



The Science and Ethics of HIV Vaccine Research

Draft 2008

**Curriculum Guide
Grades 7-12**

**Northwest Association for
Biomedical Research
www.nwabr.org**

Culminating Assessments

OVERVIEW

Three different culminating assessments are offered:

Option A – Individual Essay

Students are asked to combine the paragraphs they have written for homework over the course of the unit into one essay.

Two handouts accompany Option A:

- A framework for the student to use in writing his or her essay. The backbone of the essay will be the paragraphs students have been writing for homework throughout the unit.
- A grading rubric for both teachers and students to use.

Option B – Group Research Proposal Presentation

Students complete a ‘Research Proposal’ in small groups, and present the proposal to an Institutional Review Board (IRB) – either their classmates or other reviewers. The IRB will recommend the best proposal using the criteria for evaluation.

Two handouts accompany Option B:

- A guide to help student groups create a fundable research proposal.
- A presentation/grading rubric for both teachers and students to use.

Option C – Research Proposal Review as a member of an Institutional Review Board

Working either individually or as a group, students review a mock research proposal seeking to gain IRB approval. The IRB evaluates whether or not the research proposed should proceed.

Four handouts accompany Option C:

- A guide with questions to help students review the provided research proposal.
- A mock research proposal.
- A grading rubric for both teachers and students to use.
- An answer key for assessing student responses to the questions posed in handout 1.

The Science and Ethics of HIV Vaccine Testing Essay

Over the course of this unit, you have been asked to provide summaries of the lessons presented. This assignment asks you to combine them all into one paper. You have done most of the writing already, so this should be a matter of adding some introductory remarks, transitions between paragraphs, and conclusion.

Introduction: Provide a brief introduction describing the content of the paper (information about HIV biology, vaccines, ethics of research with humans, and the global contexts of HIV/AIDS).

Body: The summary paragraphs that you should include are:

(Note: you may combine some of the material in these paragraphs in order for your essay to flow more smoothly).

- Describe the structure and life cycle of HIV.
- What are possible targets for interrupting the HIV life cycle?
- What are the different types of vaccines currently available or in research that are most promising for preventing HIV infection?
- What are the challenges associated with creating an HIV vaccine?
- What are the basic principles that guide research with human subjects?
- Why would these principles be important to consider in a trial of an HIV vaccine?
- What potential impacts do levels of education, wealth, and health have on the distribution of HIV/AIDS? Use a particular example or examples from the lesson.
- What criteria should scientists use when determining where in the world to conduct an HIV vaccine trial?
- What ethical and cultural considerations must US researchers make before choosing populations to conduct such trials? Draw correlations between education, health resources and HIV/AIDS status, and between culture and participation in HIV/AIDS vaccine trials.

Conclusion: What conclusions can you draw from this unit? What are the implications for the future?

Reflection: Provide a brief reflection on a separate page describing whether this unit has changed your thinking about medical research, HIV/AIDS, and human trials, and if so, how. Would you change your answer to the first scenario about volunteering for a vaccine study? Please explain why or why not.

Essay: Science and Ethics of HIV Vaccine Testing

CATEGORY	4 Exemplary	3 Proficient	2 Partially Proficient	1 Developing
Introduction (Organization)	"The introduction is inviting, states the main topic and previews the structure of the paper."	"The introduction clearly states the main topic and previews the structure of the paper, but is not particularly inviting to the reader."	"The introduction states the main topic, but does not adequately preview the structure of the paper nor is it particularly inviting to the reader."	There is no clear introduction of the main topic or structure of the paper.
Transitions (Organization)	A variety of thoughtful transitions are used. They clearly show how ideas are connected.	"Transitions clearly show how ideas are connected, but there is little variety."	Some transitions work well; but connections between other ideas are fuzzy.	The transitions between ideas are unclear or nonexistent.
Sequencing (Organization)	Details are placed in a logical order and the way they are presented effectively keeps the interest of the reader.	"Details are placed in a logical order, but the way in which they are presented/introduced sometimes makes the writing less interesting."	"Some details are not in a logical or expected order, and this distracts the reader."	Many details are not in a logical or expected order. There is little sense that the writing is organized.
Accuracy of Facts (Content)	All supportive facts are reported accurately.	Almost all supportive facts are reported accurately.	Most supportive facts are reported accurately.	NO facts are reported OR most are inaccurately reported.
Support for Topic (Content)	"Relevant, telling, quality details give the reader important information that goes beyond the obvious or predictable."	"Supporting details and information are relevant, but some key content is absent"	"Supporting details and information are relevant, but several key pieces of content are absent"	Supporting details and information are typically unclear or not related to the topic.
Required Paragraphs Included (Content)	Draws in supplementary materials beyond what was covered in class. All required paragraphs present	All required paragraphs present.	"The majority of required paragraphs are present, some are missing."	The majority of required paragraphs are incomplete or missing.
Conclusion (Organization)	The conclusion is strong and thoughtfully addresses implications for the future	Conclusions are drawn from the unit and implications for the future are mentioned.	The conclusion and implications for the future are partially developed.	The conclusion and statement of implications is unclear or missing.
Reflection (Content)	Unusually thoughtful and thorough, uses several specific examples	Reflects on how learning has impacted them, uses specific examples	Reflects on learning but may not use examples	Reflection missing or incomplete

Group Research Proposal Presentation

Your research team has developed a vaccine for HIV that has produced promising results in laboratory and animal studies. You are now ready to proceed with Phase I vaccine testing in humans. Your task is to create a proposal to be reviewed by an Institutional Review Board (IRB). Once approved by the IRB, you may receive funding. However, since funding is limited only group will be able to conduct their trial. The funder (teacher!) will look to the recommendations of the IRB in deciding whether or not to fund your trial (in order for one group to receive extra credit)!

Use the questions below and your materials from the unit as guides as you create your proposal.

The presentation should focus on three main areas of understanding:

- **The structure of HIV and HIV vaccines**
- **The ethics of research with human participants**
- **The global context of conducting the trial**

For each area listed above, you will be expected to present the following information:

The structure of HIV and HIV vaccines

- Accurately explain where and how your vaccine will interrupt the HIV life cycle.
- Explain what part of the virus is used in the vaccine.
- Clearly identify the type of vaccine (subunit, DNA, etc.), and describe why you chose that type.
- How will you ensure that participants do not contract HIV from your vaccine?

The ethics of research with human participants

- Provide information about study participants (age, gender, size of study).
- Describe how many people are in a Phase I study and what its primary purpose is.
- Define *respect for persons* and how explain how your study honors respect for persons (autonomy, informed consent). Explain how you will deal with patient fears misconceptions about the vaccine trial (for example, fears of contracting HIV).
- Define *beneficence* and explain how study honors beneficence Do the benefits outweigh the risks for participants? How have you minimized the risks to the patients? Will the participants benefit directly from the study? How are the participants receiving the best care possible?
- Define *justice* and explain how the study honors justice. What basic healthcare and education about HIV do you owe the participants? How will the population be recruited and selected? Is a vulnerable population being used? How is the selection fair? Why should these participants bear the burden of the risks when the larger global population will reap the benefits of a successful trial?

The global context of conducting the trial

- Identify your study location and explain why you chose it.
How does the local trial population relate to the global population?
- What cultural considerations do you need to address in your recruitment and in how you conduct the trial?

In addition, you will be evaluated on the presentation itself:

You should have at least one visual aid to support your presentation, speak clearly, and make the presentation interesting for the audience. Your presentation should reflect thorough preparation.

Presentation Rubric

Science and Ethics of HIV Vaccine Trials

Student Name: _____

CATEGORY	Exemplary	Proficient	Partially Proficient	Developing	Not Enough to Evaluate
Structure of HIV and HIV Vaccine Strategies					
HIV Life Cycle Interruption	<ul style="list-style-type: none"> Accurately explains where and how vaccine will interrupt HIV life cycle Provides rationale for why this is the most effective strategy 	<ul style="list-style-type: none"> Accurately explains where and how vaccine will interrupt HIV life cycle 	<ul style="list-style-type: none"> Explains where and how vaccine will interrupt HIV life cycle with little support or some errors 	<ul style="list-style-type: none"> Does not clearly identify interruption of HIV life cycle 	<ul style="list-style-type: none"> Identification of life cycle absent
Type of Experimental Vaccine	<ul style="list-style-type: none"> Type of vaccine accurately correlates to where HIV life cycle is to be interrupted Provides rationale for why this is the most effective type of vaccine to use 	<ul style="list-style-type: none"> Type of vaccine is clearly identified Provides rationale for the type chosen 	<ul style="list-style-type: none"> Both type and rationale are mentioned but not clearly explained Description of type or rationale is complete but the other component is missing 	<ul style="list-style-type: none"> Type of vaccine identified incorrectly Rationale unclear or illogical 	<ul style="list-style-type: none"> Type of vaccine not identified Rationale absent
Safety of Vaccine	<ul style="list-style-type: none"> Explanation of why the vaccine will be effective but not infectious Explanation of why other vaccine types may cause infection or increase risks 	<ul style="list-style-type: none"> Explanation of why the vaccine will be effective but not infectious 	<ul style="list-style-type: none"> Partial explanation of why the vaccine will be effective but not infectious 	<ul style="list-style-type: none"> Explanation incorrect, unclear, or illogical 	<ul style="list-style-type: none"> Explanation absent
Design of Experimental Vaccine	<ul style="list-style-type: none"> Clearly identifies part of the HIV virus used in vaccine and provides rationale for why it is the best choice Makes clear connection to type, life cycle, and safety 	<ul style="list-style-type: none"> Clearly identifies part of HIV virus used in vaccine Makes connection to type, life cycle, and safety 	<ul style="list-style-type: none"> Identifies part of HIV virus used in vaccine Makes some connections to type, life cycle, and/or safety 	<ul style="list-style-type: none"> Incorrectly identifies part of HIV virus used in vaccine Weak connections to type, life cycle, or safety 	<ul style="list-style-type: none"> Identification absent No connections to type, life cycle, or safety

CATEGORY	Exemplary	Proficient	Partially Proficient	Developing	Not Enough to Evaluate
Ethics of Research with Human Participants					
Description of Trial	<ul style="list-style-type: none"> Provides information about study participants (age, gender, size of study) and justification for the use of this particular population Description of trial accurately reflects Phase I parameters and provides explanation of subsequent phases. 	<ul style="list-style-type: none"> Provides information about study participants (age, gender, size of study) Description of trial accurately reflects Phase I parameters 	<ul style="list-style-type: none"> Provides most information about study participants, but is partially incomplete Description of trial partially reflects Phase I parameters 	<ul style="list-style-type: none"> Provides limited information about study participants Description of Phase I trial is incorrect 	<ul style="list-style-type: none"> Information about study participants is absent
Autonomy	<ul style="list-style-type: none"> Defines respect for persons with clear examples Explains how study honors respect for persons with specific examples related to informed consent and autonomy Explains detailed strategies for dealing with patient misconceptions, providing specific examples 	<ul style="list-style-type: none"> Defines respect for persons Explains how study honors respect for persons Explains strategies for dealing with patient misconceptions 	<ul style="list-style-type: none"> Defines respect for persons Explanation of how study honors respect for persons is incomplete Identifies strategies for dealing with patient misconceptions but explanation is incomplete 	<ul style="list-style-type: none"> Inaccurate definition of respect for persons Explanation of how study honors respect for persons is inaccurate Strategies for dealing with patient misconceptions lacking 	<ul style="list-style-type: none"> Definition is absent Explanation is missing Strategies absent
Beneficence	<ul style="list-style-type: none"> Defines beneficence with clear examples Explains how study honors beneficence with specific examples Detailed description of benefits for patients including medical care during study Detailed description of risks to patients including how risks are minimized Rationale explains how benefits outweigh risks and makes connections to individual and societal benefits. 	<ul style="list-style-type: none"> Defines beneficence Explains how study honors beneficence Outlines benefits for patients including medical care during study Outlines risks to patients including how risks are minimized Rationale explains how benefits outweigh risks 	<ul style="list-style-type: none"> Defines beneficence Explanation of how study honors beneficence is incomplete Partially outlines benefits and risks to patients Incomplete explanation of how benefits outweigh risks 	<ul style="list-style-type: none"> Inaccurate definition Explanation of how study honors beneficence is inaccurate Benefits and risks to patients incorrectly identified Incorrect explanation of how benefits outweigh risks 	<ul style="list-style-type: none"> Definition is absent Explanation of how study honors beneficence is missing Benefits and risks not mentioned Explanation of how benefits outweigh risks is missing
Justice	<ul style="list-style-type: none"> Defines justice with clear examples Explains how study honors justice with specific examples Explains how strategies for recruitment do not target or exclude based upon convenience or availability Provides rationale for specific population selected with consideration to influence and conflicts of interest 	<ul style="list-style-type: none"> Defines justice Explains how study honors justice Defines strategies for recruitment Provides rationale for specific population selected with consideration to vulnerability 	<ul style="list-style-type: none"> Defines justice Explanation of how study honors justice is incomplete Defines strategies for recruitment Rationale for specific population selected is unclear 	<ul style="list-style-type: none"> Inaccurate definition Explanation of how study honors justice is inaccurate Strategies for recruitment weak Rationale for specific population selected contains errors Connection between local trial population and global population is illogical 	<ul style="list-style-type: none"> Definition is absent Explanation is missing Strategies absent Rationale is missing

CATEGORY	Exemplary	Proficient	Partially Proficient	Developing	Not Enough to Evaluate
Global Context					
Study Location	<ul style="list-style-type: none"> Identifies study location Provides rationale for choice with explanation for why alternatives were not chosen Provides strong connection between local trial population and global population 	<ul style="list-style-type: none"> Identifies study location Provides rationale for choice Provides connection between local trial population and global population 	<ul style="list-style-type: none"> Identifies study location Rationale for choice incomplete Connection between local trial population and global population weak 	<ul style="list-style-type: none"> Study location unclear Rationale is illogical Connection between local trial population and global population is illogical 	<ul style="list-style-type: none"> Study location absent Rationale is missing Connection is absent
Cultural Considerations	<ul style="list-style-type: none"> Cultural considerations addressed for recruitment with specific examples of for different segments of the society Cultural considerations addressed during trial with specific examples for relationship between patient and doctor/caregiver 	<ul style="list-style-type: none"> Cultural considerations addressed for recruitment Cultural considerations addressed during trial 	<ul style="list-style-type: none"> Cultural considerations for recruitment or during trial mentioned but not clearly explained 	<ul style="list-style-type: none"> Cultural considerations for recruitment or during trial incomplete or illogical 	<ul style="list-style-type: none"> Cultural considerations absent
Presentation					
Presentation	<ul style="list-style-type: none"> Excellent use of visual aid (s) in supporting points Students speak clearly and present information in an engaging manner Presentation demonstrates outstanding level of preparation 	<ul style="list-style-type: none"> Good use of visual aid (s) in supporting points Students speak clearly and present information in an engaging manner Presentation demonstrates good level of preparation 	<ul style="list-style-type: none"> Visual aid(s) present, but may not strongly support points Students speak somewhat clearly, some information is difficult to follow Presentation demonstrates preparation 	<ul style="list-style-type: none"> Visual aid (s) confusing, inaccurate, or incomplete Presentation is somewhat unclear, some information is incomplete or difficult to follow Presentation demonstrates limited preparation 	<ul style="list-style-type: none"> Visual aid (s) lacking Presentation is unclear, most information is incomplete or difficult to follow Evidence for preparation is lacking

NAME _____ Date _____ Period _____

HIV Vaccine Trials and Human Subject Selection

Research Proposal Review as a Member of an Institutional Review Board

1. Your assignment is to become a member of an Institutional Review Board (IRB) and review a proposal for an HIV vaccine trial. The application is attached.
2. Use the basic principles and IRB review handouts from class to review the proposal and answer the following questions.
3. Identify areas of concern (and there are problems!) in the proposal, explain why you are concerned using supporting details from the handouts to back up your viewpoint.
4. Be sure to state the ethical principle(s) being violated for each problem you find.
5. Please type your responses.

Questions:

1. Do the benefits outweigh the risk to the subjects? Will the subjects directly benefit from the study? Are they at risk for serious harm? Is there a way for a subject to get out of the study?
2. Have the researchers minimized the risks? Are the subjects receiving the best care possible?
3. Are the subjects being selected in an equitable way? Has there been any undue influence? Is a vulnerable population being used?
4. Will the methods and results of the study keep the subjects identity and HIV status confidential?
5. Has the researcher assured the subject understands all aspects of the study and provided a way out if they do not wish to participate?
6. How has this unit changed your thinking about medical research, HIV/AIDS and human subject trials?
7. How would you change your answer for the first scenario about your friend having HIV and wanting you to be a volunteer for a vaccine study?

Research Proposal

- I. Date of application:** (Teacher to fill in current date)
- II. Investigator:** National Institute of Allergy and Infectious Diseases (NIAID)
- III. Title of Study:** Safety of an HIV Vaccine in HIV Negative Women
- IV. Time Period:** 6 months
- V. Funding:** National Institutes of Health and Bigmoneydrugs International
- VI. Summary of Research Activities**

A. Background

- i. HIV/AIDS has become a devastating pandemic with developing countries being the most adversely affected.
- ii. There is no cure for this disease with a 98% mortality rate.
- iii. The treatments used are expensive and require access to medical care, medication and monitoring.
- iv. Cultural norms in many of the nations with high infection rates limit the effectiveness of prevention education.
- v. The HIV disease process put people at high risk for infection because the disease may be asymptomatic for several years and the testing for this disease is not readily available worldwide.
- vi. India has a rapidly growing population of HIV positive people. There are 1 billion people; half are sexually active adults. The epidemic has spread to all states and territories, the highest prevalence being in the state of Maharashtra. The most common cause of infection is heterosexual contact.
- vii. The infection rate by gender varies, but there are 2-2.5 times more males infected than females.

B. Research design

- i. Study design sequence and timing
 - 1. The study will span a six month period.
 - 2. The subjects will be screened for general health and negative HIV status.
 - 3. Food will be delivered weekly to each participating family
 - 4. The subject will be injected with the vaccine or placebo in a standard blind study format.
 - 5. Blood will be drawn for antibody testing each month for 6 months.
 - 6. The subjects will not be given HIV prevention information so as to not influence normal cultural practices. This protocol will allow for the natural exposure to occur and thus allow more data to be collected.
 - 7. At the end of the study, results will be reported to the participants and their HIV status will be checked one more time. HIV prevention information will be given to the participants.

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- ii. How study procedures differ from standard care
 - 1. There is no standard for HIV vaccines at this time.
 - 2. If a subject becomes infected she will be notified and the local health authorities will be notified

C. Controls and Blinding

- i. There will be a placebo used in this trial.
- ii. The researcher in the field will not know what is being administered.
- iii. The subjects will not know if they received the vaccine or the placebo

D. Subjects

- i. Subjects: Females age 15-49
- ii. Special Qualifications: HIV negative, married, and available for 6 months of follow up
- iii. Source Of Subjects: India, State of Maharashtra
- iv. Number of Subjects: Phase I prevention trial – 20-80
- v. Exclusion Criteria
 - 1. HIV positive
 - 2. Pregnant
 - 3. Live attenuated vaccination in the past 120 days
 - 4. Husband objects to wife's participation
- vi. Recruiting subjects
 - 1. Head of villages will be approached and informed of the nature of the study and asked to provide names of potential subjects.
 - 2. Husbands and wives will then be approached and given the information and consent forms, which will be in their native language. An interpreter will be available for questions.
- vii. Payments or free services
 - 1. Subjects will receive a complete physical including HIV screening.
 - 2. The subject and family will receive food during the study to assure adequate nutrition during the study.
 - 3. The village leader will receive compensation for each referral to be negotiated for the benefit of the village.
- viii. Location of study
 - 1. The exams, inoculations and follow up blood draws will be done in the subject's home.

E. Risks and Benefits

- i. Nature and amount of risk
 - 1. Patient may contract HIV from the Vaccine
 - 2. They may contract HIV from unprotected sexual contact if while taking the placebo or if the vaccine is ineffective.
 - 3. There may be unforeseen side effects of the vaccine as this is the first human trial.
 - 4. Infection could develop at the site of inoculation
- ii. Benefits
 - 1. The family will receive better nutrition for the six month trial.
 - 2. The subject may become immune to HIV
 - 3. If successful, a Phase 2 trial will be done extending the services to the village of the subjects
 - 4. If successful, this drug will go through Phase 3 trials and be available for the U.S. market.

F. Adverse Effects

- i. If a subject becomes ill from the vaccination process or contracts HIV during this study, they will receive treatment from the local health care system.
- ii. Compensation for their illness will be in the form of payment for their care.

G. Confidentiality

- i. Data will be published without identifying information.

H. Consent forms will be provided in the native language.

I. Drugs

- i. A recombinant Vaccine for HIV-1
- ii. Toxicity - Not established Phase I trial

NAME _____ Date _____ Period _____

IRB Review Questions

Response	Criteria	Score
Above Standard	Clarity of thought, Complete. Shows understanding of all flaws in the IRB application and clearly identifies the Basic Ethical Principles violated. Describes corrections needed to improve study both scientifically and ethically.	
Standard	Clarity of thought, shows understanding of flaws in the IRB, but did not identify all flaws. Clearly identifies the science and basic ethical principles violated for those flaws identified.	
Below Standard	Completes the assignment, but explanations may be slightly ambiguous or unclear, may contain some incompleteness, inappropriateness, or unclarity in identification of Flaws and/or does not correctly identify ethical principles	
Needs Improvement	Begins successfully, but omits significant parts or fails to complete, may misuse ethical and scientific terms. Information may be incorrect or omitted, incorrect or incomplete in analysis, inferences and conclusions.	
Conventions	Criteria	Score
Standard	Writing style shows organization, grammatical correctness, correct spelling.	
Below Standard	Errors in spelling, grammar, or organization.	

Total Score: _____

Comments: _____

Key for Research Proposal Review

Questions: Students should be citing facts from the Basic Principles handout.

1. Principle = Beneficence

- a. Very few benefits
 - i. Better nutrition
 - ii. Possibility of immunity
- b. Risks-
 - i. Side effects from an unknown medication.,
 - ii. Infection at injection site.
 - iii. Contracting HIV through vaccine or unprotected sex with placebo or ineffective vaccine.
 - iv. There is no opt out option listed in the proposal.
 - v. Study is too short and there is no long term follow up to see if the HIV status of the subject changes. Could pose risks not only for this population, but also for the subjects in the next phase.

2. Principle = Beneficence

- a. It is difficult to minimize risk from drug itself as it has not had human trials yet.
- b. By using a placebo subjects may take more risks in sexual activity thinking they are protected.
- c. The subjects are not being offered the best care (drug cocktails) if they become infected.
- d. If the women become pregnant during the study is there a risk to the fetus.
- e. HIV prevention information is being withheld.

3. Principle = Justice

- a. Women only in the study? Why not men, reasoning not clearly stated.
- b. Women in this part of the world have few rights. The husband or village leader can force or prevent a women's participation. This makes them a vulnerable population
- c. Undue influence is present by negotiating with the village leader, perhaps leading him to force women in his village to participate.
- d. Malnutrition is a huge problem in this area, so women may participate to get more food for their family. Husbands may force their wives to participate for the food and/or to receive favors from the village leader.

4. Principle = Respect for Persons

- a. The village leader will know who is in the trial or who refused allowing undue influenced to be placed on subjects
- b. Families will know as husbands will have the opportunity to object. They may shun their wives if they have complications as a result of the trial
- c. The subjects will be confidential in the reporting of the data in the final publication.
- d. Their health status will be reported to the local health care providers.
- e. The whole

5. Principle = Respect for Persons

- a. The informed consent document is not included.
- b. There is no indication of who the interpreters are. They may have a bias to convince women to join the study.
- c. Limited education and understanding of HIV and the immune system may hamper the subjects ability to understand the purposes and risks of the study
- d. There are many opportunities for undue influence
- e. There is no option for leaving the study after starting listed in the proposal

6. Students own viewpoint with answers backed up by course material

7. Students own view point with answers backed up by course material.