Science Exemplary Text
Student Handout

Recent evidence challenges long-held theories of how cells turn malignant—and suggests new ways to stop tumors before they spread.

What causes cancer?

Tobacco smoke, most people would say. Probably too much alcohol, sunshine or grilled meat; infection with cervical papillomaviruses; asbestos. All have strong links to cancer, certainly. But they cannot be root causes. Much of the population is exposed to these carcinogens, yet only a tiny minority suffers dangerous tumors as a consequence.

A cause, by definition, leads invariably to its effect. The immediate cause of cancer must be some combination of insults and accidents that induces normal cells in a healthy human body to turn malignant, growing like weeds and sprouting in unnatural places.

At this level, the cause of cancer is not entirely a mystery. In fact, a decade ago many geneticists were confident that science was homing in on a final answer: cancer is the result of cumulative mutations that alter specific locations in a cell's DNA and thus change the particular proteins encoded by cancer-related genes at those spots. The mutations affect two kinds of cancer genes. The first are called tumor suppressors. They normally restrain cells' ability to divide, and mutations permanently disable the genes. The second variety, known as oncogenes, stimulate growth—in other words, cell division. Mutations lock oncogenes into an active state. Some researchers still take it as axiomatic that such growth-promoting changes to a small number of cancer genes are the initial event and root cause of every human cancer.

Gibbs, W. Wayt. (2008). "Untangling the Roots of Cancer." *Scientific American Special Edition*. June 2008.

This is an example of exemplary text found in *Common Core Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects: Appendix B Text Exemplars and Sample Performance Tasks.* Retrieved from http://www.corestandards.org/assets/Appendix_B.pdf

Science Exemplary Text
Teacher Resource

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Teacher introduces the text with minimal commentary and students read it independently. Teacher then reads passage aloud. Give a brief definition to words students would likely not be able to define from context (underlined in text). Teacher guides the students through a series of text-dependent questions. Complete the performance task as a cumulative evaluation of the close-reading.

Text-Dependent Questions

1. What is the author's purpose in the article?
2. What are the common things people think cause cancer and why might these not be correct?
3. What does the author say is the immediate cause of cancer?
4. The author says, "A cause by definition, leads invariably to its effect." If cancer is the effect, what are the causes stated by the author?
5. What is the author's reasoning for shifting from the common, accepted causes of cancer to the scientific causes?
6. Categorize the two types of cancer genes that mutations affect. Compare the results of the activation of each type of gene.
7. What is one way the article states that cancer can harm the body?
8. Come to a consensus on the meaning of the following words:
    a. Malignant
    b. Carcinogens
    c. Mutations

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EFL 6
Word Count 251

9. In the last sentence of the text, the author uses the word *axiomatic.* Explain why he may have chosen to use this word instead of a more general synonym.

Performance Tasks for Informational Texts
Compare and contrast with a Venn diagram the causes and effects of cancer based on cellular mutations. Use technical terms specifically to explain your insights. [RST.11-12.4]

Students analyze the structure of *Untangling the Roots of Cancer* to explain how the major sections contribute to our understanding the causes of cancer. [RI.11-12.5]

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