

Woman Crush Wednesday: Jane Cooke Wright

Understanding Mitosis

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Grade Level	9th – 10th Grade	**Time Frame**	2-3 class period(s)
Subject	Science	**Duration**	60-120 minutes
Course	Biology		

Essential Question

What happens when there is uncontrolled cell division during mitosis? How have women in history shaped science today?

Summary

This lesson is part of the "Woman Crush Wednesday" series that looks at the ways female scientists have shaped our views of science. In this biology lesson, students will explore the many contributions of Jane Cooke Wright, with special attention on her study of the impact of uncontrolled cell division during mitosis and cancer types and treatments. This lesson extends students' understanding of mitosis through real world applications. Students should have knowledge of the process of cellular division prior to this lesson.

Snapshot

Engage

Students discuss what qualities characterize trailblazers and watch a video about the work of physician Jane Cooke Wright.

Explore

Students play a kinesthetic game of tag, which simulates cells that are controlled, uncontrolled, and undergoing treatment.

Explain

Students build vocabulary by using a TIP Chart as they learn about the uncontrolled replication of cells and the field of oncology.

Extend

Students research and create an infographic on cancer treatment options and how these options address the uncontrolled replication of cancer cells.

Evaluate

Students reflect on the impact Jane Cooke Wright's work has had on modern day cancer treatment

options.

Standards

ACT College and Career Readiness Standards - Science (6-12)

IOD403: Translate information into a table, graph, or diagram
IOD505: Analyze presented information when given new, simple information
EMI401: Determine which simple hypothesis, prediction, or conclusion is, or is not, consistent with a data presentation, model, or piece of information in text

Oklahoma Academic Standards (Biology)

B.LS1.4 : Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
B.LS1.4.1: In multicellular organisms, individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow.

Attachments

- Checklist-Infographic-Jane-Cooke-Wright-1 - Spanish.docx
- Checklist-Infographic-Jane-Cooke-Wright-1 - Spanish.pdf
- Checklist-Infographic-Jane-Cooke-Wright-1.docx
- Checklist-Infographic-Jane-Cooke-Wright-1.pdf
- Lesson-Slides-Jane-Cooke-Wright-Women-Crush-Wednesday.pptx
- Tip-Chart-Jane-Cooke-Wright - Spanish.docx
- Tip-Chart-Jane-Cooke-Wright - Spanish.pdf
- Tip-Chart-Jane-Cooke-Wright.docx
- Tip-Chart-Jane-Cooke-Wright.pdf

Materials

- Lesson Slides
- Student devices with internet access
- *Women in Science: 50 Fearless Pioneers Who Changed the World* Book by Rachel Ignotofsky, p. 76-77 (Optional)
- Student Infographic Checklist (attached, one per group or share digitally)
- TIP Chart handout (attached, one per student)

Engage

Introduce the lesson using the attached **Lesson Slides.** Display **slides 3–4** to share the essential questions and lesson objectives as needed.

Display **slide 5.** Ask the class "What is a trailblazer? Can you think of any trailblazers? What makes those people trailblazers?" Generate a class list of the qualities that characterize a trailblazer. Write answers/lists on the board to refer back to later, if needed.

Move to **slide 6.** If you have a copy of **Women in Science: 50 Fearless Pioneers Who Changed the World** by Rachel Ignotofsky, read the Jane Cooke Wright excerpt aloud to students.

Watch the video of real life trailblazer Jane Cooke Wright, which describes her immense contributions to science.

Embedded video

https://youtube.com/watch?v=6hHiWeki9GE

Show **Slide 7**, which lists the highlights of Jane Cooke Wright's contributions. Briefly review them with students. Ask students "Now that you've identified traits of trailblazers, would you consider Jane Cooke Wright a trailblazer? Why or why not?"

Sample Student Responses

She was a woman working in science when it was mostly men at the time. She was young. She was a minority.

Teacher's Note

The link below will take you to an additional short article about her work if you would like students to have more information:

Celebrating Black History Month--Jane Cooke Wright

Explore

Teacher's Note

The following kinesthetic learning activity should be held outdoors or in a gym to allow students to move freely as they play a tagging game. Decide how you want to recognize students as "Treatment" in Round 2 of the game. This could be armbands, a sign, tag, or sticker. It just has to be something that is easily visible to other students. It is important to set boundary lines. Stop each round when you see fit.

Display **slide 8.** Go over the rules of the game before moving outside or to your open space:

1. To better understand the effects of the uncontrolled division of cancer cells, take students to an open space to engage in the following tagging game that simulates cell division.
2. Start Round One like a normal tagging game with one tagger.
3. Explain that this tagger is an abnormal cell that is replicating out of control. Every time a new person is tagged they become a replicating cell and can start tagging too.
4. *Set a time limit based on your class size*.
5. Play Round One of the game once or twice.
6. Discuss what they noticed and felt as taggers or "cells" that began to replicate.

Sample Student Responses

The more taggers there were (the more cell replication got out of control) the harder it was to stay away. Things got out of control quickly.

Describe instructions for Round Two:

1. Designate 3-5 students, depending on the size of your class, as "Treatment."
2. Assign "Treatment" taggers to tag the taggers (the cells replicating out of control).
3. Let students know that "Treatment" taggers cannot be tagged themselves.
4. Before Round Two begins, announce that, when a "Treatment" tagger tags one of the "out of control cells," that person has to freeze and can no longer tag others.

Have students play Round Two once or twice. When you think it is time to end the game, ask the students the following questions:

1. What did you notice about each of the two rounds?
2. Were the "Treatment" taggers able to able to stop all of the "out of control cells?"
3. Were some "out of control cells" able to evade treatment?
4. How did the students being chased by the taggers feel knowing that the "Treatment" students could stop the "replicating cell" students?

Sample Student Responses

It was frustrating that some of the "out of control cells" were so hard to catch. It felt better knowing that there were people there to protect from the taggers.

Display **slide 9.** Ask students to use the prompts on the slide to discuss what happened in both rounds of tag. Encourage them to see the connection between the tagging game and what happens when cancer cells begin to replicate. Ask them to connect treatment group (in the game) with the technology Jane Cooke Wright worked on to attack rapidly growing cells.

Explain

Display **slide 10.** Explain the TIP chart strategy. Pass out copies of the **Tip Chart handout** or have students write on their own paper using the example on the slide.

Display **slide 11.** Show The Amoeba Sisters' video "The Cell Cycle (and Cancer)". You only need to show the first 3:30 of the video, but feel free to show more if students are interested and time allows.

Embedded video
https://youtube.com/watch?v=QVCjdNxJreE

As students watch, have them complete the I (information) column. You may choose to pause the video after each term and allow students to fill in the column.

Cell cycle: 0:55

Cell division: 1:19

Mitosis: 1:36

Cancer: 1:59

Tumor: 3:01

Radiation/chemotherapy: 3:12

Allow students time to complete the P (picture) column. You may want to use the TIP Chart as the students' Exit Ticket.

Teacher's Note

Another video that is optional: Animated Intro to Cancer Biology (show till 5:28). This video can serve as a refresher about the nucleus, organelles, chromosomes, DNA, genes, nucleotides and mutations and is a bit more technical.

Embedded video
https://youtube.com/watch?v=46Xh7OFkkCE

Extend

Assign students to create their own infographic. Have them review their own research to gather information to incorporate into their infographic.

Display **slide 12.** Put students in groups of 3-4. Assign groups to select one of the eight forms of cancer treatment listed on the slide. If you allow groups to pick, make sure that all of the treatment forms are covered.

Invite students to use their own devices to link to the cancer.gov site using the QR code on the slide. Encourage groups to explore additional resources. This site provides information about how treatments address replicating cells and should be required as a source for all groups.

Hand out the Infographic Checklist and explain to groups the expectations for content and layout of their original infographic. Give students time to create their infographic.

Teacher's Note

Students can use Canva or Piktochart to make a digital infographic or you could have them create them on poster board/paper.

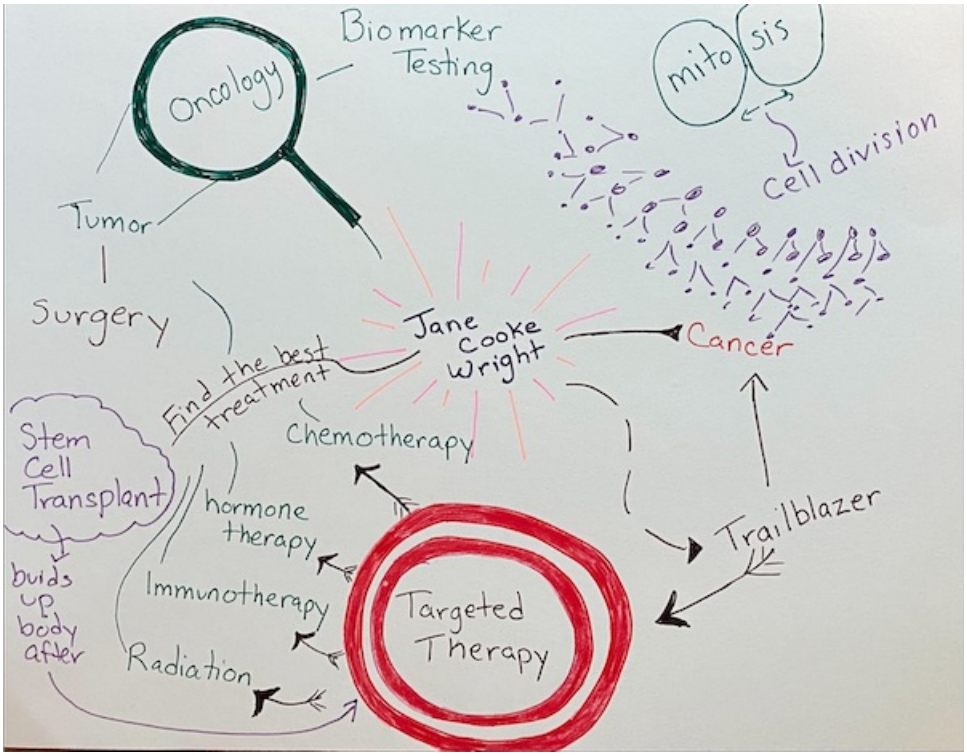
Evaluate

Display infographics in the classroom or school hallway.

Show **slide 13.** Have students take a Gallery Walk of their classmates' infographics.

Once they have viewed all of the infographics, let them know that their next task is to create a Mind Map. Have students create their Mind Map on a sheet of paper. Instruct them to use Jane Cooke Wright as the main idea in the center of the map.

Have them include **ten** of the following words as the surrounding ideas: biomarker testing, cancer, cell division, chemotherapy, hormone therapy, immunotherapy, mitosis, oncology, radiation, stem cell transplant, surgery, targeted therapy, tumor, trailblazer.



Teacher's Note

If students need a refresher about Jane Cooke Wright, have them revisit **slide 7.** You may want to use their mind maps as an assessment to check for and address any student misconceptions or knowledge gaps.

Resources

- Amoeba Sisters. (2018, Mar 20). *The cell cycle (and cancer).* [Video]. YouTube. https://www.youtube.com/watch?v=QVCjdNxJreE
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