

## Harvard Summer Program Immunology Project Resource Information Form

<b>Title</b>	Cell Structure and Function: Cells from the Human Immune System
<b>Resource Type</b>	<input type="checkbox"/> Lesson Plan <input checked="" type="checkbox"/> Activity <input type="checkbox"/> Lab Activity <input type="checkbox"/> Web-quest
<b>Description</b>	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.
<b>Author(s)</b>	Bob Becker
<b>Author Institution(s)</b>	Wachusett Regional High School, Holden, MA
<b>Objective</b>	Students will learn that cells that they might first perceive 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.
<b>Key Concepts</b>	Diversity in cell structure and function; basic blood composition; diverse roles of white blood cells; introduction of a developing biological theory (hygiene hypothesis).
<b>Student Prep</b>	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".
<b>Materials</b>	Individual computer access with Power Point and/or computer presentation apparatus (with Power Point) for teacher-directed lesson.
<b>Grade level(s)</b>	9 - 12
<b>Teacher Prep Time</b>	~20 minutes; teacher preview of presentation and student copies of answer sheets are needed,
<b>Class Time</b>	20 - 30 minutes
<b>National Standards</b>	<ul style="list-style-type: none"> <li>* The planning of inquiry-based science programs.</li> <li>* The actions taken to guide and facilitate student learning.</li> <li>* The assessments made of teaching and student learning.</li> </ul>
<b>State Standards</b>	<p>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.</p> <p style="padding-left: 40px;">2.1 Relate cell parts/organelles to their functions. *</p> <p style="padding-left: 40px;">2.2 Explain the role of cell membranes as a highly selective barrier (diffusion, osmosis, and active transport). *</p> <p>4. Human Anatomy and Physiology Broad Concept: There is a relationship between structure and function in organ systems of humans.</p> <p style="padding-left: 40px;">4.1 Describe how the function of individual systems within humans are integrate to maintain a homeostatic balance in the body.</p>
<b>Sources</b>	None
<b>References</b>	<p>Internet references:</p> <p><a href="http://oac.med.jhmi.edu/pathconcepts/ShowImage.cfm?TutorialID=7&amp;ConceptID=27&amp;ImageID=259">http://oac.med.jhmi.edu/pathconcepts/ShowImage.cfm?TutorialID=7&amp;ConceptID=27&amp;ImageID=259</a></p> <p><a href="http://image.bloodline.net/stories/storyReader\$1628">http://image.bloodline.net/stories/storyReader\$1628</a></p> <p><a href="http://www.cytochemistry.net/microanatomy/blood/blood_cells.htm#RED%20BLOOD">http://www.cytochemistry.net/microanatomy/blood/blood_cells.htm#RED%20BLOOD</a></p>

	<p>20CELLS</p> <p><a href="http://www.cat.cc.md.us/courses/bio141/lecguid/unit1/prostruct/euproreview/epit.html">http://www.cat.cc.md.us/courses/bio141/lecguid/unit1/prostruct/euproreview/epit.html</a>  <a href="http://www.nursing.ucla.edu/Userpages/mwoo/cbc/smear.htm">http://www.nursing.ucla.edu/Userpages/mwoo/cbc/smear.htm</a>  <a href="http://www.julies-story.org">www.julies-story.org</a>  <a href="http://micro.magnet.fsu.edu/cells/virus.html">http://micro.magnet.fsu.edu/cells/virus.html</a>  <a href="http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune2.html">http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune2.html</a>  <a href="http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune3.html">http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune3.html</a>  <a href="http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune4.html">http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune4.html</a>  <a href="http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune5.html">http://www.schoolscience.co.uk/content/4/biology/abpi/immune/immune5.html</a>  <a href="http://rex.nci.nih.gov/behindthenews/uis/uisframe.htm">http://rex.nci.nih.gov/behindthenews/uis/uisframe.htm</a>  <a href="http://www.jdaross.cwc.net/introimmunity.htm">http://www.jdaross.cwc.net/introimmunity.htm</a>  <a href="http://www.naturalrearing.com/J_In_Learning/Immunization/Immunesystem/IMMUNESYSTEM1.htm">http://www.naturalrearing.com/J_In_Learning/Immunization/Immunesystem/IMMUNESYSTEM1.htm</a>  <a href="http://www.hopkins-aids.edu/hiv_lifecycle/hivcycle_txt.html">http://www.hopkins-aids.edu/hiv_lifecycle/hivcycle_txt.html</a>  <a href="http://www.hhmi.org/biointeractive/animations/infection/inf_frames.htm">http://www.hhmi.org/biointeractive/animations/infection/inf_frames.htm</a>  <a href="http://www.hhmi.org/biointeractive/animations/tcell/tcell_frames.htm">http://www.hhmi.org/biointeractive/animations/tcell/tcell_frames.htm</a>  <a href="http://press2.nci.nih.gov/sciencebehind/immune/immune08.htm">http://press2.nci.nih.gov/sciencebehind/immune/immune08.htm</a>  <a href="http://home20.inet.tele.dk/iir/IIR/IIRimsys.htm">http://home20.inet.tele.dk/iir/IIR/IIRimsys.htm</a>  <a href="http://www.cf.ac.uk/biosi/associates/cold/info.html">http://www.cf.ac.uk/biosi/associates/cold/info.html</a>  <a href="http://www.microbe.org/microbes/virus1.asp">http://www.microbe.org/microbes/virus1.asp</a></p> <p>Goldsby, Richard A., Kindt, Thomas J., Osborne, Barbara A., Kuby, Janis; <u>Immunology</u> Fifth Edition (2003), WH Freeman and Company</p> <p>Campbell, Neil A, Reece, Jane B.; <u>Biology</u> , Sixth Edition (2002), Benjamin Cummings</p> <p>Pier, Gerald; Lyczak, Jeffrey B.; Wetzler, Lee M.; Immunology, <u>Infection and Immunity</u>; (2004) ASM Press</p>
<b>Assessment</b>	2-Page activity sheet accompanies Power Point presentation