NEO/SCI®
TEACHER'S
GUIDE

ELISA:HIV/AIDS Test Simulation Lab

INVESTIGATION

#20-2963

OBJECTIVES

- *Learn* about basic immunology concepts
- *Learn* about HIV infection and AIDS
- *Understand* how the ELISA for HIV screening works
- *Observe* simulated ELISA antigen/antibody reactions
- *Analyze* ELISA test results

For complete technical support call 1–800–526–6689

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TEACHER'S GUIDE

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New ideas for teaching science

Science Concepts

- Viruses and disease
- Transmission of viral diseases
- HIV
- ELISA
- Antibody-antigen reactions

Overview

The **ELISA:HIV/AIDS Test Simulation** lab investigation is a hands-on learning experience about HIV infection and AIDS, what it is, how it is transmitted and how to prevent the spread of AIDS. It:

- provides educational material about HIV/AIDS
- provokes discussion and learning about the disease
- poses a number of different patient scenarios
- allows the student to perform a simulated test following the same steps used in medical laboratories and blood banks
- provides a useful teaching aid for cross-curricular integration

In real life situations, testing for the presence of HIV antibodies is the first meaningful step in getting an answer to the question:"How do I know I have been infected with HIV?"

There are many misconceptions about the test for HIV/AIDS and its results. There are also many questions about the consequences of a positive result. This activity explores these issues in a responsible, informative and experimental way that will reinforce learning about HIV/AIDS.

Kit Materials List

20	8-microwell strips
8	Microspatulas
10	Plastic pipets
10	Medicine cups
1	Vial with glass beads coated with simulated HIV antigen
2	Simulated anti-human antibody enzyme linked conjugate, 10mL
2	Simulated chromagen, 10mL
9	Simulated patients sera, 10mL
1	Simulated negative control serum, 10mL
1	Simulated low positive control serum, 10mL
1	Simulated high positive control serum, 10mL

Time Requirements

Pre-lab preparation:	5 minutes
Procedure:	30 minutes
Analysis and Discussion:	1 Class period

Pre-Lab Preparation

Enough materials are provided for a class of up to 40 students working in groups of 4.

Dispense 12 coated beads in the medicine cups provided to each student group.

Dispense the rest of materials needed for each group.

Set up a station with all of the simulated patient samples for students to come up and dispense them as needed.

Safety & Disposal

This lab investigation includes simulated non-biological solutions and is used to mimic the actual steps of an HIV ELISA test. Because the test is simulated and does not use any biological solutions you cannot be infected with HIV/AIDS or any other infection from the contents of this kit. However, be sure to use proper chemical laboratory protocol and follow all of the safety instructions included.

Be sure to always have students wear safety goggles, gloves and a lab apron to protect their eyes and clothing when working with any chemicals.

Be sure that students always wash their hands before leaving the laboratory.

Note: *For the sake of the learning experience, you may want the students to practice aseptic procedures. They will be handling fluids that represent body fluids. Body fluids may contain pathogens. Therefore, students should be cautioned not to spill or splash the simulated "body fluids" that may "contaminate" their work area. If a spill or splash occurs, you should "disinfect" it immediately.*

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ACTIVITY 1

Simulated HIV Test

Overview

Students are going to perform a simulated HIV ELISA test on nine patients. They are provided with a scenario for each patient. Students will:

- Read through each scenario and discuss it with your group.
- Try to predict which of the patients would test positive and negative and discuss why you think so.
- Perform the test and check your results with your teacher. Answer the questions in the Analysis section and discuss your answers with your group.

Patient Scenarios

Jan

Lynn

Baby Elizabeth

Roger

Bob

Tony

Richard

Tania

William

What you need

Per student

- Gloves
- Goggles
- Apron

Per group

- 1 Microwell strip
- 1 Microspatulas
- 1 Plastic pipets
- 12 Glass beads coated with simulated HIV antigen
- Marking pencil

Per class

- Simulated anti-human antibody enzyme linked conjugate, 10mL
- Simulated chromagen, 10mL
- Simulated patients sera, 10mL
- Simulated negative control serum, 10mL
- Simulated low positive control serum, 10mL
- Simulated high positive control serum, 10mL

What to do...

Step 1 – HIV antigen

Provide each student group with two 8-microwell strips. Have students label the wells #1-12. Using a microspatula, add one glass bead coated with coated with simulated HIV antigen to each of wells 1-12 of the microwell strip.

Step 2 – Sample diluent

Using a pipet, add 2 drops of water to each of the 12 wells.

Step 3 - Controls

Add 2 drops of each control as follows:

- Negative control to well #1
- Low positive control to well #2
- High positive control to well #3

Step 4- Patients' sera

Add 2 drops of each patient's serum as follows:

- Jan to well #4
- Lynn to well #5
- Baby Elizabeth to well #6
- Roger to well #7
- Bob to well #8
- Tony to well #9
- Richard to well #10
- Tania to well #11
- William to well #12

Step 5 – Incubate

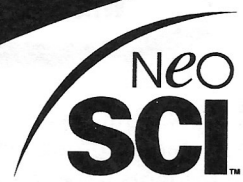
Incubate your microwell strip for 3 minutes at room temperature.

Step 6 – Add Conjugate

Add 2 drops of Conjugate to the sera in each of wells 1-12.

Step 7- Incubate

Incubate your microwell strip for 3 minutes at room temperature.



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Step 8- Chromagen

Add 2 drops of Chromagen to each of wells 1-12.

Step 9 – Read Control Results

Control Sera:

Negative: Colorless or light yellow
Low Positive: Light orange
High Positive: Dark red

Step 10 – Interpret Patients' Results

Positive: Color greater than or equal to low positive control
Negative: Color light yellow or less than low positive

Record your results and observations in the Data Table.

Step 11 – Cleaning

Discard well contents into waste container. Rinse the microwell strips thoroughly with water. Rinse the microspatulas under running water. Rinse pipets by sucking water up and discarding three times. Air dry materials before packing them away.

Data Table

Well Number	Patient	Result	Observations/Comments
1	Negative Control	-	
2	Low positive Control	+	
3	High Positive Control	+	
4	Jan	-	
5	Lynn	-	
6	Baby Elizabeth	+	
7	Roger	-	
8	Bob	+	
9	Tony	-	
10	Richard	+	
11	Tania	-	
12	William	+	

Questions

(Student answers will vary)

1. Jan
2. **Lynn**
3. **Baby Elizabeth**
4. **Roger**
5. **Bob**
6. **Tony**
7. **Richard**
8. **Tania**
9. **William**

Assessment

Students can be assessed on their group participation and teamwork, equipment handling skills, understanding of the biological principle applied to the test, and participation in the discussions of the patient scenarios and results.

Learners can be assessed on their research, investigation and presentation

The discussion questions listed above can also be used to assess students' understanding of the medical, social, moral and economic consequences of HIV/AIDS.

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Cross Curricular Integration

Have students do library or Internet research for social studies, English, or science on the following questions:

- Are there any beneficial viruses or beneficial uses for viruses?
- What factors contribute to the emergence of a previously unknown virus? HIV and Ebola are examples of viruses that recently emerged.
- What are some reasons why scientists are finding it difficult to make an AIDS vaccine?
- Why can you still catch the flu even if you've had a flu shot?
- How did the plague affect Europe in the Middle Ages?