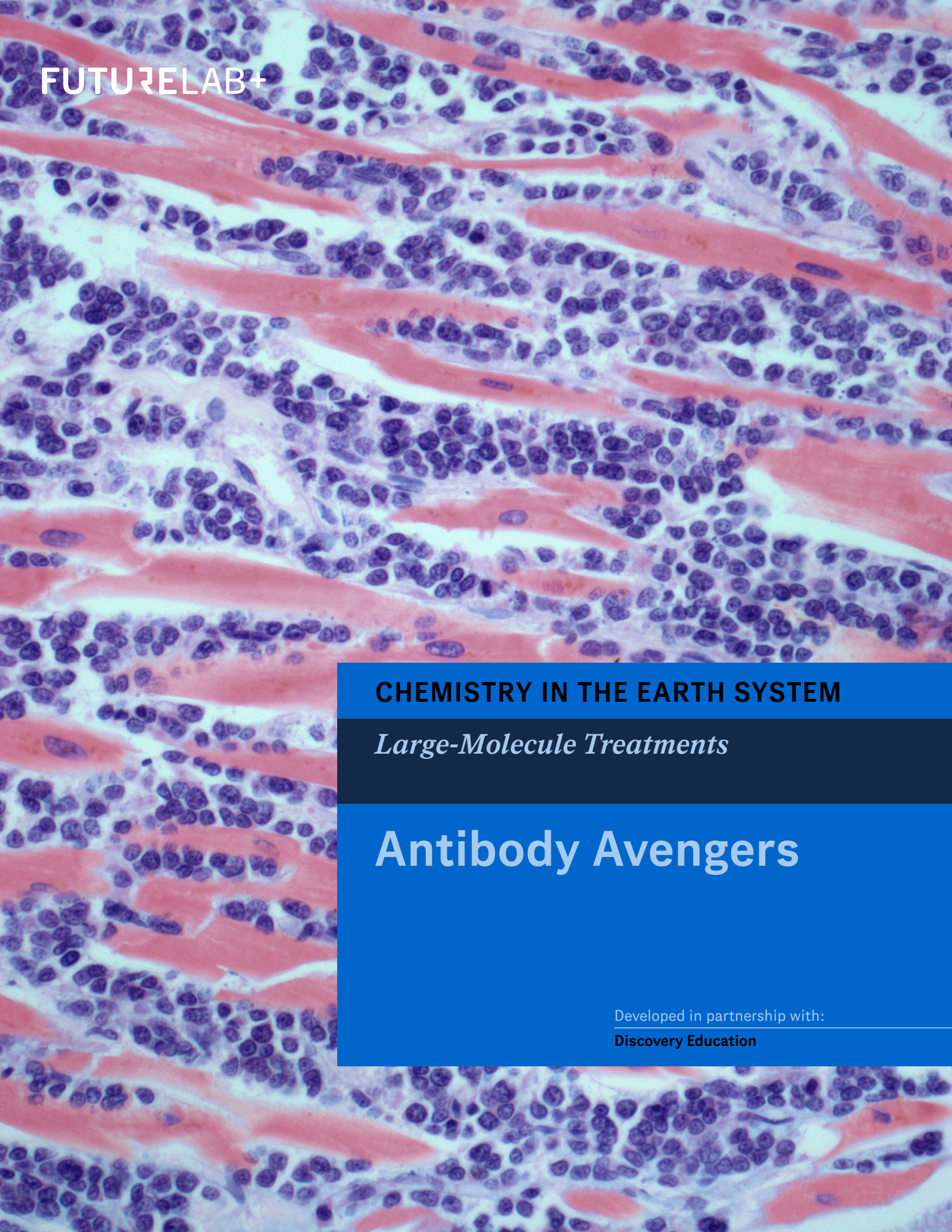

FUTURELAB+

CHEMISTRY IN THE EARTH SYSTEM

Large-Molecule Treatments

Antibody Avengers

Developed in partnership with:

Discovery Education

In this Lesson Plan:

Print the **Teacher Section** →

Print the **Student Section** →

This document is separated into two sections, For Teachers [T] *and* Student Resources [S]*, which can be printed independently.*

Select the appropriate printer icon above to print either section in its entirety.

Follow the tips below in the Range field of your Print panel to print single pages or page ranges:

Single Pages (use a comma): T3, T6

Page Range (use a hyphen): T3–T6

Cover Image
A light micrograph of a section through cardiac muscle showing heart cancer.

CHEMISTRY IN THE EARTH SYSTEM / IMMUNOTHERAPY

Antibody Avengers

ACTIVITY DURATION

Three days (45-minute sessions)

DRIVING QUESTION

Can we treat life-threatening diseases with a patient's own immune system?

ESSENTIAL QUESTIONS

What is immunotherapy?

How does the immune system work and how do cancer cells evade it?

Why are monoclonal antibodies such a promising medical breakthrough in the treatment of diseases such as cancer?

OVERVIEW

In this lesson bundle, students discover how immunotherapy can transform a patient's own immune system into a secret weapon against cancer. The lesson kicks off with an overview of how immune cells work together to detect and destroy foreign invaders. After this overview, students research and create an infographic of the immune system using specific terminology. The lesson then proceeds into a deep-dive exploration of PD-L1 receptor proteins; molecules that attach to cancer cells and shield them from the immune system. After learning about PD-L1, students perform a role-play demonstration of how the PD-L1 pathway inhibits T cells and allows cancer cells to evade the immune system. Students then return to the infographic they made and brainstorm how the different components of the immune system could better detect and stop cells disguised with PD-L1. They create a 2D model of their mechanism of action and share their design with their peers and instructor for feedback. Once they have done this, students discover that what they have created is actually a prototype model of monoclonal antibody treatment—a therapy that doctors prescribe today. It works because cloned antibodies (called monoclonal antibodies) block PD-L1 from binding to immune cell receptors.

Continues next page >

OBJECTIVES

Students will be able to:

Explain how cancer cells can hide from a person's immune system.

Create models of proposed mechanisms that could help the immune system better detect and destroy cancer cells.

Research the field of immunotherapy and how monoclonal antibodies work in cancer treatment.

Discover how monoclonal antibodies may be used to fight other infectious pathogens, such as coronavirus.

OVERVIEW (CONTINUED)

This removes the disguise, and helps treatments find and destroy the cancer cells more effectively. The lesson concludes with a Stop and Jot activity that focuses on how monoclonal antibodies are developed and deployed in the treatment of genetic diseases, cancer, Covid-19, and other conditions.

STUDENT TASKS

Day 1	*Day 2*	*Day 3*
Discover the key players in the human immune system, and identify the role each type of cell plays in eliminating invaders. Demonstrate how the human immune response works through the creation of a timeline infographic.	Use role-play to model how cellular receptors on cancer cells trick the immune system. Complete a KWL sheet to survey prior knowledge, ask questions, and define learning on the topic of cancer cells. Research the PD-L1 pathway and how it allows cancer cells to evade the immune system.	Create and modify a 2D model that will show how the PD-L1 pathway benefits cancer cells, and how it can be disrupted through immunotherapy. Define their thoughts and feelings on the use of monoclonal antibodies as a treatment for various types of diseases.

MAKE CONNECTIONS!

How does this connect to careers?

Oncologists provide medical care for a person diagnosed with cancer. They recommend the best plan of action for treatment that is specific to the patient and their type of cancer.

Genetic engineers use a variety of molecular tools and technologies to rearrange fragments of DNA. The overall goal in doing so is to add or remove an organism's genetic makeup for the better, or to transfer DNA code from one species into another.

Marketing Specialists translate complicated scientific processes into terms that patients can understand. They work to educate patients and practitioners on new therapies that scientists are creating every day.

Immunologists study the immune system—the built-in defenses our bodies have that help us ward off disease. They examine how the immune system functions when it is healthy, but they also explore immunodeficiencies and autoimmune diseases, like allergies, lupus, and Type 1 Diabetes.

Intellectual Property Lawyers help their clients create and uphold patents for new inventions, such as medical therapies. Patenting and trademarking are essential steps that treatments must undergo before they can be used on patients.

How does this connect to our world?

During the Covid-19 pandemic, scientists were puzzled by a question: why did some people who contracted the disease never experience symptoms, while others got seriously sick? While pre-existing conditions and risk factors explained some of the difference, they didn't explain all of it. It turns out that everyone's immune system works in a slightly different way, and there is still so much more to learn about how this complex body system works. The more we understand about the components of immune function, the better we're able to preserve health and fight disease.

One of the most hopeful frontiers of immunology research has to do with cancer—a common and devastating disease. Promising therapies like monoclonal antibody treatments are providing new ways to stop cancer cells in their tracks.

Pedagogical Framing

Instructional materials are designed to meet national education and industry standards to focus on in-demand skills needed across the full product development life cycle—from molecule to medicine—which will also expose students and educators to the breadth of education and career pathways across biotechnology.

Through this collection, educators are equipped with strategies to engage students from diverse racial, ethnic, and cultural groups, providing them with quality, equitable, and liberating educational experiences that validate and affirm student identity.

Units are designed to be problem-based and focus on workforce skill development to empower students with the knowledge and tools to be the change in reducing health disparities in communities.

SOCIAL-EMOTIONAL LEARNING

Students practice social awareness and management skills to successfully understand what others are feeling, while appreciating and interacting positively with their diverse groups during the lesson. Many students might have personal experience with a cancer diagnosis in their family or friend group, and they will carry that experience with them into sensitive discussions. This requires all discussion participants to demonstrate empathy and practice self-management skills as personal and sensitive health topics are discussed.

CULTURALLY AND LINGUISTICALLY RESPONSIVE INSTRUCTION

This lesson applies culturally and linguistically responsive instruction to the study of content connected to cell division, immunology, and cell-signaling pathways. Students will also explore the difficulties of understanding and stopping cancer cells from replicating. This requires excellent research problem-solving and modeling skills. The lesson offers opportunities for the growth of critical consciousness of self and community, while encouraging students to bridge the learning to real-world modeling of what bioengineers do to create new and innovative medical treatments.

COMPUTATIONAL THINKING PRACTICES

In this lesson, students put four computational thinking strategies into practice: collecting data, building models, decomposition, and finding patterns. Students gain experience with the computational thinking strategy of collecting data by researching the immune system. As they build a 2D model of the immune system, they explore how the computational thinking strategy of building models allows for testing and tweaking to take place in real time. The computational thinking strategy of decomposition helps students break the immune system down into component parts and zero in on the jobs that specific cells (like T cells) are doing to fight disease. Finally, students use the computational thinking strategy of finding patterns to understand how monoclonal antibodies work to treat diseases.

ADVANCING INCLUSIVE RESEARCH

Immunology is the study of the immune system; one of the most complicated systems in the body. The more that scientists learn about the immune system, the more they understand that each person's immune system is different and affected by environmental and genetic factors. In order to create immunotherapies that work for as many people as possible, it's crucial that clinical trials of potential immunotherapies consist of diverse groups.

CONNECTION TO THE PRODUCT LIFE CYCLE

The production of many of the medicines and treatments used in immunotherapy are being developed to help people with difficult-to-treat diseases live longer and more fulfilling lives. These therapies, such as monoclonal antibodies, and the careers associated with their development, testing, and bringing them to market, are located in the **development** phase of the product life cycle.

Day 1

Slides 1–8

INDUSTRY AND CAREER CONNECTION

As students examine the immune system, they are studying the work that immunologists have done. Our current understanding of the immune system is based on the extensive research done by these scientists.

Slides 1–8

Students will be introduced to a secret topic and take notes to uncover what they will be learning. (12 minutes)

1 To begin this lesson, ask students to form groups of three or four. Tell students that their job is to work together to figure out what topic this lesson will begin with. Each group should choose one member to be the scribe for the group.

2 Using the strategy called *The Envelope Please*, provide each group with a sealed envelope that has three-to-five detailed clues written on the outside and the link to an introductory video on the inside.

Teacher Note > *Clues on the outside of each envelope should include:*

- **a.** This army's mission is to find and destroy invaders
- **b.** Chemical communication is the key to success
- **c.** Pieces fit together like a puzzle
- **d.** Remember your enemies
- **e.** It has saved your life!

Inside the envelope should be a piece of paper with only the QR code and link to the video: *How does your immune system work?*

3 Students should read and discuss the clues in their groups and make predictions while the scribe writes the predictions down on a sticky note.

4 After giving groups two-to-three minutes for discussion and making predictions, the instructor should announce "The Envelope, Please!" This is the cue that the students can open their envelopes and discover where they are to go to confirm their predictions.

5 Give each student a copy of the *Introductory Topic Notes Capture Sheet* as they open their envelopes.

6 The students should watch the video segment introducing the immune system; the secret topic. As they watch, they should complete their *Introductory Topic Notes Capture Sheet*.

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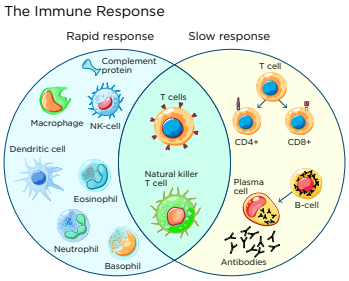
Day 1

Continued



COMPUTATIONAL THINKING IN ACTION

As students work through the interactive resources, they are using the computational thinking strategy of collecting data. This skill will help students find the information they need to develop their infographic model of the immune system in the next step of the lesson. By developing the infographic, students are gaining experience with the computational thinking strategy of building models.

Slides 9–11

7	Once all groups are finished, ask each group to reflect on and discuss the accuracy of their predictions using *My Turn, Your Turn*. If they guessed correctly, which clues lead them to the topic?
8	Next, students share the answers on their *Introductory Topic Notes Capture Sheet* with their whole group. Allow students to make additions or changes to their notes as they listen and discuss.

Slides 9–11

Students will develop a timeline infographic that explains how the human immune response works. (25 minutes)

1	Tell students that for the next part of the lesson, they will use their *Introductory Topic Notes Capture Sheet* about the immune system to make an infographic that explains the steps of the immune response and how it fights against one of the major diseases impacting people: cancer. They should be sure to include the major parts of an infographic—information, data, and graphics—in their work.
2	Give students the link to the *T Cells Attack* game and the *Cancer-Immunity Cycle* interactive to use as resources along with their notes to help them create their infographic. Students can play the game and click through the interactive to add to their knowledge of the immune cycle as it relates to cancer. Students should use the TIMELINE template on *Canva* for this project as the immune response should be written in an order of steps.
3	Each group should work together to create their infographic. *Canva* allows students to work simultaneously so all group members can edit and add to the infographic.

Teacher Note > *Groups may want to have two students serve as designers and one or two students serve as researchers. The researchers can write down or record the information from resources or notes that should be used, while the designers can add text, images, graphics, and data to the infographic given to them by the group researchers.*

4	Give students 25 minutes to work on their infographics that show a timeline of the body's immune response.

Continues next page >

Day 1

Continued

Slide 12

Slide 12	
Students share their infographics and provide feedback to their peers. (10 minutes)	
1	For the final 10 minutes of the class, ask student groups to join another group to present their infographics to each other. They should give feedback using a *Plus/Delta* strategy and make comparisons about how well their infographic conveys the immune response pathway.
2	Explain to students that in the next class, they will look at how cancer can evade the immune system and brainstorm ways that cancer cells might be stopped.

Day 2

Slides 13–21

INDUSTRY AND CAREER CONNECTION

As students learn how cancer cells replicate to form tumors, they are seeing the intersection of the professions of genetic engineering and oncology. Genetic engineers develop therapies that stop the proliferation of cancer cells. Oncologists find cancer and diagnose courses of treatment, which might include therapies developed by genetic engineers.

Slides 13–15

Students complete a KWL sheet that surveys prior knowledge, asks questions, and defines learning on the topic of cancer cells. (6 minutes)

1 Tell students that for the next part of this lesson, they will be looking at how cancer cells can hide from or "trick" the immune system. Give students a copy of the *Cancer Cell KWL Capture Sheet*. Give students two-to-three minutes to complete the "K" section of the sheet where they will write down anything they already know about cancer cells. Use a *Stand and Share* protocol to ask students to share some of the things they wrote down with the whole group to check for previous knowledge.

2 After sharing, give students another two-to-three minutes to do a *Turn and Talk* to discuss and write down any questions they have about cancer cells with their elbow partner (a person sitting to their right or left). Challenge students to come up with at least three questions about cancer cells that they want to know the answer to and add them to the "W" section of their *Cancer Cell KWL Capture Sheet*. The instructor should allow students to share their questions and create a list on the front board or overhead screen.

3 Turn students' attention to the images on the slideshow that show that cancer cells and tumors form from mutations that disrupt cell division. Explain to students that when regulatory proteins fail to halt the cell cycle and destroy the cell when there are errors, this cell can continue to divide over and over when cells are not needed, with each new cell containing the same errors. A mass of these unnecessary cells forms a tumor, which can eventually disrupt the function of organs and other important body processes.

Slides 16–21

Students research the PD-L1 pathway and how it allows cancer cells to evade the immune system. (39 minutes)

Teacher Note > *Prepare Three Truths and One Lie statements in advance, and have them available to show to students on the main board or overhead projector for the next activity.*

1 Tell students that next they will be watching a short video (*Cancer Immunotherapy: The PD-L1 Pathway*) that shows one way that scientists have discovered that cancer cells use to "hide" from immune cells that are out to destroy them. Use *Three Truths and One Lie* to introduce the video by asking students to predict which statement they think is the

Continues next page >

Day 2

Continued

Slides 16–21

CULTURALLY AND LINGUISTICALLY RESPONSIVE INSTRUCTION

Role-playing scenarios allow culturally diverse learners to express learned ideas in a safe group setting and provides scaffolding to codeswitch from their personal language to academic English.

COMPUTATIONAL THINKING IN ACTION

Here, students use the computational thinking strategy of decomposition to break down the immune system into "players," or component parts. Then, they examine the function of T cells in order to understand how they interact with the PD-L1 protein.

lie. While you pause and play the video as needed, students pay close attention and take any notes on the back of their KWL sheet that will help them understand which statement you provided is the lie, and what is going on between the cancer (tumor) cell and the immune cell (T cell) in the video.

2 Next, ask students to form groups of four or five. Tell students that for their next task, they should review the video on their student devices and create a short role-play scenario that explains what happens in the PD-L1 pathway with tumor cells that allows them to evade death (apoptosis) from T cells.

3 Ask students to be sure that they account for the following "players" in their role-play scenario: a tumor cell, a T cell, PD-L1 protein, B7.1 receptor protein, and PD-1 receptor protein. Encourage students to use analogies in their role-play that would allow the audience to easily understand what is happening without specific knowledge of protein receptors on cells, etc.

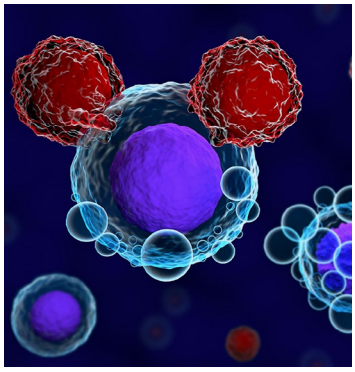
4 Give student groups 15 minutes to discuss and create their role-play scenario. For the final five minutes of this time, students should practice acting out their role-play to prepare for their presentation for the class.

5 Give each group the chance to perform the role-play they created for the class that shows the PD-L1 pathway and the relationship to tumor and immune cells. After each group acts out their scenario, the other students can give feedback using the *AEIOU* (A-Adjective, E-Emotion, I-Interesting, O-Oh! Surprising, U-Um? Question) strategy on sticky notes to the role-play group, and then ask questions.

6 To conclude the activity, students should refer back to their *Cancer Cell KWL Capture Sheet* and complete the "L" column to show what they have learned about cancer cells and how they evade the immune system. Refer back to the original student-generated list of questions on the front board or overhead screen, and allow students to share what they learned and which questions were answered with the whole group, if time allows.

Teacher Note > *Unfamiliar with how to use Flipgrid in the classroom? It is recommended to view the video Flip Tutorial for Teachers.*

7 As an exit ticket, ask students to pair up and *Brainstorm* ideas for how the PD-L1 pathway could be disrupted to stop cancer cells from hiding from T cells. Ask student pairs to go to a link you've provided to the video platform *Flip*. Students should record a short explanation that answers the topic question "How could cancer cells be stopped from using the PD-L1 pathway as a way to hide from the immune system?" and upload it to the post before class ends.



An illustration of T cells attacking cancer cells.

Day 3

Slides 22–27

INDUSTRY AND CAREER CONNECTION

As students brainstorm ways to disrupt the PD-L1 protein, they are simulating the work of immunologists. When immunologists and genetic engineers develop new therapies for treating diseases, they must patent and trademark their ideas before they go to market. Intellectual property lawyers counsel these professionals on how to navigate the complicated process of obtaining patents for their creations.

Slides 22–24

Students view and respond to the video explanations about how to stop cancer cells from using the PD-L1 pathway. (8 minutes)

1 To begin the class, ask students to go to *Flip* to view the videos they recorded as exit tickets in the previous class period.

2 Ask students to take two-to-three minutes to view and comment on the ideas in the videos that the class came up with to answer the question, "How could cancer cells be stopped from using the PD-L1 pathway as a way to hide from the immune system?" When the time is up, ask students to share their favorite ideas with the class using a *Snowball Fight*.

3 Reveal to students that, by coming up with ways to disrupt the PD-L1 pathway in cancer patients' cells, they are modeling what scientists are doing in the field of immunotherapy.

4 To introduce immunotherapy to students and see how immunotherapy is working on this problem, show the video *PD-L1/PD-1 Pathway: A Security Checkpoint* on the overhead screen. Ask students to create *Table Top Texting* responses from the video to share with their neighbor.

Slides 25–27

Students learn that, by coming up with ways to disrupt the PD-L1 pathway in cancer patients' cells, they are modeling what scientists are doing in the field of immunotherapy. (16 minutes)

1 Tell students that, for the next part of the lesson, they will be creating two-dimensional models that can show how the PD-L1 pathway works to hide cancer cells from T cells, and then make a modification to show how PD-L1 could be disrupted to allow the T cell to identify and destroy the tumor cell.

2 Ask students to form groups of three and explain to students that their model should include the following: a tumor cell, a T cell, PD-L1 proteins, and the BD.7 and PD-1 receptors. Each part should be labeled.

Teacher Note > *Direct students' attention to the materials they have available to create their models, such as various types and colors of paper and cardboard, scissors, glue, markers, etc.*

3 Give student groups 15 minutes to make the pieces for their model. They should also practice using their model to show how the PD-L1 pathway works to hide cancer cells and how it could be disrupted.

Continues next page >

Day 3

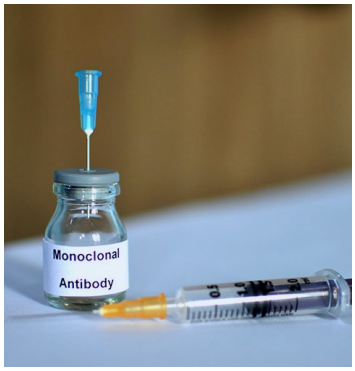
Continued

Slides 25–30

An illustration of monoclonal antibodies.

INDUSTRY AND CAREER CONNECTIONS

Marketing specialists work with artists, designers, and writers to develop marketing campaigns for treatments. These campaigns help explain how a treatment works to patients and doctors so that they can decide whether or not it could help in treatment.



4	As students are creating their models, the instructor should circulate to monitor student progress. As groups finish creating their pieces, each group should demonstrate the action of their model for the teacher.
5	After reviewing all of the models, reveal to students that what they have created is a prototype model of how a monoclonal antibody therapy called Tecentriq works to treat certain types of lung cancer. Remind students that earlier they learned that antibodies are proteins that bind to antigen receptors on a cell. Monoclonal antibodies are proteins given to patients that are created and cloned in a lab by scientists to bind to specific receptors as a way to treat disease.
6	Play the animation of *Tecentriq's mechanism of action* for students and ask them to compare their models to the animation. Once the animation is complete, ask students to make any modifications to the models to accurately represent how a monoclonal antibody treatment works. If they did not create antibodies to block PD-L1 initially, they should add those pieces to their model.

Slides 28–30

Students use a strategy to further analyze antibody treatments. (21 minutes)

1	For the final part of the lesson, students will participate in a Stop And Jot activity as they learn about various current and future applications of monoclonal antibody treatments. Give each student a copy of the *Monoclonal Antibodies Stop and Jot Capture Sheet*. Play the following video clips for students: **Video 1**: *Monoclonal antibodies in medicine* **Video 2**: *How Monoclonal Antibodies Treat Cancer* **Video 3**: *Team Clotting episode 3: future treatments for haemophilia A* **Video 4**: *Monoclonal Antibody Therapy for COVID-19: What Is It and How Does It Work?*
2	After each clip, students should read the question on the *Monoclonal Antibodies Stop and Jot Capture Sheet* and write down their ideas and thoughts in the box.
3	When the Stop and Jot activity is complete, ask students to form small groups to discuss their "jots" (the ideas and thoughts they wrote in the boxes) about the applications of monoclonal antibodies in medicine and patient treatment. Ask them to answer the question: *How can monoclonal antibodies help patients faced with disease in ways that are different from traditional medicine?*

National Standards

Next Generation Science Standards

Science Engineering Practices (SEP)

Practice 2
Developing and Using Models

Develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations.

Practice 6
Constructing explanations and designing solutions.

Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.

Disciplinary Core Ideas (DCI)

LS1.A
Structure and Function

Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.

LS3.B
Variation of Traits

Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.

Crosscutting Concepts (CC)

Structure and Function

Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

Systems and System Models

When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.

Educator Resources

The Envelope Please

Directions

Students use prior knowledge and clues in order to make predictions about a topic of study. Discussion and reflection solidify understanding and allows students to make connections between what they know and what they learn from the provided source.

Cut out the clues and secure each one to the front of an envelope (one clue per envelope). Cut out the URL/QR codes and place one inside each envelope.

Clues

Attach one to the outside of each envelope.

This army's mission is to find and destroy invaders

Chemical communication is the key to success

Pieces fit together like a puzzle

Remember your enemies

It has saved your life!

Continues next page >

Educator Resources

The Envelope Please

Continued

Source

Include one URL/QR code inside each envelope.

 *https://dlc.com/FLP-CH1-1T5a*	 *https://dlc.com/FLP-CH1-1T5a*	 *https://dlc.com/FLP-CH1-1T5a*
 *https://dlc.com/FLP-CH1-1T5a*	 *https://dlc.com/FLP-CH1-1T5a*	 *https://dlc.com/FLP-CH1-1T5a*

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Introductory Topic Notes Capture Sheet

Directions
Watch the YouTube Video segment introducing the secret topic. As you watch, complete the capture sheet.

1. Make a prediction about your secret topic.

_____

_____

2. In the rows below, describe the role of each of the "soldiers" in the human immune system.

	Soldier	Role
a	Leukocytes	
b	Phagocytes	
c	Lymphocytes	
d	T Cells	
e	B Cells	
f	Helper T Cells	

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Introductory Topic Notes Capture Sheet

Continued

3. What is the relationship between antigens and antibodies?

4. Summarize what the job of the immune system is.

5. What goes wrong when a person develops an autoimmune disease?

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Introductory Topic Notes Capture Sheet

Continued

6. Final thoughts…explain the Clues!

	Clue	How It Relates to the Immune System
a	This army's mission is to find and destroy invaders.	
b	Chemical communication is the key to success.	
c	Pieces fit together like a puzzle.	
d	Remember your enemies.	
f	We owe it our lives!	

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Cancer Cells KWL Capture Sheet

Directions

Complete the "K" section of the sheet by writing down anything you already know about cancer cells. When the teacher directs you, create at least three questions about cancer cells that you want to know the answer to and add them to the "W" section of the capture sheet. When the teacher directs you, complete the "L" column to show what you have learned about cancer cells and how they evade the immune system.

Topic: **Cancer Cells**

K	W	L
What do you already know about this topic?	What questions do you have about this topic?	What did you learn about this topic?

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Monoclonal Antibodies Stop and Jot Capture Sheet

Directions
After each clip, students should read the question on the capture sheet and write down their ideas and thoughts in the box.

	Video	Question	Stop and Jot!
1	*Monoclonal Antibodies in Medicine*	What surprised you about the history of the development and use of monoclonal antibodies in the video?	
2	*How Monoclonal Antibodies Treat Cancer*	Would you recommend using monoclonal antibodies as a treatment for cancer to someone you knew? Why or why not?	

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Monoclonal Antibodies Stop and Jot Capture Sheet

Continued

	Video	Question	Stop and Jot!
3	*Team Clotting Episode 3: Future Treatments for Haemophilia A*	Do you think monoclonal antibodies would be a better treatment for hemophilia than gene therapy? Why or why not?	
4	*Monoclonal Antibody Therapy for COVID-19: What Is It and How Does It Work?*	Based on what you know about monoclonal antibody treatment, what would you guess the mechanism of action would be for using monoclonal antibodies to work against the SARS-CoV-19 virus (coronavirus)? Sketch or write out your ideas.	