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| **Students will understand**   * Cells and biochemicals of the immune system protect the body against infections and cancer. * The immune system consists of physical barriers, an innate immune response of inflammation, phagocytosis, complement, collectins, and cytokines. * In the cellular immune response, helper T calls stimulate B cells to produce antibodies and cytotoxic T cells to secrete cytotoxins. * Inherited immune deficiencies affect innate and adaptive immunity. * Rapid HIV replication can exhaust the T cell production. * An overly sensitive immune system can cause allergies. * Cancer is genetic, but not necessarily inherited. * Cancer is caused by a loss of cell division control, implicated genes encode growth factors * Knowing the genome sequence of a pathogen can shed light on how it evades the human immune system. * Cancer is a result of a single gene that mutated. * Cancer can develop by environmental trigger or by inherited susceptibility. * Cancer stem cells are cells that veer from normal development. * Determining which mutation occurred in particular stages of cancer can reveal the sequence of gene actions. * Diagnosis and treatment of cancer will increasingly consider genomic information. | **Essential Questions:**   1. Why do mutations leading to cancer occur in somatic cells? 2. How the determination of mutations present in a particular stage of a cancer can reveal the sequence of gene actions? 3. How will the treatment of cancer better use genetic information? 4. What is the difference between innate and adaptive immunity? 5. What is the physical basis of a blood type and blood incompatibility? 6. Which component of the human immune response explains why we experience the same symptoms of an upper respiratory infection when different types of viruses can cause these conditions? 7. What are the dangers of a bone marrow transplant being too different or too similar from the recipient’s tissue? 8. What does HIV do the human immune system? 9. Why is deficiency in T cells more dangerous than a deficiency in B cells? 10. What are the characteristics of cancer cells? 11. Why some cancers may be the culmination of a series of mutations in several genes? 12. Why don’t all cancers of the same cell type respond to the same drug? 13. How is the cell cycle controlled from inside and outside the cell? 14. How can the same type of cancer be associated with deletion as well as translocation of the genetic materials? 15. What are the different genetic changes that occur in a cancer cell? 16. What are the new strategies for treating cancer? |

**Sub-Unit Components/Sub-Headings/Objectives**

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| Genetics of Immunity   * The Importance of Cell Surfaces * The Human Immune System * Abnormal Immunity * Altering Immune Function * The Pathogen’s Perspective | The Genetics of Cancer   * Characteristics of Cancer Cells * Origins of Cancer Cells * Genes Associated with Cancer * Environmental Causes of Cancer * Human Genome Data |  |  |  |  |

**Knowledge—Students will know…**

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| 1. Define, interpret, and use unit vocabulary. 2. Describe the importance of cell surfaces. 3. Describe the human immune system. 4. Distinguish between innate and adaptive immunity. 5. Distinguish between primary and secondary immune response. 6. Distinguish between an autoimmune condition and an allergy. 7. Explain the physical basis of a blood type and blood incompatibility. 8. Discuss abnormal immunity. 9. Outline the effect of HIV to the human immune system. 10. Describe the dangers of bone marrow transplant being too different or too similar to the recipient’s tissues. 11. Describe the role antibiotics play in allergic reactions and in autoimmune disorders. 12. Explain the altering immune function. 13. Explain why a deficiency of T cells is more dangerous than a deficiency of B cells. 14. Describe how cancer is genetic but usually not inherited. 15. Define and explain the characteristics of cancer cells. 16. Outline the origins of cancer cells. 17. List and explain the genes associated with cancers. 18. List and describe the environmental causes of cancer. 19. Distinguish between plasma cells and a memory cell descended from the same T cell. 20. Describe the human genome data tailor diagnosis and treatment |

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| **Standards** | **Assessments/Evidence** |
| *List the standards set used and the individual standards to be taught and assessed. Highlight or* ***Bold*** *the standards of significance.* Example:   * HS-LS1-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. * HS-LS1-2: Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. * HS-LS1-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. | **Which assessments will provide the best evidence of meeting the learning objectives? Consider the DOK required.**   * Bell-Ringer * Journal Activities * Exit-Slips * Exams * Quizzes * Small Group (Team Activities) * Experiments * Projects * Presentations * Case Studies * Vocabulary |

**Reading and Writing Standards (except for English/Language Arts courses)**

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| Include at least one CCSS Literacy and one Writing standard that will be taught and assessed. Access them with these links and then list below:   * [CCSS.ELA-Literacy.RST.9-10.8](http://www.corestandards.org/ELA-Literacy/RST/9-10/8/) Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.  * [CCSS.ELA-Literacy.RST.9-10.9](http://www.corestandards.org/ELA-Literacy/RST/9-10/9/) Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. |

**Instructional Resources/Materials**

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| * Lewis, R. (2008). *Human genetics: Concepts and applications*. Boston: McGraw-Hill Higher Education. * Lewis, R. (2007). *Case workbook to accompany Human genetics: Concepts and applications*. Boston: McGraw-Hill Higher Education. * Brooker, R. J. (2018). *Genetics: Analysis and Principles*. New York: McGraw Hill Education. * Robinson, T. R. (2010). *Genetics for dummies:* Hoboken, NJ: Wiley. * <Http://Wardisiani.com> * WWW.mhhe.com/lewisgenetics7 |