

SUBJECT: Medical Interventions		GRADE: 10-12	
Unit Title: How to Fight Infection		Time Frame: Marking Period	
UNIT OVERVIEW			
<p>In Lesson 1.1, students explore interventions involved in detecting, fighting, and preventing an infectious disease as they investigate a potential outbreak at a fictitious college. Sue Smith, a freshman in college, is not feeling well. She thinks she just has a cold, but further investigation will reveal something far more serious: bacterial meningitis.</p> <p>Students use various techniques and technologies to diagnose Sue and determine the source of the disease on campus. They analyze clues found in the history and physical exam of each possible patient, identify pathogens present in body fluids through DNA sequence analysis, and test for the infectious agent using the antibody-based, enzyme-linked, immunosorbent assay (ELISA).</p> <p>Students are introduced to the field of bioinformatics as they explore genetic databases to identify known gene sequences. They also review principles of human immunity as they learn how antibodies can be used to identify the presence of a disease agent. At the conclusion of the investigation, students outline a plan to stop a potential outbreak on campus and discuss interventions such as antibiotic therapy and vaccination, topics explored in greater detail in subsequent lessons.</p>			
LRG SKILLS AND DISPOSITIONS		STEELS STANDARDS	
S1C - Collaboration & Teamwork S4C – Critical Thinking & Problem Solving		3.1.9-12.B Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. 3.1.9-12.C Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	
COMPETENCIES		LEARNING TARGETS	
I can identify and apply medical interventions.		I can identify evidence that helps scientists determine the source of a potential outbreak of an infectious disease.	
		I can identify how has the development of antibiotics impacted human health?	
		I can explain how medical technology, such as bioinformatics, has changed disease detection.	

SUBJECT: Medical Interventions		GRADE: 10-12	
Unit Title: Genetic Testing and Screening		Time Frame: Marking Period	
UNIT OVERVIEW			
<p>In Unit 2, students examine the available types of genetic testing and screening and discuss ethical implications of these tests. Students will focus on prenatal testing, newborn testing, and carrier screening; however, ethical use of genetic testing to screen for disease risk is also addressed. Students will explore genetic risk for chronic diseases such as cancer in more detail in Unit 3.</p> <p>Playing the part of genetic counselors, students analyze a patient case concerning issues of genetic testing and provide appropriate recommendations. Next, students explore molecular techniques to complete a genetic test by amplifying a DNA segment using the polymerase chain reaction (PCR). Students then have a chance to see the connection between phenotype and genotype as they test their own genes. Finally, students investigate the interventions that exist to help protect and monitor a growing fetus. Students also research the value of proper prenatal care and interventions that protect and monitor the mother and growing fetus, then relate their findings to outcomes in both mother and child.</p>			
LRG SKILLS AND DISPOSITIONS		STEELS STANDARDS	
S1C - Collaboration & Teamwork S4C – Critical Thinking & Problem Solving		3.1.9-12.P Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	
COMPETENCIES		LEARNING TARGETS	
I can explain how genetic counselors assist patients with decisions related to reproduction or personal disease risk?		I can explain is the relationship between phenotype and genotype?	
		I can show which medical interventions and lifestyle modifications can help a pregnant woman have a healthy pregnancy?	
		I can debate the ethical implications of genetic testing?	

SUBJECT: Medical Interventions		GRADE: 10-12	
Unit Title: How to Conquer Cancer		Time Frame: Marking Period	
UNIT OVERVIEW			
<p>In this unit, students are introduced to Mike Smith, the 16-year-old son in the Smith family. For the last couple of months, Mike has experienced pain in his upper arm that may be indicative of cancer. Through the exploration of Mike’s case, students explore diagnostic techniques used to diagnose Mike’s particular cancer, including diagnostic imaging and examination of cancerous tissue.</p> <p>Students look at the physiology of cancer and investigate the genes involved with cancer. Students examine the technology researchers use to get a better understanding of the differences between gene expression in cancer cells versus healthy cells. Students learn ways that this technology is used to potentially develop personalized medicine for treating cancer.</p>			
LRG SKILLS AND DISPOSITIONS		STEELS STANDARDS	
S1C - Collaboration & Teamwork S4C – Critical Thinking & Problem Solving		3.1.9-12.P Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	
COMPETENCIES		LEARNING TARGETS	
How does the development of cancer relate to the cell cycle?		I can identify factors such as age, personal lifestyle choices, or environment influence a person’s risk for developing cancer?	
		I can show how has imaging technology changed medicine?	
		I can analyze information that gene expression patterns tell scientists?	

SUBJECT: Medical Interventions		GRADE: 10-12	
Unit Title: How to Prevail When Organs Fail		Time Frame: Marking Period	
UNIT OVERVIEW			
<p>Students learn how to produce and purify a protein in a laboratory setting to understand how human insulin is produced to treat people with diabetes. Instead of creating insulin, students use the process of bacterial transformation to manufacture a green fluorescent protein (GFP) that is easily visible and can be traced in the laboratory. Then they learn techniques used to isolate a specific protein from a mixture, in this case, column chromatography.</p> <p>Although students complete these three laboratory experiments using GFP, the processes can be adapted to the production of insulin. Students will relate their molecular work to the case of Diana Jones. Without insulin, she would have died long ago. As the unit progresses, students research and design other medical interventions to help Diana in her battle with diabetes and renal failure.</p>			
LRG SKILLS AND DISPOSITIONS		STEELS STANDARDS	
S1C - Collaboration & Teamwork S4C – Critical Thinking & Problem Solving		3.1.9-12.P Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	
COMPETENCIES		LEARNING TARGETS	
I can describe how organ failure relates to specific medical interventions.		I can explain how genetic engineering can be used to produce proteins such as insulin.	
		I can show how the sequence of amino acids relates to the overall shape of a protein.	
		I can perform techniques that can be used to separate proteins in a mixture.	