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Week 5: Pharmacology

Module 2: Drug Discovery

Lesson: Why Can't New Medicines Be Used Right Away?

Lesson Overview

Students investigate why new medicines must go through multiple stages of testing before reaching patients. They use evidence from the module to explain how scientists evaluate safety and effectiveness and make decisions that balance potential benefits and risks.

Learning Targets

Explain why new medicines must be tested before use.

Describe how drug testing moves from small to larger groups.

Use evidence to make decisions about safety and effectiveness.

Vocabulary

Testing
checking if a drug works and is safe

Safety
whether a drug causes harm

Effectiveness
whether the drug works

Risk
the chance something harmful could happen

Materials

Module
Student response sheets
Whiteboard or chart paper

Instructional Notes

This lesson follows students' learning about how medicines work in the body by focusing on how medicines move from discovery to patient use. Students develop the understanding that discovering a potentially helpful drug is only the beginning of a much longer decision-making process. Many students enter the lesson believing that if a medicine appears effective, it should immediately become available. The conceptual shift in this lesson is from focusing only on benefits to considering both benefits and risks. Students discover that scientists gather evidence over time to reduce uncertainty and protect patients. This lesson prepares students for future learning about health science decisions, scientific investigation, and the role evidence plays in balancing innovation with patient safety.



Learning Experience

8 min	Opening	Present the scenario: "A student has a life-threatening illness. Doctors have a new medicine that might help, but it has not been fully tested." Provide two choices: Use it now or Wait For Full Testing. Students choose one option independently, write one reason supporting their decision, and discuss their thinking with a partner. Reveal evidence one piece at a time: • It worked in lab tests. • It worked in animals. • In a small group of people, some had serious side effects. Students reconsider their decision after each new piece of evidence and briefly explain their thinking to a partner. Sentence Frame: "I chose _____ because _____, but now I think _____ because the evidence shows _____."
15 min	Module	Focus: Why do scientists test drugs in steps before people can use them? Guiding Questions: • Why don't scientists test drugs on large groups immediately? • What are scientists testing at each stage? • Why do some drugs fail testing? Quick Checks: • Thumbs up/down: "A drug should be tested on large groups first." • Complete: "Scientists test drugs in steps because _____." Sentence Frame: "The most important reason is _____ because it helps _____."
15 min	Application	Introduce the scenario: "A deadly disease is spreading in several communities. Current treatments are not working well for many patients. Researchers have developed a new medicine that shows promise, but it has not completed all stages of testing. A public health advisory team must make a recommendation." Display all information at the same time. Community leaders are considering two options: Allow limited use of the medicine now for patients with severe illness. OR Require the medicine to complete all planned testing before use. Evidence from the Module: • "After verifying that the drug is hitting the correct target, a series of trials are done to monitor the side effects of the drug." • "In order to be approved, there must be evidence that the drug is safe and produces the intended result." • "Phase 1 usually has 20-100 participants. This phase is to determine the safety and dosing of the drug." • "Phase 2 includes several hundred participants. This phase determines the safety, dosing, side effects, and effectiveness."



		• “Phase 3 ranges from 300 to 3000 participants with the condition or disease of interest.” • “Phase 4 is conducted after the drug is approved and is being prescribed for patients.” Students: Step 1: Analyze the Situation Work with a partner. Read the scenario and evidence. Identify the benefits and concerns raised by the situation. Step 2: Make a Recommendation Decide which option your team supports. Prepare to defend your recommendation. Step 3: Use Evidence Select evidence from the module that supports your recommendation. Construct a brief explanation using the evidence. Step 4: Compare and Evaluate Share your recommendation with another pair. Discuss similarities and differences in reasoning. Revise your explanation if your thinking changes. Sentence Frames: “Our team recommends _____.” “One piece of evidence from the module states _____.” “This evidence is important because _____.”
2 min	Reflection	Why would skipping testing steps be dangerous?
2 min	Career Connections	Scientists, clinical researchers, physicians, and the FDA regularly make decisions similar to the one explored in this lesson. New treatments can offer hope, especially during serious health crises, but decisions must be supported by evidence. Drug testing helps researchers understand both benefits and risks so that patients can receive treatments that are as safe and effective as possible.