

LAB-AIDS® #3

AIDS and STD Transmission and Control (A Simulation)

AIDS (Acquired Immune Deficiency Syndrome) and STDs (Sexually Transmitted Diseases) are a serious problem in student and general populations in the United States and throughout the world.

Acquired Immune Deficiency Syndrome (AIDS) was first recognized in the United States in 1981 by the Center for Disease Control in Atlanta. AIDS is caused by a retrovirus known as Human Immunodeficiency Virus or HIV. This serious virus infects and eventually kills helper T-cells which normally activate other T and B lymphocytes of the immune system. HIV is transmitted through infected cells found in blood or semen. The most common methods of transmission of AIDS are through sexual contact, intravenous drug use, pregnancy (when mother is HIV positive), transfusions of contaminated blood or accidental needle punctures when contaminated body fluids are present.

STDs or sexually transmitted diseases include many diseases; some easily treated as well as more serious diseases such as gonorrhea, Hepatitis B, herpes, and syphilis. Some of these diseases have become more difficult to treat as they have evolved into drug-resistant strains.

Knowledge of transmission of these diseases is essential in order to prevent further spread and the deaths that may result. Many HIV-positive persons show no symptoms; some live ten years or more before coming down with the disease. More often, AIDS patients die within three years of their diagnosis.

In this lab activity you will learn how communicable diseases can be spread through the exchange of body fluids. You will also explore the effectiveness of latex barriers as a method to prevent the exchange of body fluids.

PROCEDURE: PART A

1. Each student in your class will have a tray and a pipette (dropper). You will have a numbered bottle containing your "body fluids".
2. Using your bottle of "body fluids", fill the largest cavity of your tray about 1/3 full. **Before you make any exchanges of your "body fluids", use your dropper to place 2 drops each in cavities labeled "A" and "B" on your tray.**
3. Observe what your "body fluids" look like. Describe what you see _____

4. You will have a given amount of time to make exchanges of your "body fluids" with other students in your class. You have many options: you can chose any partner/s selectively, haphazardly, or select none if you like.

When making exchanges of "body fluids", you will need to place 2 drops of your fluids (from the large cavity) into the large cavity of the tray of your partner. Each of you should stir your large cavity after the exchange.

Then place 2 drops of this fluid into cavities #1 and #2 for exchange or Contact #1.

Do the same with your other contacts/exchanges if you select more, except that you will be placing results of Contact #2 in cavities #3 and #4.

Contact #3 should be placed in cavities #5 and #6, if made.

Contact #4 should be placed in cavities #7 and #8, if made.

Contact #5 should be placed in cavities #9 and #10, if made.

5. At the end of the allotted time, the number of exchanges you made was _____.
6. List the names of the students with whom you made exchanges or contacts.

Contact #1 _____ Contact #4 _____
 Contact #2 _____ Contact #5 _____
 Contact #3 _____

- Observe your "body fluids" in the large cavity after the exchanges. Describe _____ .
Do your "body fluids" look different than they did prior to the exchanges in Procedure #3? _____ .
- You will now be making tests on your "body fluids" by using **simulated** test solutions for AIDS (HIV) and another for Hepatitis B, (a STD). The test for AIDS (HIV) will be positive (+) if the "body fluids" tested turn pink or purple. You are negative (-) and do not have AIDS if there is no color change. The test for the STD, Hepatitis B will be positive (+) if the "body fluids" tested turn white or a whitish precipitate forms. It is negative ____ (-) if there is no color change.
- Using HIV Test Solution, place 1-2 drops in cavity #1, #3, #5, #7, #9 (if you have had that many contacts or exchanges.)
- Using Hepatitis B Test Solution, place 1-2 drops in cavity #2, #4, #6, #8, #10 (depending on the number of exchanges you made.)

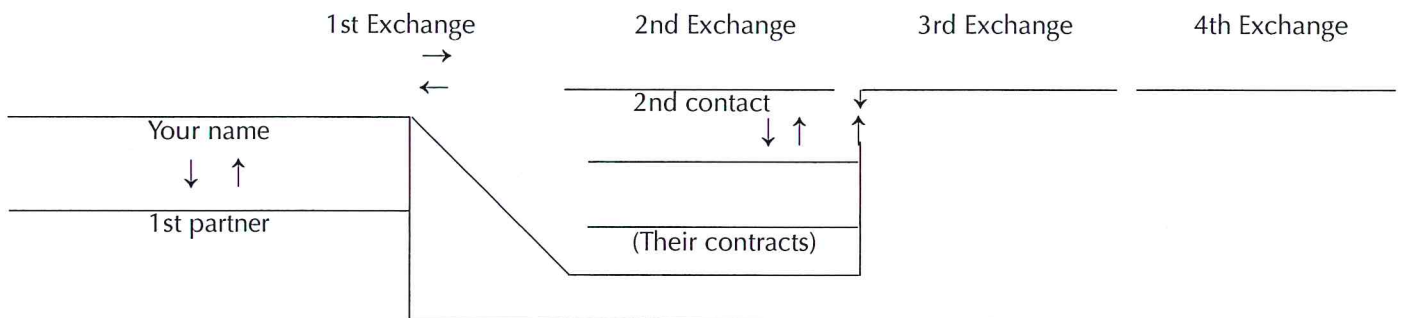
Record results of your tests in the chart below:
Place (+) for a positive result or (-) for a negative result.

"Body Fluids" (after exchanges)	HIV TEST	HEPATITIS B TEST
	cavity 1 _____	cavity 2 _____
cavity 3 _____	cavity 4 _____	
cavity 5 _____	cavity 6 _____	
cavity 7 _____	cavity 8 _____	
cavity 9 _____	cavity 10 _____	

Table 1.

- Before testing your original "Body Fluids" construct a diagram showing the contact or exchanges you made and who your contacts made exchanges with. This diagram should lead you to "Patient Zero" for AIDS and or Hepatitis B. Epidemiologists would compile data like this to identify the first case in an area (**Patient Zero**).

For example:



Did any of your partners exchange "body fluids" with anyone prior to exchanging with you? If so, be sure to include their exchanges in your diagram.

- Now** test cavities "A" and "B". Record results below.

	HIV TEST	HEPATITIS B TEST
Body Fluids before exchanges	cavity A _____	cavity B _____

13. How many students are in your class? _____
How many showed up positive for HIV? _____ Ratio: _____ % of class _____

14. How many students were positive for Hepatitis B? _____ Ratio: _____ % of class _____

15. How many students were positive for both HIV and Hepatitis B? _____ Ratio: _____ % of class _____
16. How many students were negative for both diseases? _____ Ratio: _____ % of class _____
17. How many students were infected after just 3 exchanges? _____
18. Did anyone abstain or refuse to exchange body fluids? _____ How many? _____
19. How many students would be infected if limited to only one exchange? _____
Why? _____
20. Explain how you would be able to determine Patient Zero for AIDS and or Hepatitis B. _____

21. How would you determine the source from which Patient Zero acquired the disease? _____

PART B DETERMINING THE EFFECTIVENESS OF LATEX BARRIERS

HIV (AIDS) and other STDs can be prevented in many cases by using barriers to eliminate the exchange of body fluids during sexual contact. Condoms can provide safer sex, but are they fail-safe or completely protective? Condoms are intended for the prevention of pregnancy and as such are less than perfect. When used correctly, they have a 2% failure rate despite claims that they are 99.8% leakage free. The actual failure rate may be as high as 8 to 10%. The HIV virus has a size of 120 nanometers and is roughly one hundred times smaller than a sperm. This fact alone makes it much easier for HIV to leak out of condoms. Most condoms are made of latex.

In the following activity, each pair of students will be testing a latex balloon for leakage of fluids. You will also be testing for its permeability with different fragrances.

PROCEDURE: I. TESTING LATEX BARRIERS FOR LEAKAGE

1. Using your dropper, carefully place a small amount of water from your beaker into your balloon (just enough to fill out its shape). Does your balloon hold water without leaking? _____
Total balloons tested in class? _____
How many balloons in your class leaked fluids? _____
Ratio of failures (leaked): _____ What percentage leaked? _____
2. Place a dab of petroleum jelly on your balloon. How does this affect the latex? _____
3. Test your balloon again for leakage. Does it leak now? _____
Inflate your balloon. What happens to the latex balloon where the petroleum jelly was applied? _____

4. What does this tell you? _____

II. TESTING THE PERMEABILITY OF LATEX BARRIERS

In this test you will see that latex may be able to hold fluids of a certain size molecule, but may also allow diffusion of other substances that have smaller molecules.

1. With the solutions provided and using your dropper, place 3-4 drops of the fragrance inside your balloon. **Make sure you do not spill any of the solution on the outside of the balloon.** If you do, rinse this off. Inflate your balloon and tie it closed. RECORD THE NUMBER OF THE FRAGRANCE YOUR GROUP USED AND THE COLOR OF THE BALLOON YOU USED. Allow each student in your group to record their observations. Then pass your balloon to another group to record their observations. You will observe:

- a. No odor (just the smell of latex) b. One of the following fragrances: banana, lemon, vanilla, almond, or peppermint

Record your observations in Table 2:
Odor detected(+); not detected (-)

Color of Balloon	Odor detected	Odor (smells like)

Table 2.

How many balloons were permeable? _____ What percentage of balloons in the class were permeable? _____

CONCLUSIONS:

- How does the number of exchanges of "body fluids" affect the overall number of AIDS or STD cases in a given population? _____

- How can you protect yourself from acquiring AIDS or other STDs? _____
What method provides 100% protection? _____
- What are the limiting factors involved in the use of latex barriers in preventing pregnancy? _____
In preventing AIDS? _____
- What problem/s result when latex is stretched? _____
- What problem/s may result when latex is exposed to such chemicals as petroleum jelly? _____

- Was an epidemic of AIDS or Hepatitis in your class started by just one or two students? _____
- Write two statements about how this lab has affected your attitude or thinking about teenage sexuality.
 - _____
 - _____