Background: HIV (Human Immunodeficiency Virus) is the causative agent of AIDS (Acquired Immune Deficiency Syndrome). HIV is a retrovirus that attacks its host’s CD4 Cell and Helper T-Cell (types of White Blood Cells). One of the challenges in treating individuals infected with HIV is that the virus can remain in a latent state for months or even years. People infected with the virus are contagious but may appear normal and healthy. HIV is spread through the exchange of bodily fluids (e.g., sex, intravenous drug use, and from pregnant mother to fetus). There are currently treatments, but no cure for HIV infection.

Student Expectation: The student is expected to:

(TEKS B.4C) Compare the structures of viruses to cells, describe viral reproduction, and describe the role of viruses in causing diseases such as human immunodeficiency virus (HIV) and influenza.

Key Concepts:
- Viruses are not living. Viruses rely on host cell machinery to reproduce and synthesize proteins.
- Viruses are not made of cells. Viruses consist of nucleic acid (DNA or RNA) contained within a capsid (a protein coat).
- Viral life cycle exists in one of two states: a lytic cycle or a lysogenic cycle.
- Viruses can cause disease. Some viruses can transform a host cell into a cancer cell.

Purpose: To demonstrate the rate at which a virus can be transmitted through a population.

This lab models the progression of the infection as HIV spreads throughout the class. Each student will receive a test tube that represents his/her body fluids. One student’s vial will be infected with a chemical (NaOH) that will represent the HIV Virus. The class will then engage in a simulation representing risky behavior (unprotected sex, intravenous drug use, etc.) known to be the most common forms of HIV transmission. After a designated number of rounds, the spread of the virus will be measured using a pH indicator.

Materials: (Each Student Shall Have)

- (1) Pair of safety goggles
- (1) Test tube containing personal “body fluids”
- (1) Long stemmed disposable pipette
- (2) Clean, dry glass slides
- (1) Class Set Procedure Handout
- (1) Individual Lab Write up Handout
- Phenolphthalein (One dropper bottle/table)
- Paper towels
Procedure:

1. Put on your safety goggles and inspect all of your equipment and glassware for chips or breakage.

2. Select a test tube of “body fluids” (with pipette) from the test tube rack at your table. Record the # of your test tube on your lab write up sheet.

*Precaution: One test tube will contain the strong base, NaOH. Handle with care; Do Not squirt at other students; Report all spills.

3. Pretest for HIV: Place one drop of your “body fluids” solution on slide #1. Place the slide aside for the moment – it will be tested at the end of the simulation.

4. Virus Transmission: WAIT FOR INSTRUCTOR’S SPECIFIC INSTRUCTIONS.
   a. Round 1. Each person will find 1 other person at his/her table to exchange “body fluids” with (either gender). Wait for instructor’s prompt.
   b. Each partner will draw up fluid from his/her test tube (approximately ¾ of the pipette stem) and squirt the full amount into the partner’s tube. This exchange represents the risky behavior of unprotected sex or intravenous drug use.
   c. Place your thumb over the test tube and invert quickly, two times, to mix the contents.
   d. Go back to your seat and record the person you exchanged fluids with on to your Lab Write Up Sheet.

5. Repeat 2 more times to for round 2 and 3.
   a. WAIT FOR INSTRUCTOR’S INSTRUCTIONS EACH TIME BEFORE EXCHANGING FLUIDS.
   b. Select a new partner for each round.
   c. Mix contents and RECORD PARTNER on data sheet at the conclusion of each round.

6. At the conclusion of round 3, place a drop of your body fluids on to slide #2.

7. Testing for Infection: Place on drop of indicator (Phenolphthalein) on the top of each sample of body fluids (slide #1 and #2).
   a. Clear or yellow = negative result (not infected)
   b. Red or pink = positive result (infected with HIV)

8. Thoroughly wash, dry and return neatly all glassware to the lab table.

9. Complete the Lab Write Up Sheet. Complete data and answer all questions completely.
HIV Lab Write Up

Define or state the significance of the following terms.

HIV – _________________________________________________________________

AIDS – _______________________________________________________________

Retrovirus – __________________________________________________________

White Blood Cells – ____________________________________________________

Latent State – _________________________________________________________

Contagious – _________________________________________________________

Lytic Cycle – _________________________________________________________

Lysogenic Cycle – ____________________________________________________

Restate the key concepts of this activity in your own words.

• _________________________________________________________________

• _________________________________________________________________

• _________________________________________________________________

• _________________________________________________________________
1. How is HIV spread (transmitted from person to person)?

2. Explain the difference between HIV and AIDS.

3. Can you tell by looking at a person whether or not they have HIV? Explain.

4. How is the spread of HIV enhanced by the fact that it remains in a latent state for long periods of time?

5. The rhinovirus (responsible for the common cold), is similar to HIV in that it contains RNA as its genetic material. What is it about RNA viruses that make creating vaccines more difficult?

6. The development of antiviral drugs is now used to treat certain viral infections, including HIV. These drugs work by targeting some aspect of the viral life cycle (e.g., how it attaches to or enters the cell). What about HIV makes it difficult to eradicate from the body of an infected patient?

7. HIV can exist in an infected person in either a lytic or lysogenic state. What might you infer about the current life cycle state of HIV in an infected individual exhibiting symptoms of AIDS versus someone whose outwardly appeared normal? Which of the two individuals would be contagious (capable of spreading the virus)?