Harvard Summer Program Immunology Project Resource Information Form	
Title	Cell Structure and Function: Cells from the Human Immune System
Resource Type	__Lesson Plan _X_Activity ___ Lab Activity ___Web-quest
Description	Introductory biology courses at the high school level emphasize the diversity in structure and function in cells. The human immune system provides us with an excellent illustrative example of how the cells from just one area of the body can vary widely.
Author(s)	Bob Becker
Author Institution(s)	Wachusett Regional High School, Holden, MA
Objective	Students will learn that cells that they might first percieve as relatively homogeneous, (blood cells), are actually quite diverse; students will also make connections between this information and basic microscopy and cytology concepts that they have previously encountered.
Key Concepts	Diversity in cell structure and function; basic blood composition; diverse roles of white blood cells; introduction of a developing biological theory (hygeine hypothesis).
Student Prep	Cursory understanding of the range of eukaryotic cell size and function; basic exposure to micrometry; knowledge of phagocytosis and the etymology of "macro" and "phage".
Materials	Individual computer access with Power Point and/or computer presentation apparatus (with Power Point) for teacher-directed lesson.
Grade level(s)	9 - 12
Teacher Prep Time	~20 minutes; teacher preview of presentation and student copies of answer sheets are needed,
Class Time	20 - 30 minutes
National Standards	* The planning of inquiry-based science programs. * The actions taken to guide and facilitate student learning. * The assessments made of teaching and student learning.
State Standards	2. Structure and Function of Cells Broad Concept: All living things are composed of cells. Life processes in a cell are based on molecular interactions. 2.1 Relate cell parts/organelles to their functions. * 2.2 Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, and active transport). * 4. Human Anatomy and Physiology Broad Concept: There is a relationship between structure and function in organ systems of humans. 4.1 Describe how the function of individual systems within humans are integrate to maintain a homeostatic balance in the body.
Sources	None
References	Internet references: http://oac.med.jhmi.edu/pathconcepts/ShowImage.cfm?TutorialID=7&ConceptID=27&ImageID=259 http://image.bloodline.net/stories/storyReader$1628 http://www.cytochemistry.net/microanatomy/blood/blood_cells.htm#RED%20BLOOD%

	20CELLS http://www.cat.cc.md.us/courses/bio141/lecguide/unit1/prostruct/euproreview/epit.html http://www.nursing.ucla.edu/Userpages/mwoo/cbc/smear.htm www.julies-story.org http://micro.magnet.fsu.edu/cells/virus.html http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune2.html http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune3.html http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune4.html http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune5.html http://rex.nci.nih.gov/behindthenews/uis/uisframe.htm http://www.jdaross.cwc.net/introimmunity.htm http://www.naturalrearing.com/J_In_Learning/Immunization/Immunesystem/IMMUNES YSTEM1.htm http://www.hopkins-aids.edu/hiv_lifecycle/hivcycle_txt.html http://www.hhmi.org/biointeractive/animations/infection/inf_frames.htm http://www.hhmi.org/biointeractive/animations/tcell/tcell_frames.htm http://press2.nci.nih.gov/sciencebehind/immune/immune08.htm http://home20.inet.tele.dk/iir/IIR/IIRimsys.htm http://www.cf.ac.uk/biosi/associates/cold/info.html http://www.microbe.org/microbes/virus1.asp Goldsby, Richard A., Kindt, Thomas J., Osborne, Barbara A., Kuby, Janis; Immunology Fifth Edition (2003), WH Freeman and Company Campbell, Neil A, Reece, Jane B.; Biology , Sixth Edition (2002), Benjamin Cummings Pier, Gerald; Lyczak, Jeffrey B.; Wetzler, Lee M.; Immunology, Infection and Immunity; (2004) ASM Press
Assessment	2-Page activity sheet accompanies Power Point presentation