

4. Have each group present its poster, while giving a brief explanation of the vaccination studied. Then ask students to hang posters around the room. As a class, discuss the importance of vaccinations.

5. If your class is interested in the potential risks of vaccinations, encourage them to do further research on this topic. What are some problems associated with vaccines? What are the recommendations for countering these risks? Hold a class debate about whether certain vaccinations should be mandatory. The following Web sites should be helpful:

Vaccine Safety www.vaccines.net

CDC: Overview of Vaccine Safety www.cdc.gov/nip/vacsafe/

Conclusion

Use review questions to further discuss:

1. Why is it important to vaccinate against rare diseases?
2. Considering what you learned about vaccinations, why do you think most are given during the first year of life?
3. Do you think there will be new vaccinations required during your lifetime? Explain your answer.