

Harvard Summer Program Immunology Project Resource Information Form	
Title	Immunity and Autoimmune Disease
Resource Type	√ Lesson Plan √ Activity ___ Lab Activity ___ Web-quest
Description	This lesson plan begins with a review of the basic function of the immune system in response to a viral infection. The lesson then introduces immunocompetency among B and T lymphocytes and provides a comparison between humoral and cell mediated immunity. These key concepts provide students with the information needed to understand the cause of autoimmune disease. The lesson concludes with a sample list of diseases and requires students to research and present a specific disease.
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Objective	To compare and contrast the function of a healthy immune system with one that has been compromised by an autoimmune disease.
Key Concepts	<ul style="list-style-type: none"> • Compare and contrast immunocompetency in B and T cells. • Compare and contrast the forms of immunity generated by B and T cells. • Introduce the possible causes and treatments of autoimmune disease. • List several types of autoimmune disease.
Student Prep	Students should be familiar with the organs of the immune system and their respective functions. Students should also be familiar with the integumentary, skeletal, muscular, nervous, cardiovascular, endocrine, and digestive systems.
Materials	Computers equipped with QuickTime Research periodicals and resources
Grade level(s)	Anatomy and Physiology (11th and 12th graders)
Teacher Prep Time	10 minutes to review lesson plan, especially the animations
Class Time	3- 50 minute class periods <ul style="list-style-type: none"> • One to review the immune system and introduce immunocompetency • One to introduce humoral and cell mediated immunity • One to introduce autoimmune diseases

<p>National Standards</p>	<ul style="list-style-type: none"> ■ Knows the structures of different types of cell parts (e.g., cell wall; cell membrane; cytoplasm; cell organelles such as the nucleus, chloroplast, mitochondrion, Golgi apparatus, vacuole) and the functions they perform (e.g., transport of materials, storage of genetic information, photosynthesis and respiration, synthesis of new molecules, waste disposal). ■ Understands the chemical reactions involved in cell functions (e.g., food molecules taken into cells are broken down to provide the chemical constituents needed to synthesize other molecules; enzymes facilitate the breakdown and synthesis of molecules). ■ Knows how cell functions are regulated through changes in the activity of the functions performed by proteins and through the selective expression of individual genes, and how this regulation allows cells to respond to their environment and to control and coordinate cell growth and division. ■ Knows that the complexity and organization of organisms accommodates the need for obtaining, transforming, transporting, releasing, and eliminating the matter and energy used to sustain the organism. ■ Understands the processes of cell division and differentiation (e.g., meiosis, mitosis, embryo formation, cellular replication and differentiation into the many specialized cells, tissues, and organs that comprise the final organism; each cell retains the basic information needed to reproduce itself).
<p>State Standards</p>	<p>2.1 Relate cell parts/organelles to their functions.</p> <p>3.9 Recognize that while viruses lack cellular structure they have the genetic material to invade living cells.</p> <p>4.1 Explain how major organ systems within humans have functional units with specific anatomy that perform the function of that organ system.</p> <p>4.2 Describe how the functions of individual systems within humans are integrated to maintain homeostatic balance within the body.</p>
<p>Sources</p>	<ul style="list-style-type: none"> • Campbell, Neil A. and Reece, Jane B. <i>Biology</i>. Benjamin Cummings., 6th edition. 2002. • Marieb, Elaine. <i>Essentials of Human Anatomy and Physiology</i>. Pearson Education Inc., 2000. • www.biology.arizona.edu/immunology/tutorials/immunology/main.html • www.biologymad.com • www.cdad.com/nih/immune2/index.html

	<ul style="list-style-type: none"> • www.hhmi.org/biointeractive/disease/animations.html • www.mayoclinic.com • www.micro.msb.le.ac.uk/MBChB/2a.html • www.ncbi.nlm.nih.gov/ • www.niaid.nih.gov/publications/autoimmune/autoimmune.html • www.northarundel.com/aniplayer • www.ntri.tamuk.edu/immunology/blood.html • www.nci.nih.gov/sciencebehind/immune/immune00.html • www.whfreeman.com/kuby/index.html
References	<ul style="list-style-type: none"> • Campbell, Neil A. and Reece, Jane B. <i>Biology</i>. Benjamin Cummings., 6th edition. 2002. • Marieb, Elaine. <i>Essentials of Human Anatomy and Physiology</i>. Pearson Education Inc., 2000. • www.biology.arizona.edu/immunology/tutorials/immunology/main.html • www.biologymad.com • www.cdad.com/nih/immune2/index.html • www.hhmi.org/biointeractive/disease/animations.html • www.mayoclinic.com • www.micro.msb.le.ac.uk/MBChB/2a.html • www.ncbi.nlm.nih.gov/ • www.niaid.nih.gov/publications/autoimmune/autoimmune.html • www.northarundel.com/aniplayer • www.ntri.tamuk.edu/immunology/blood.html • www.nci.nih.gov/sciencebehind/immune/immune00.html • www.whfreeman.com/kuby/index.html
Assessment	<p>Students may complete the webquest at, www.biology.arizona.edu/immunology/tutorials/immunology/main.html. This webquest reviews the immune system through a series of multiple-choice questions.</p> <p>Students are to research the causes, symptoms, treatments, statistics, and prognosis of a specific autoimmune disease and design a powerpoint presentation based on their research.</p>