

Name \_\_\_\_\_

## Respond to Anesthesia Research

Read the *Pathways* classroom magazine, then answer the questions below.

1. Why was surgery considered a “last resort” before the discovery of general anesthesia? Why is the discovery of anesthesia significant?

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2. What sorts of things are anesthesiology researchers trying to find out? How might their research have wider implications for other research and health care in general?

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3. What kinds of interesting technology, tools, and methods are anesthesiology researchers currently using in their work? List three examples.

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4. Choose one of the anesthesiology researchers featured in the magazine. Summarize their research. What are they studying? What are they hoping to achieve? How will their research help people? If you had the chance to interview them about their research to find out more, what questions would you ask?

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# Write Like a Medical Detective

A *grant*—money given for a particular purpose—often provides the funding needed for scientists to investigate medical mysteries and make discoveries by conducting research. Use the steps below to design and seek funding for your own anesthesiology research project!



1. Choose ONE prompt that interests you most:

- Every day about 60,000 people nationwide have surgery under general anesthesia. Surgery patients range widely in age, genetics, and health, and do not all respond exactly the same to anesthesia.
- After general anesthesia, some patients experience side effects like nausea and confusion.
- After surgery, when anesthesia wears off, some patients feel pain and discomfort.

2. On a separate page, create and fill a planner like the example below about your own research idea.

3. Write a 2–3 paragraph grant proposal, persuading reviewers to fund your research.

<b>My Chosen Prompt</b>	Prompt: "After general anesthesia, some patients experience side effects like nausea and confusion."
Write down the prompt that is most interesting to you. What makes you curious?	I'm curious about: why some patients experience nausea and others do not.
<b>Literature Review</b>	
Research what is already known about your topic.	My research reveals that nausea could be related to dehydration since patients often aren't able to eat and drink in the hours leading up to surgery.
<b>Prior Knowledge</b>	
Make connections to things you already know or are learning about.	I know that leading up to a big race, long distance runners take care to hydrate their bodies well because they can't drink a lot of fluid while running. I know that <b>homeostasis</b> helps to keep fluid levels steady in the human body. I know that thirst and dehydration are related to homeostasis.
<b>Research Question</b>	
What would you like to find out?	Do patients who hydrate well in the days leading up to surgery experience nausea after surgery less frequently than patients who do not?
<b>Study Design</b>	
Explain in simple terms how you plan to test your research question.	My study will compare two groups. Group A will be advised to drink the recommended number of ounces of water per their body weight in the four days leading up to surgery. Group B is the control and will not receive any special instructions.  My study will track body fluid homeostasis once a day leading up to surgery, right before surgery, and during emergence from surgery with the help of blood tests.  My study will compare reported instances of nausea with body fluid homeostasis data to see if there is a connection.
<b>Tools &amp; Methods</b>	
What will you use?	My study will use a <i>serum osmolality test</i> —which checks levels of sodium and other essential minerals in the blood—as a measure of homeostasis.
<b>Implications</b>	
How could your research help patients or other researchers?	The findings of my research could: <ul style="list-style-type: none"> <li>• provide a simple preventive intervention for postoperative nausea</li> <li>• inspire future researchers to develop easier ways to monitor body fluid homeostasis</li> <li>• help inform research on other patients who experience nausea, such as migraine sufferers and those undergoing cancer treatment</li> </ul>

## VOCABULARY LIST

### BRAIN & BODY

**binding site** (*noun*): a region on a large molecule, such as a protein within a living organism, where another molecule can attach (called binding). Only specific molecules can attach to each binding site (think of puzzle pieces fitting together).

- ◆ Knowing the shape of a binding site helps scientists create targeted drug treatments.

**neuron** (*noun*): a cell within the nervous system that transmits information to other nerves, muscles, or gland cells.

### BRAIN STATES

**conscious** (*adjective*): awake and aware of one's thoughts and surroundings; alert to sensations in the body and able to respond.

**unconscious** (*adjective*): not awake or aware, due to an interruption in communication between different parts of the brain.

- ◆ Unconsciousness is a different state than sleep. For example, a sleeping person can be woken by a loud noise, but an unconscious person cannot. While a person can fall asleep naturally, they can't become unconscious unless they receive anesthesia or experience a head injury, such as a concussion.

### PAIN

**acute pain** (*noun*): pain that lets you know you may be hurt or have a problem you need to do something about.

- ◆ The nerves in the injured part of your body send messages to the brain about the situation. Your brain then makes you feel pain.

**chronic pain** (*noun*): pain that may last for weeks, months, or even years. There are many causes of chronic pain.

### ANESTHESIA & RESEARCH

**anesthesia** (*noun*): a loss of sensation; a medical treatment that prevents patients from feeling pain during surgery and other medical procedures.

- ◆ Some *anesthetics* (drugs doctors use to produce anesthesia) cause numbness in a specific area, while others cause unconsciousness as well.

**anesthesia researcher** (*noun*): a scientist who studies anesthesia and its effects on the brain and body in order to investigate questions about the nature of pain, consciousness, and unconsciousness, and how to develop even more effective anesthetics.

**anesthesiologist** (*noun*): a doctor who administers anesthesia and treats pain.

- ◆ Anesthesiologists carefully monitor patients throughout a medical procedure using a variety of devices that display blood pressure, blood oxygen levels, heart function, and respiration. They adjust medications as needed to make sure each patient remains safe.
- ◆ Anesthesiologists can also help treat chronic or acute pain outside the operating room, and may conduct research as well.

**machine learning** (*noun*): a type of artificial intelligence in which computer algorithms (sets of rules and procedures) are developed to analyze and make predictions from data that's fed into the system.

**neuroengineering** (*noun*): the field combining engineering techniques and technology with neuroscience (the study of the nervous system).

#### TAKE IT FURTHER

Choose five vocabulary words that you think will be the hardest to remember, then write a paragraph with them (nonfiction or fiction).