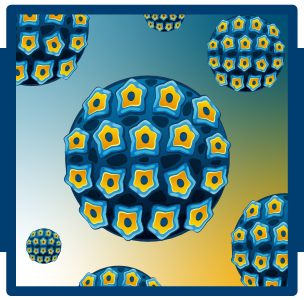
Teacher Key

UNIT: GOING VIRAL!
LESSON 1: SILENT SABOTAGE
Activity 1B: FROM CODE TO CANCER



TEXAS BIOMEDICAL RESEARCH INSTITUTE
HEALTH STARTS WITH SCIENCE

Processing Out

Directions: Read the following statements. Refer to the article and activity 2B as needed.

1. Evolution occurs through genetic mutations. Using **Table 1** and **Figure 2**, analyze the HPV16 genome and propose a specific mutation to one of its genes (such as E1, E6, L1, etc.). Explain whether this mutation would pose a higher risk or a lower risk for cancer and justify your reasoning.

Answers will vary.

Examples:

A mutation in the E6 gene that reduces its ability to inactivate p53 could be disadvantageous for the virus. Since p53 (the "guardian" protein) helps protect cells from becoming cancerous, a fully functional p53 would lower the virus's ability to promote cancer development. As a result, this mutation could lead to a **lower cancer risk** for the host.

A mutation in the E4 gene that enables it to be expressed in non-epithelial cells, such as blood cells, could be advantageous for the virus. This adaptation might allow the virus to travel through the bloodstream and infect a wider range of cells throughout the body. As a result, it could lead to **higher risk of cancer** in the host by expanding the virus's reach and persistence.

2. Based on your proposed mutation in Question 2, generate a claim as to whether this virus would most likely belong to sub-lineage A, B, C, or D (as shown in **Figure 4B**). Identify evidence, providing where the evidence is located in the article data and explain your reasoning as to how the evidence supports your claim.

Claim: this can be stated as a hypothesis (which is not an if/then statement) or as a statement.

Evidence: students need to clearly state their evidence and cite where in the article the evidence is located, including identifying data tables and/or figures.

Reasoning: must link the evidence to the claim.

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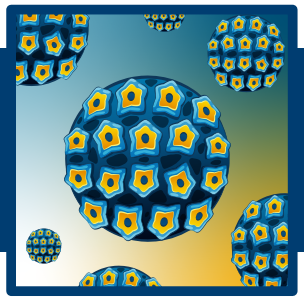

Sample Claims:

A mutation that results in a **lower cancer risk** means the virus will belong to either the **B or C lineages**.

A mutation that results in a **higher cancer risk** indicates the virus will belong to the **D lineage or potentially A**.