

Cancer Biology Curriculum Development Resources for Teachers

Background Readings for Curriculum Development Workshop

1. Overview of ELISA. Please read the first three parts, “Introduction,” “ELISA Formats” and “Direct vs. indirect detection ELISA strategies.” Please watch the two short videos as well.:
<https://www.thermofisher.com/us/en/home/life-science/protein-biology/protein-biology-learning-center/protein-biology-resource-library/pierce-protein-methods/overview-elisa.html>
2. Polymerase Chain Reaction: A technique used to amplify, or make many copies of, a specific target region of DNA. *Khan Academy*. <https://www.khanacademy.org/science/biology/biotech-dna-technology/dna-sequencing-pcr-electrophoresis/a/polymerase-chain-reaction-pcr>
3. Cancer and the Cell Cycle. How cancer can be linked to overactive positive cell cycle regulators (oncogenes) or inactive negative regulators (tumor suppressors). *Khan Academy*.
<https://www.khanacademy.org/science/biology/cellular-molecular-biology/stem-cells-and-cancer/a/cancer>.
4. Decoding DNA finds breast tumor signatures that predict treatment response. (2012) AAAS *EurekAlert!* https://www.eurekalert.org/pub_releases/2012-06/wuso-ddf060612.php

Resources at the Workshop

- Mutations in Cancer. This 8:33 [CC] video provides an overview of the types of genes that, when mutated, can lead to the development of cancer.
<https://www.hhmi.org/biointeractive/mutations-cancer>

HHMI BioInteractive: Potential Classroom Activities

1. The Eukaryotic Cell Cycle and Cancer. This interactive module explores the phases, checkpoints, and protein regulators of the cell cycle. The module also shows how mutations in genes that encode cell cycle regulators can lead to the development of cancer. TEACH TIME: One to two 50-minute class periods, depending on the amount of in-class discussion and which worksheet students will be using.
 - https://www.hhmi.org/biointeractive/eukaryotic-cell-cycle-and-cancer?field_bio_biointeractive_topics=23473
2. Cancer Cell Invasion. Students explore a photo of tissues and cells as a phenomenon to explore the invasion of cancer cells into muscle tissue.
 - <https://www.hhmi.org/biointeractive/cancer-cell-invasion>
3. Cell Division and Cancer Risk. This activity guides the analysis of a published scientific figure from a study that investigated how random mutations during cell division can contribute to cancer.
 - <https://www.hhmi.org/biointeractive/cell-division-and-cancer-risk>
4. BCR-ABL: Protein Structure and Function. This tutorial describes the structure and function of the cancer-causing protein BCR-ABL. It also shows how drugs targeting this protein can help treat chronic myeloid leukemia (CML), a cancer of the white blood cells.
 - <https://www.hhmi.org/biointeractive/bcr-abl-protein-structure-and-function>

5. The Evolution of Cancer. This tutorial describes the structure and function of the cancer-causing protein BCR-ABL. It also shows how drugs targeting this protein can help treat chronic myeloid leukemia (CML), a cancer of the white blood cells.
 - https://www.hhmi.org/node/18385/devel?field_bio_format_type=25953

Additional Resources

- Cancer as a Genetic Disease. 58 min lecture video
 - <https://www.hhmi.org/biointeractive/cancer-genetic-disease>
- Chial, H. (2008) Genetic regulation of cancer. Nature Education 1(1):67. Good background, with a bit more detail and history than the Khan Academy background reading. This paper introduces 7 categories of mutations, which may cause confusion if also using the 3 HHMI mutation categories.
 - <https://www.nature.com/scitable/topicpage/genetic-regulation-of-cancer-891>
- Classifying Cancer Genes and Examining Patient Data. Short Tips from Teachers video
 - <https://www.hhmi.org/biointeractive/classifying-cancer-genes-and-examining-patient-data>
- Short Videos about various topics related to breast cancer, National Breast Cancer Foundation
 - <https://www.youtube.com/c/nbcf/videos>