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Curriculum Units by Fellows of the National Initiative
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Making connections in science: viruses and the immune system

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This unit is developed for an AP Biology class to use readings, models, and case studies to develop their literacy and scientific thinking skills while being immersed in high-level content. For example, complex discussions about vaccine development will help students demonstrate a sound understanding of viruses and the human immune system. While a number of examples will be used, an emphasis will be placed on Human Immunodeficiency Virus (HIV) and the struggle to produce a viable vaccine. More specifically, students will contrast innate and adaptive immunity, while learning the names and roles of various immune cells. They will also compare and contrast various forms of viruses, including bacteriophages, to define common structures. With a number of viruses, they will investigate the host-pathogen arms race that contributes to evolution and will make connections to overarching themes in Biology.

Students will learn about the history of vaccines through articles about smallpox variolation and vaccine development. Using historical context, this will foster discussions of ethical considerations and scientific advancement. Finally, students will explicitly study the structure and life cycle of HIV. In doing so, they will learn about why some individuals are naturally immune or have increased defenses against HIV, and how the virus's high recombination rates, high mutation rates, and ability to evade the immune system make it so difficult to develop a vaccine. The structure of the unit is developed in a way to help students form connections to big ideas in Biology while practicing complex analytical skills and discussing highly relevant material in a way to cover required material from the AP Biology Curriculum Framework.

(Developed for AP Biology, grades 11-12; recommended for AP Biology, grades 10-12; and Biology and Anatomy and Physiology, grades 11-12)

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