

| Harvard Summer Program Immunology Project Resource Information Form | |
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| Title | HIV/AIDS: The Status of the Epidemic Today |
| Resource Type | <input checked="" type="checkbox"/> Lesson Plan <input checked="" type="checkbox"/> Activity <input type="checkbox"/> Lab Activity <input type="checkbox"/> Web-quest |
| Description | This lesson includes a pre-test, power point lecture, and a research assignment. The pre-test is meant to be administered to students the day before the power point activity, for the purpose of measuring how much information students really do know about HIV and AIDS. The powerpoint presentation makes up the major portion of the lesson. It includes some basic statistics showing the status of the epidemic worldwide and in the United States, an overview of how a healthy immune system works, and how HIV interferes with the functioning of the immune system. A follow up assignment which asks the students to investigate other infectious diseases is also included. |
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| Objective | <ol style="list-style-type: none"> 1. Students analyze statistics related to AIDS and recognize that, despite progress made in industrialized countries due to the availability of anti-viral drugs, the disease is still a major problem throughout the world. 2. Students understand how viruses utilize the body's own cells to replicate. 3. Students understand the major parts of the body's immune system, and how those parts work together to fight off disease. 4. Students investigate an infectious disease and examine how that disease is fought off by the body's immune system. |
| Key Concepts | <ol style="list-style-type: none"> 1. HIV/AIDS (statistics about the spread of the disease, structure of HIV, replication process of HIV, immune reaction to HIV, clearing up misconceptions about HIV) 2. Immune System (major parts of the immune system, how a healthy immune system functions, impact of HIV on the immune system) 3. Different pathogens affect the immune system in different ways. |
| Student Prep | Students should be familiar with the following concepts before beginning this lesson: -Cell structure and function -Proteins (structure, role as cell surface markers, receptors, enzymes, etc) -Cell membrane structure -Transcription/Translation |
| Materials | Computer (with connection to internet and with Quicktime installed) and projector to show power point Library/computer lab access Teacher will need to have an account with teachersdomain.org (a PBS website) in order to view one of the animations in the powerpoint presentation. |
| Grade level(s) | 9-12 (General Biology) |
| Teacher Prep Time | 15 minutes (set up power point) |

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| Class Time | <p>15 minutes for pre-quiz at the end of class the day before the powerpoint lesson. 60-90 minute block (depending upon how much explanation/expansion is given by teacher) for power point presentation. May also be shown over the course of two class periods. 1 additional block (long or short) to begin research on pathogen topics.</p> |
| National Standards | <p>The following life science content standards are addressed through this lesson:</p> <p>CONTENT STANDARD C: As a result of their activities in grades 9-12, all students should develop understanding of</p> <ul style="list-style-type: none"> * The cell * Molecular basis of heredity * Biological evolution * Interdependence of organisms <p>Above from: National Science Education Standards, Chapter 6, Science Content Standards 9-12. http://www.nap.edu/readingroom/books/nse/html/6e.html#ls</p> |
| State Standards | <p>The following life science content standards are addressed through this lesson:</p> <ul style="list-style-type: none"> 1.3 Describe the composition and functions of the four major categories of organic molecules (carbohydrates, lipids, proteins, and nucleic acids). 1.5 Explain the role of enzymes in biochemical reactions. 2.1 Relate cell parts/organelles to their functions. 2.2 Differentiate between prokaryotic cells and eukaryotic cells, in terms of their general structures and degrees of complexity. 2.5 Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, and active transport). 3.1 Describe the structure and function of DNA, and distinguish among replication, transcription, and translation. 3.2 Describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology. 3.9 Recognize that while viruses lack cellular structure, they have the genetic material to invade living cells. 4.1 Explain how major organ systems in humans (e.g., kidney, muscle, lung) have functional units (e.g., nephron, sarcome, alveoli) with specific anatomy that perform the function of that organ system. <p>Above from: Science and Technology /Engineering Curriculum Frameworks http://www.doe.mass.edu/frameworks/scitech/2001/standards/ls9_106.html</p> |
| Sources | <p>TEXT SOURCES:</p> <p>“Averting AIDS and HIV”, www.avert.org</p> <p>Lue, Dr. Robert, “Evasion and Destruction of the Immune System by HIV”, Department of Molecular and Cellular Biology, Harvard University, lectures July 16, 2004 and July 22, 2004.</p> |

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| | <p>Starnbach, Dr. Michael, “Adaptive Immune Responses to Bacterial Pathogens”, Department of Microbial and Molecular Genetics, Harvard Medical School, lecture July 13, 2004.</p> <p>IMAGE SOURCES: All images were obtained from the web between the dates of 7/13/04 – 7/22/04</p> <p>“Access Excellence @ the national health museum”, http://www.accessexcellence.org/AB/GG/Antibody.html</p> <p>“Bio 160, Development of Vaccines to Infectious Disease” Brown University, http://www.brown.edu/Courses/Bio_160/Projects1999/hiv/</p> <p>Campbell and Reece, Biology, 6th edition http://occawlonline.pearsoned.com/bookbind/pubbooks/campbell6e_awl/chapter43</p> <p>“Centers for Disease Control and Prevention”, http://www.cdc.gov/hiv/graphics/images/1178/1178-3.htm</p> <p>“Free Graphics”, http://www.freegraphics.com/images/downloads/worldaids/index3.html</p> <p>“Galaxy Goo, An Online Exploration of Science and Community”, http://www.galaxygoo.org/hiv/hiv_lifecycle.html</p> <p>“Health”, AllRefer.com, http://health.allrefer.com</p> <p>“The HIV/AIDS Search Engine”, http://www.hivaidsearch.com/hiv-aids-links.asp</p> <p>“MSN Encarta: Multimedia”, http://ca.encarta.msn.com/media</p> <p>“Population Reference Bureau”, http://www.prb.org</p> <p>Rochester Institute of Technology, http://www.rit.edu/~photo/IFS/index-pages/IFS-37.html#luxe.html</p> <p>Spencer S. Eccles Health Sciences Library, University of Utah, http://medlib.med.utah.edu/WebPath/TUTORIAL/AIDS/AIDS001.html</p> <p>“Teachers’ Domain, Multimedia Resources for the Classroom and Professional Development”, www.teachersdomain.org/9-12/sci/life/gen/hivimmunity/index.html</p> <p>“Yahoo Health” http://health.yahoo.com/health/ency/adam/000821/i9478</p> |
| References | See Above Sources |

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| Assessment | <p>Pre-test can be altered and readministred as a formal assessment on HIV.</p> <p>Depending upon teacher objectives, basic questions about the immune system can be added in to the quiz to assess all of the material from the power point lecture.</p> <p>Students could apply their immune system knowledge to researching another pathogen (activity included in this lesson). Pathogen research done by each student could be presented to the class in the form of a visual presentation (powerpoint/poster/brochure) or a more formal paper.</p> |
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