Harvard Summer Program Immunology Project Resource Information Form

Title	What cells are in there? Flow Cytometry Technology
Resource Type	_X_Lesson Plan __Activity ___ Lab Activity ___Web-quest
Description	This lesson focuses on cell cytometry. Teachers use a power point presentation and a series of questions to facilitate discussion and learning about the technology and uses of cell cytometry. Students will do demonstrations that simulate how a cytometer quantifies different white blood cells in a sample based on shape and size and on the use of fluorescent probes to quantify subsets of T-cells. Applications in medicine will be mentioned. **This lesson could be used within a unit on: The cell, Anatomy and Physiology or Immunology**
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Objective	Students will: • Understand how a cytometer works • Become familiar with applications of the technology • Calculate percentages of white blood cell differentiations
Key Concepts	• Use and applications of flow cytometry technology • Fluorescent molecule labeling • Components of white blood cell differentiation
Student Prep	• General knowledge of white blood cells
Materials	• 5 Large boxes of Runts • 1 Box of Nerds • Computer • LCD Computer Projector (or some other way to project computer image to classroom) • 6 Large/Wide straws (these can be found at Dunkin Donuts or Starbucks) • Tape to seal straws • Balance for massing out candy
Grade level(s)	9-10
Teacher Prep Time	

Class Time	1-2 Hours
National Standards	**Science and Technology** **CONTENT STANDARD E: As a result of activities in grades 9-12, all students should develop** • Abilities of technological design • Understandings about science and technology • Science often advances with the introduction of new technologies. Solving technological problems often results in new scientific knowledge. New technologies often extend the current levels of scientific understanding and introduce new areas of research. • Creativity, imagination, and a good knowledge base are all required in the work of science and engineering. **Life Science** **CONTENT STANDARD C: As a result of their activities in grades 9-12, all students should develop understanding of** * The cell Cells have particular structures that underlie their functions. Every cell is surrounded by a membrane that separates it from the outside world. Inside the cell is a concentrated mixture of thousands of different molecules which form a variety of specialized structures that carry out such cell functions as energy production, transport of molecules, waste disposal, synthesis of new molecules, and the storage of genetic material. •
State Standards	**Strand 4: Technology/Engineering** Science tries to understand the natural world. Based on the knowledge that scientists develop, the goal of engineering is to solve practical problems through the development or use of technologies. For example, the planning, designing, and construction of the Central Artery Tunnel project in Boston (commonly referred to as the "Big Dig") is a complex and technologically challenging project that draws on knowledge of earth science, physics, and construction and transportation technologies. Technology/engineering works in conjunction with science to expand our capacity to understand the world. For example, scientists and engineers apply scientific knowledge of light to develop lasers and fiber optic technologies and other technologies in medical imaging. They also apply this scientific knowledge to develop such modern communications technologies as telephones, fax machines, and electronic mail.
Sources	None

References	http://courses.dce.harvard.edu/-bios169c/resourcemain.html maintained by Dr. Jeffrey Lyczak
Assessment	Teachers can check for student understanding by: 1. Homework assignment 2. Project in technology 3. Prompt on a test