



Cancer Detection

<p>Lesson Plan for Grades: High School Length of Lesson: 70 minutes With transition times, a possible warm up, and cleaning time, this would extend to 90 minutes (two 45 minutes sessions).</p>
<p>Authored by: UT Environmental Science Institute Date created: 04/22/2020</p>
<p>Subject area/course:</p> <ul style="list-style-type: none">• Biology, specifically cancer
<p>Materials:</p> <ul style="list-style-type: none">• Microscopes• Non-cancerous tissue slides*• Cancerous or malignant tissue slides*• Laptop• Projector• Handout• Markers• Paper folded into three sections <p>*Slides can be bought from science classroom supply vendors.</p>
<p>TEKS/SEs:</p> <p>§112.34. Biology <i>Process</i></p> <p>(3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:</p> <p>(A) analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student</p> <p>(C) draw inferences based on data related to promotional materials for products and services</p> <p><i>Content</i></p> <p>B.6 Science concepts. The student knows the mechanisms of genetics such as the role of nucleic acids and the principles of Mendelian and non-Mendelian genetics</p> <p>B.6(E) identify and illustrate changes in DNA and evaluate the significance of these changes</p>
<p>Lesson objective(s):</p> <ul style="list-style-type: none">• Students will be able to determine how cancerous tissue looks based through the comparison of cancerous and non-cancerous tissue cells.
<p>Differentiation strategies to meet diverse learner needs:</p> <ul style="list-style-type: none">• Teacher will give instructions in multiple formats: handouts, larger print on the board, verbally, and through model examples.• Teacher will allow students autonomy in job assignments while still ensuring all student participation.



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<ul style="list-style-type: none">The elaborate section allows students who grasp the concept to move forward and students who are struggling to continue to collaborate with their partners to discuss the idea further.
ENGAGEMENT (10 minutes) <ul style="list-style-type: none">Watch video from 2min-9min (most important part for lesson is from 6min-9min): https://youtu.be/ZrcXtByaFBM.Discuss cancer, and cancer identification by pathologists in the video.
EXPLORATION (25-35 minutes) <ul style="list-style-type: none">Go over proper lab safety gear and procedures.Students go through lab and look at healthy tissue in a microscope, describe what they see on handout.Students use a laptop to access video and web activity, answer questions on handout.Teacher sets up next slides.Students go to lab station and see examples of cancerous tissue, describe what they see on handout.
EXPLANATION (15-25 minutes) <ul style="list-style-type: none">Students are presented with slides of tissue that have cancer, no cancer, and some cancer.Students are given some time to discuss in groups their answer choices.Students defend answer choices using evidence from exploration activity.
ELABORATION (10 minutes) <ul style="list-style-type: none">Students write an informational pamphlet on how to identify cancerous tissue using information they get from the handout. This can be done individually, in pairs, or in groups.
EVALUATION (throughout entire lesson) <ul style="list-style-type: none">Teacher will conduct formative assessments during the lesson by walking around and leading discussions with each group.If there is time have students submit an exit slip with the following questions:<ul style="list-style-type: none">Is all cancer bad? Why or why not?Why is metastasis bad?What causes cancer? What does it all start with?
SOURCES AND RESOURCES <ul style="list-style-type: none"><i>Hot Science - Cool Talks #120</i> Detecting Cancer by Touch by Dr. Livia Eberlin: https://youtu.be/ZrcXtByaFBMPBS Learning Media “How Cancer Cells Grow and Divide”: https://klru.pbslearningmedia.org/resource/tdc02.sci.life.stru.oncogene/how-cancer-cells-grow-and-divide/Video: https://www.pbs.org/wgbh/nova/cancer/grow_flash.htmlNational Institute of Health (NIH)’s Flickr album on cancer research images: https://www.flickr.com/photos/nihgov/albums/72157666320520263.



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Exploration (35 minutes)

Materials:

- Microscopes
- Non-cancerous tissue
- Cancerous tissue
- Handout

Prior to starting class, it is recommended teachers should:

- Set up different microscope lab stations and assign a number, letter, or other symbol.
- Split students into groups and assign them to a lab station.
- Create a handout or PowerPoint using images of cancerous and non-cancerous cell. The National Institute of Health (NIH)'s Flickr account has images available for use: <https://www.flickr.com/photos/nihgov/albums/72157666320520263>.

During class:

Teacher will give lab procedure instructions and lab safety instructions to students along with the Lab Handout before instructing students to go into their assigned groups. Instructions include:

- Please wear goggles, gloves, lab coats and closed-toe shoes
- Long hair must be worn up (away from the face)
- Keep Benedict's solution away from eyes, and mouth. Dispose of liquid in proper areas.

Teacher can choose the amount of time spent doing each part of the lab depending on the speed of which students are finishing it.

The lab is in three different parts all three parts require note taking on the Lab Handout.

Part 1: Students look at non-cancerous tissue slides under a microscope and take notes.

Part 2: Students learn about cancer, and formation of cancerous cells and tissue.

Students will take notes on a web activity and video.

Web activity:

<https://klru.pbslearningmedia.org/resource/tdc02.sci.life.stru.oncogene/how-cancer-cells-grow-and-divide/>

Video: https://www.pbs.org/wgbh/nova/cancer/grow_flash.html

Part 3: Students look at cancerous tissue slides under a microscope and take notes.

*Note: During Part 2 teacher should switch slides from part one out.

Safety Concerns: Depending on the slides acquired, students may want to touch the sample on the slide, if the cover slip can be lifted. The sample should be considered a biohazard. The use of protective measures such as gloves and if possible, lab coats is recommended. Students also have the possibility of cutting themselves on glass because of the slides. Proper handling of slides should be demonstrated if teacher does not set up slide themselves.



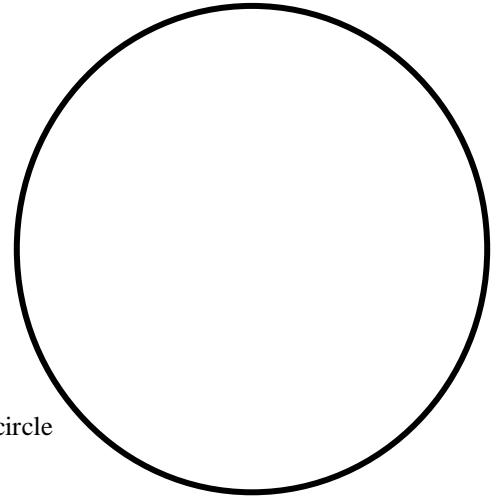
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Exploration: Lab Handout

Do you think there will be a difference between cancerous and non-cancerous tissues? How different do you think they will be if you do?

Part 1: Non-Cancerous Tissue

Observations: _____



Draw out what you see in this circle

Part 2: Web activity

What is a mutation?

What could happen after the second mutation of a previously mutated cell after replication occurs?

How do further mutations aid in cancerous cell growth?

What is angiogenesis?

Why can angiogenesis have a negative impact on the human body?



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What happens when a tumor metastasizes?

Video

What is an oncogene?

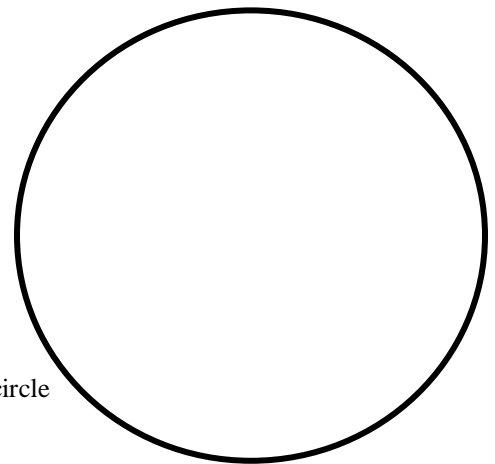
How does an oncogene work? Summarize in your own words.

How do cancer cells get into the circulatory system?

What are some ideas that cancer researchers have for stopping cancer?

Part 3: Cancerous Tissue

Observations: _____



Draw out what you see in this circle

Summary of Observations:

Here write out the differences that you saw in the slide of the two different tissues, and an answer to the first question. Is there anything that you learned that you think would apply or help in explain the differences that you saw between the slides?



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Feel free to use this space below to sketch out anything about the topic!



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Elaborate (15-25 minutes):

Materials:

- PowerPoint or handout created by teacher with cancerous and non-cancerous cells
- Laptop and projector (if using a PowerPoint)

For each image shared (in the PowerPoint or handout), teachers should provide the following instructions to the class.

You will have 2 minutes to do the following:

- Answer the question: Does each image portray cancerous tissue? How do you know?
- Provide evidence from what you learned
- One person will have to present and defend your answer.

Teacher should adjust the number of images to fit the time that remains in the lesson. The time for groups to make their argument over the picture will be dependent on time remaining in the lesson after the explore.

If students all have the same answer, choose one group to present and ask if any groups provided different evidence and use that as a platform for discussion.

Teacher should scaffold in additional information they think would aid in student understanding of cancer, cancer cells, and mutation.

- If a group disagreed start a discussion as to why, this also is a chance to build on and help in correcting possible misconceptions