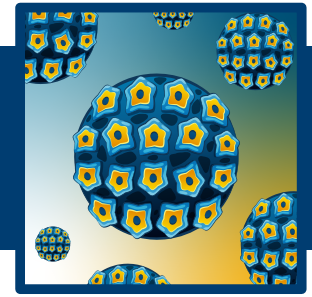


Teacher Directions

UNIT: GOING VIRAL!

LESSON 1: SILENT SABOTAGE

Activity 1C: Text Dice-ction



TEXAS BIOMEDICAL
RESEARCH INSTITUTE
HEALTH STARTS WITH SCIENCE

Instructional Objectives

- › Analyze the HPV16 genome.
- › Relate HPV evolution to the incidence of cancer.

Activity 1C Rationale



Suggested time: ~30 min

In this activity, students will read a section of the *Oncovirus Exposed: The HPV/Cancer Connection*, pages 4 - 6, and **Figure 4**. With this information, students will analyze how HPV has evolved and how evolution/mutations relate to cancer risk. Working in groups, students will roll a die and respond to the corresponding prompt, first as an individual and then in collaboration with their group.

Education Standards

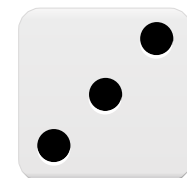
TEKS: B.5.D, B.6.C, B.7.A, B.7.C, B.7.D, B.10.D

ELPS: C.1.C, C.1.E, C.1.G, C.2.E, C.2.I, C.3.D, C.3.E, C.3.G, C.4.D, C.4.F, C.4.G, C.4.K, C.5.B, C.5.F

NGSS:

Student Materials

- › Text Dice-ction Directions (1 per group)
- › HPV/Cancer Connection Article
- › Pen
- › Die (1 per group)



MIDDLE & HIGH SCHOOL LEVEL

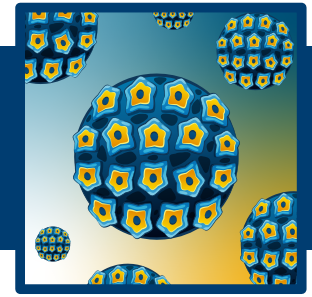
Teacher Enrichment Initiatives (TEI) | NIH SEPA | ©2026 | [TxBiomed.org](https://www.txbiomed.org)
NIH SEPA Project #1R25GM142021-01A1 | Some graphic elements courtesy of [Freepik](https://www.freepik.com)

Teacher Directions

UNIT: GOING VIRAL!

LESSON 1: SILENT SABOTAGE

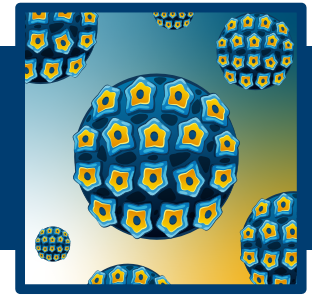
Activity 1C: Text Dice-ction



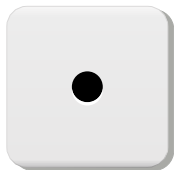
Directions

1. Students will work in pairs or groups.
2. Prompt students to read pages 4-6 of *Oncovirus Exposed: The HPV/Cancer Connection*.
 - a. Encourage them to underline or highlight key terms related to HPV evolution, high-risk vs. low-risk strains, and Figure 4.
3. Each student rolls a die to receive a random discussion prompt from the Text Dice-ction handout.
4. Allow time for students to write a response to their prompt on their student directions sheet.
 - a. Encourage students to refer to the article and Figure 4 to formulate their responses.
 - b. Possible guiding questions:
 - i. Where in the article can we find information that supports or challenges this statement?
 - ii. What data or evidence from the article supports this claim?
 - c. Possible sentence starters:
 - i. Figure/Table ___ shows _____, which relates to this claim because _____.
 - ii. On page ___, it says _____, which gives evidence for _____.
 - d. Possible individual student responses: please see page 4.
5. Once all students have finished writing their individual responses, they take turns sharing their responses within their group.
 - a. Encourage active listening and encourage students to ask clarifying questions or build on others' ideas.
 - b. Ensure students are taking notes on their student directions sheet under Group Takeaways.
6. After sharing, students work together to summarize key patterns or new ideas that emerged, surprises or disagreements, and/or any lingering questions.
7. They write their collective takeaways in the Group Takeaways section of the handout.

UNIT: GOING VIRAL!
LESSON 1: SILENT SABOTAGE
Activity 1C: Text Dice-ction



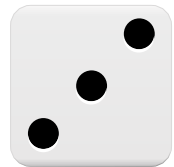
Text DICE-ction



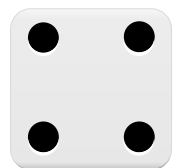
A pattern I notice in the evolution of HPV is...



If HPV continues to evolve, I predict it might...



Compared to low-risk strains, high-risk strains have evolved...



One unexpected finding about HPV evolution is...



My hypothesis is that the longer a strain has existed, the more likely it is to...



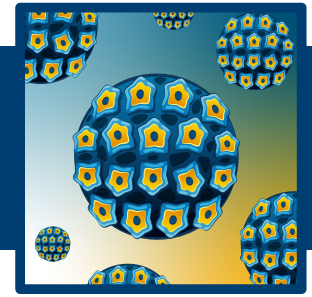
One question I still have about HPV evolution is...

Teacher Directions

UNIT: GOING VIRAL!

LESSON 1: SILENT SABOTAGE

Activity 1C: Text Dice-ction



Text DICE-ction

(Possible student responses)



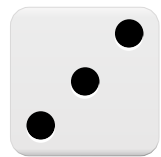
A pattern I notice in the evolution of HPV is...

...the most recently evolved sub-lineages of HPV16, like A4, C1, D2, and D3, are linked to a higher risk of cancer, while older strains show lower cancer risk
...in Figure 4A, the Alpha-9 HPV viruses are nearly all oncogenic and share a common ancestor
...geographic regions vary in their rates of HPV-related cancer, with the Americas experiencing the highest risks.



If HPV continues to evolve, I predict it might...

... develop even more efficient ways to avoid the immune system.
... increase its ability to cause mutations in host cells.
... develop new, higher risk sub-lineages.



Compared to low-risk strains, high-risk strains have evolved...

... to interact with host cell polymerases during differentiation, which increases the risk of mutations and cancer.
... in locations such as East Asia, Africa and the Americas.
... mainly in the Alpha-9 and Alpha-7 species.



One unexpected finding about HPV evolution is...

... that more evolved strains of HPV16 have higher cancer rates.
... sublineages D2 and D3 have much higher cancer rates (10X) compared to other lineages.
...that evolution does not impact cancer risk when comparing Alpha 2 and Alpha 9 species.
*Misconception: the evolution/cancer risk referenced in this article is specific to the HPV 16 sublineages.



My hypothesis is that the longer a strain has existed, the more likely it is to...

...have adapted to avoid detection by the immune system but might be less aggressive than newer, faster-evolving strains.
...accumulate mutations that make it better at surviving in the body.



One question I still have about HPV evolution is...

...answers will vary.
...why a virus that relies on the host to survive would evolve in a way that increases the risk of killing the host through cancer.

MIDDLE & HIGH SCHOOL LEVEL