

## When Cells Misbehave: Cancer Research with AI

Grade Level: **9-12** | Duration: **70 minutes** | Subject Area: **Biology**

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This lesson was designed for the WeTeach\_AI **Advancing AI Literacy Project**. The project supports the development of standards-aligned AI literacy lessons written by teachers for teachers. Additional lesson plan material, such as rubrics, answer keys, activity guides, and instructional considerations can be [found here](#) on our website.

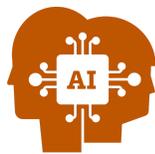
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**Lesson Author:** Dr. Vashunda Warren, STEM Teacher and High School Principal

*“Based in North East Texas, I am a STEM educator and leader with nearly 30 years of experience from early childhood to higher education. Passionate about equity and innovation, I design hands-on learning experiences that integrate emerging technologies and make STEM approachable for all. This AI literacy lesson was created to empower students and educators to confidently navigate and apply new technologies to expand access and opportunity in STEM.”*

### Lesson Description

In this lesson, students will explore how normal cell differentiation keeps tissues healthy and what happens when this process goes wrong, leading to cancer. Through case studies and AI-generated summaries, they’ll analyze how artificial intelligence supports cancer research and treatment strategies. The class will also debate ethical implications of using AI in medicine, weighing benefits against potential risks. This lesson connects biology concepts to real-world applications, encouraging critical thinking about science and technology.



## Lesson Objectives

(formatted as “Students will be able to...” statements)

- Differentiate normal cell differentiation (specialization) from dysregulated cell cycles that can culminate in cancer, using case evidence.
- Analyze AI-generated case summaries about oncology to identify oversimplifications, uncertainty, and missing context; propose corrections.
- Appraise ethical, equity, and access considerations of AI in cancer screening/treatment and argue a position supported by evidence.
- Synthesize biological and ethical insights into a short, evidence-based brief or discussion claim.

## Essential Questions

1. *Why does cellular specialization matter for multicellular organisms, and how can breakdowns in regulation lead to cancer?*
2. *Who benefits—and who might be left out—when AI informs healthcare decisions, and how should we respond?*

## TEKS Alignment (Texas Standards Alignment)

### §112.42 Biology

- **(c)(6)(B):** Explain the process of cell specialization through cell differentiation, including the role of environmental factors.
- **(c)(6)(C):** Relate disruptions of the cell cycle to how they lead to the development of diseases such as cancer.

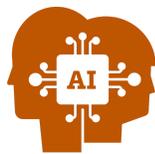
## CSTA/ISTE Alignment (National Standards Alignment)

### CSTA

**2-IC-21:** Discuss issues of bias and accessibility in the design of existing technologies.

### ISTE

**2.6.a:** Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.



## Effective Pedagogical Strategies

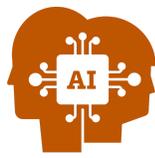
Curriculum provides guidance for instructors to create a classroom environment that nurtures emotional safety, encourages resiliency in the face of mistakes, and fosters a sense of belonging for all students.	Activities that prioritize student questioning and discussion prompts with an emphasis on questions that promote higher order thinking skills (e.g., apply, analyze, evaluate) are selected.
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## AI Literacy Competencies

*(based on TeachAI Framework)*

<b>Engaging with AI 7:</b> Connect AI's social and ethical impacts to technical capabilities.	<b>Designing with AI 5:</b> Describe an AI model's purpose, intended users, and limitations.
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Key Terms	
Term	Definition
<b>Cell Differentiation</b>	The process by which unspecialized cells become specialized in structure and function, influenced by genes and environment.
<b>Cancer</b>	A disease of uncontrolled cell division caused by disruptions in normal cell-cycle regulation.
<b>Metastasis</b>	Spread of cancer cells to other parts of the body.
<b>Oncogene</b>	Gene that can trigger cancer when mutated or overactive.
<b>Tumor Suppressor Gene</b>	Gene that normally prevents uncontrolled cell growth.



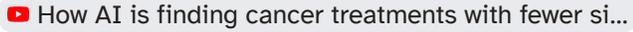
## Launch

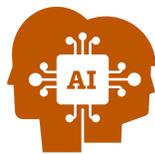
Engaging activity or prompt to introduce the lesson. **Estimated time: 15 minutes**

**Objective:** Activate prior knowledge and connect biology to real-world AI applications.

### Materials:

- Projector or screen for displaying video
- Quick poll tool (Mentimeter, Google Forms, or hand-raise)

Teacher Instructions	Sample Teacher Remarks
<p>Play this video clip showing AI assisting in cancer detection:</p> <p></p> <p>Pose the prompt: <i>“What happens when cells stop following the rules of the cell cycle? How might AI help doctors detect or treat cancer?”</i></p> <p>Conduct a quick poll: <i>“Would you trust AI to help diagnose cancer? Why or why not?”</i></p> <hr/> <p><b>Anticipated Student Outcomes</b></p> <ul style="list-style-type: none"><li>- Students connect cell cycle concepts to cancer biology.</li><li>- Students begin considering the ethical and practical implications of AI in healthcare.</li></ul>	<p><i>“Today, let’s start with a quick video showing how AI is being used in cancer detection.”</i></p> <p><b>(Pause to play the video)</b></p> <p><i>“Think back to what we know about the cell cycle. What happens when cells stop following the rules? That’s right—cancer can develop. Now, here’s the big question: How might AI help doctors detect or treat cancer?”</i></p> <p><b>(Pause for a few student responses.)</b></p> <p><i>“Would you trust AI to help diagnose cancer? Why or why not? Take a moment to share your opinion in our quick poll.”</i></p> <p><b>(Use Mentimeter, Google Forms, or hand-raise.)</b></p> <p><i>“Great insights! Today, we’re going to dig deeper into how AI supports cancer research. You’ll evaluate its benefits and risks by comparing AI-generated explanations with trusted sources. By the end, you’ll be able to explain what AI gets right, what it misses, and why evidence matters.”</i></p>



## Exploration

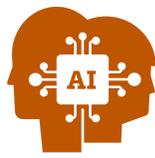
Step-by-step student tasks, experiments, or investigations. **Estimated time: 25 minutes**

**Objective:** Investigate cancer biology and AI’s role in oncology.

**Materials:**

- AI-generated case summaries about cancer research (provided or generated live)
- Comparison chart template (provided in this lesson’s resources)
- Textbook or vetted sources

Teacher Instructions	Sample Teacher Remarks
<p>Provide students with the following case studies. Task students to watch a video or read an article:</p> <ul style="list-style-type: none"> <li>- <a href="#">Bay Area startup uses AI to speed up ca...</a></li> <li>- <a href="#">How AI is finding cancer treatments with...</a></li> <li>- <a href="#">Applications of Artificial Intelligence in Cancer</a></li> <li>- <a href="#">Novel research and future prospects of artificial intelligence in cancer diagnosis and treatment</a></li> </ul> <p>Either distribute AI-generated summaries (generated in advance), or ask students to generate summaries live using an approved AI tool. Using comparison charts, students read the summaries and compare them with the original content.</p> <p>Task students to annotate AI text with corrections and evidence.</p> <p>Groups create a chart:</p> <ul style="list-style-type: none"> <li>- “AI got this right”</li> <li>- “AI missed this”</li> <li>- “Needs clarification”</li> </ul> <p>Provide scaffolds for analysis using sentence starters:</p> <ul style="list-style-type: none"> <li>- “One claim AI made that I trust is ___ because ___.”</li> <li>- “One claim I question is ___ because ___.”</li> </ul>	<p>“Now, you’ll investigate how AI explains cancer biology. Each group will read an AI-generated case summary about cancer research and compare it to your textbook or vetted sources. Your job is to annotate the AI text with corrections and evidence. Then, create a quick chart with three columns:</p> <ul style="list-style-type: none"> <li>- ‘AI got this right’</li> <li>- ‘AI missed this’</li> <li>- ‘Needs clarification.’</li> </ul> <p>This will help us see where AI is accurate and where it falls short. If you’re unsure how to start, use these sentence starters:</p> <ul style="list-style-type: none"> <li>- ‘One claim AI made that I trust is ___ because ___.’</li> <li>- ‘One claim I question is ___ because ___.’</li> </ul> <p>Remember, your reasoning should come from evidence in the textbook or other reliable sources.”</p> <p><b>(While students work, move around and ask guiding questions.)</b></p> <p>“What evidence supports your decision to accept or reject this AI detail? If an explanation seems vague, how could the prompt be more specific? Would a scientist agree with this claim? Why or why not?”</p>



## Anticipated Student Outcomes

- Students identify accurate vs. inaccurate AI claims.
- Students practice evidence-based reasoning and prompt refinement.
- Students prepare for concept mapping and justification in the assessment phase.

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## Whole Class Discussion

Discussion questions, teacher prompts, and expected student responses. **Estimated time: 15 minutes**

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**Objective:** Synthesize findings and debate ethical implications.

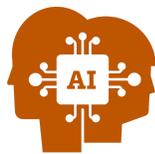
### Materials:

- Student comparison charts (designed previously in the lesson)
- Whiteboard or digital board for recording patterns

### Sample Teacher Remarks

*“Now that you’ve analyzed AI’s explanations and compared them to trusted sources, let’s bring our ideas together. Our goal is to identify patterns in AI’s accuracy and discuss the bigger question: Should we trust AI in healthcare?”*

Sample Discussion Questions	Sample Student Responses
1. What patterns did you notice in AI’s explanations of cancer?	<i>“AI was good at explaining basic cell cycle concepts but missed details about specific mutations and treatment options.”</i>
2. What are the benefits and risks of using AI in cancer screening and treatment?	<i>“Benefits include faster detection and analyzing huge datasets. Risks include misdiagnosis if the AI model is trained on biased data.”</i>
3. Who might be left out when AI informs healthcare decisions?	<i>“Patients in rural areas or minority groups might be left out if the AI wasn’t trained on diverse data.”</i>
4. How can doctors and AI work together effectively?	<i>“Doctors should use AI as a tool, not a replacement—verify AI suggestions with clinical judgment.”</i>
5. What ethical questions should we ask before using AI in medicine?	<i>“Who is responsible if AI makes a mistake? How do we protect patient privacy?”</i>



## Assessment

Formative or summative assessment tasks and criteria. **Estimated time: 15 minutes**

**Objective:** Reflect on AI performance and its role in cancer research using evidence-based reasoning.

### Materials:

- Annotated AI summaries and comparison charts (both developed earlier in the lesson)
- Exit ticket handout or digital form (Google Docs, LMS, or sticky notes)
- Optional: Devices for audio/video submissions

Assessment Opportunities	Facilitation Tips
<p><b>Option A: Evidence-Based Brief</b> Students write a short position statement:</p> <ul style="list-style-type: none"><li>- “Should AI play a major role in cancer research? Support your claim with biological and ethical evidence.”</li></ul> <p><b>Option B: Concept Map</b> Show normal vs. dysregulated cell cycle and note where AI explanations were accurate or flawed.</p> <p>Providing the following submission options is recommended:</p> <ul style="list-style-type: none"><li>- Written paragraphs (Google Docs, LMS, or sticky notes).</li><li>- Audio or video response for students who prefer verbal expression.</li></ul> <p>If assigning outside of class, post clear submission guidelines. For example, responses should include at least one vocabulary term from today (e.g. cell cycle, mutation, or bias).</p> <p><input checked="" type="checkbox"/> Use the rubric provided in this lesson’s resources to assess student submissions.</p>	<p>Remind students their responses should explain their position and support it with evidence from today’s activity. Model response examples for students:</p> <ul style="list-style-type: none"><li>- Position: AI should play a major role because it can detect patterns humans miss, but it needs oversight to avoid bias.</li><li>- Evidence: In our case study, AI correctly identified abnormal cell growth but oversimplified treatment options.</li></ul> <p>Offer sentence starters for students who need scaffolds:</p> <ul style="list-style-type: none"><li>- “One strength of AI in cancer research is ___ because ___.”</li><li>- “One risk or limitation is ___ because ___.”</li><li>- “Based on today’s evidence, I believe AI should/should not ___.”</li></ul> <p>Circulate and ask probing questions:</p> <ul style="list-style-type: none"><li>- “Why does this strength or limitation matter?”</li><li>- “How does your evidence support your claim?”</li></ul> <p>Skim for misconceptions (e.g., assuming AI replaces doctors entirely) and note for future review.</p>