

13 Living With Your Liver



How often do you think about what's going on inside your body? Most healthy people don't need to worry about what's happening inside. But knowing more about the human body can help you make better decisions about your health.

CHALLENGE → How does the liver help your body stay in balance?

PROCEDURE

1. With your group of four, discuss the following questions.

What do you know about your liver?

For example:

- How big is it?
- What does it do?
- What kinds of things can harm your liver?
- Is your liver essential?

Write your ideas down in your science notebooks.

2. Assign a role for each person in your group. Assuming there are four people in your group, each of you will read one role.

Roles

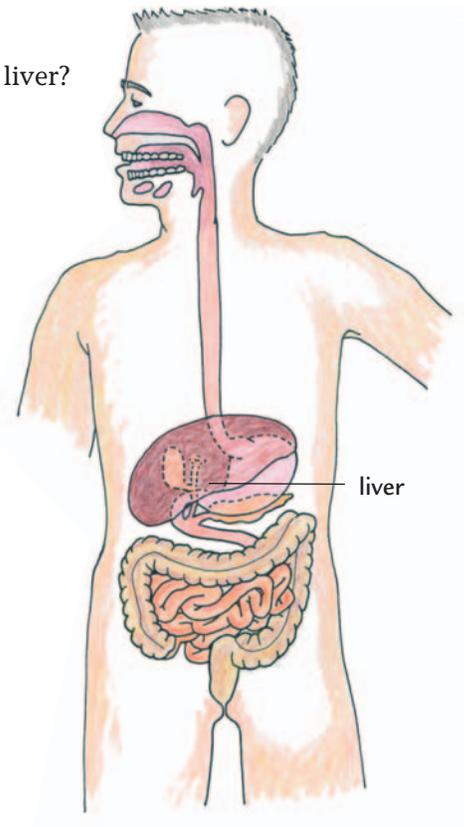
Mr. Lee, a science teacher

Rick, a middle school student

Kamika, a middle school student

Yolanda, a middle school student

3. Read the following role-play aloud.



LIVING WITH YOUR LIVER

- Rick: Mr. Lee, you told me that we're going to study the digestive system soon. I think it's going to be pretty interesting.
- Yolanda: I think digestion is gross. My mom's a surgeon and she showed me some pictures of the inside of . . .
- Kamika: Relax, Yolanda. Rick cares about the digestive system because he almost died from something he ate this summer.
- Mr. Lee: Almost died? What happened, Rick?
- Rick: My little sister and I found some mushrooms growing near our house. I ate some. She doesn't like mushrooms, so she didn't eat any.
- Yolanda: My grandpa says "Never eat wild stuff whose name you don't know."
- Rick: Well, I sure won't do it again. I never felt so awful. The nurse in the emergency room said I was lucky my dad brought me in so fast.
- Kamika: So the mushrooms burned your stomach?
- Mr. Lee: Actually, most poisons are dangerous because they can destroy your liver.
- Yolanda: Why is that? I thought the liver was just one of those weird organs that doesn't really do much.
- Rick: Nope. It does a whole lot of stuff your body can't live without.
- Yolanda: Isn't the liver huge? Isn't it the size of your brain?
- Mr. Lee: That's close, Yolanda. In fact, it's even bigger! A liver weighs over 3 pounds. It's the largest organ in your body, except for your skin.
- Kamika: So Rick almost died because those mushrooms hurt his liver? That doesn't make sense. The food you swallow doesn't even go to the liver.
- Mr. Lee: But after the food is broken down, your blood carries the substances you've digested to the liver. The liver controls what gets stored or filtered out. Only then are these substances carried to the rest of your body.
- Rick: Oh, I get it. The liver's sort of like a traffic cop that controls which cars go and which cars stop.
- Mr. Lee: Exactly. That's a great metaphor, Rick!
- Yolanda: I remember my mom's friend talking about this—she's a toxicologist. That means she studies harmful substances, called toxins (TOX-ins). A **toxin** is any substance that can cause damage to your body. The liver breaks down toxins so they don't get to the rest of your body and hurt other organs.
- Kamika: Now I get it. Rick's liver had so much toxic stuff sent to it all at once that it got damaged.



- Mr. Lee: You're right, Kamika. Even now Rick probably has to be careful what he eats while his liver recovers.
- Rick: That's because the liver also helps digest fats, and helps control, or **regulate**, how much cholesterol (kuh-LESS-tuh-rall) and sugar are in your blood.
- Yolanda: It sounds like the liver controls how much and what kinds of substances go to different organs and systems.
- Mr. Lee: Yes, the liver helps your body keep in balance. That's what regulation is—keeping things balanced and responding to changing needs. The liver does many things in your body, but most of them involve regulation.
- Kamika: What's a healthy balance of a mushroom poison in your blood? Zero, I bet!
- Rick: I think so!
- Kamika: But maybe that's not true for cholesterol and sugar. Wouldn't you need some around all the time so your body can use it?
- Yolanda: Yeah, my mom says you need some cholesterol. *Too much* is the problem.
- Mr. Lee: And sugar is what we use as a quick source of energy, but too much or too little in the blood can be a serious problem!
- Rick: Mr. Lee, I overheard a doctor telling my parents that if I were an adult, he would tell me not to drink any alcohol while my liver was recovering.
- Yolanda: Why would that be?
- Kamika: Maybe it's harmful!
- Mr. Lee: That's right, Kamika. It is harmful. Alcohol is a toxin. It can cause a lot of damage if someone drinks a large amount all at once or smaller amounts over long periods of time. If someone's liver is already damaged, alcohol can be toxic in even smaller amounts.
- Rick: So your liver can wear out, but a little bit at a time.
- Mr. Lee: That sounds right. Sometimes damage to the liver builds up over many years as the liver works to remove toxins. Scar tissue forms, which is called cirrhosis (si-ROW-sis). If it's bad enough, you need a transplant.
- Kamika: Cirrhosis! That's what my cousin has! I didn't realize it meant a worn-out liver. She doesn't touch alcohol. She had hepatitis (hep-uh-TIE-tus). She got it from a blood transfusion when she was a baby.
- Mr. Lee: Your cousin must have hepatitis C. Today donated blood gets tested, and hepatitis C almost never gets into the blood supply. Hepatitis C is often a chronic disease, which means that she may have recurrences of hepatitis C for the rest of her life. There is still no vaccine for hepatitis C, but there is for hepatitis A and hepatitis B.
- Yolanda: Hepatitis attacks the liver. They made sure to vaccinate my uncle for hepatitis A and B as soon as they saw he had liver damage.

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- Rick: So Kamika's cousin won't ever be allowed to drink, I guess. Hey, you know what other things are toxins? Ibuprofen (eye-byoo-PRO-fin) and acetaminophen (uh-see-tuh-MIN-uh-fin), those headache medicines. I had to stay away from them when I was sick.
- Yolanda: Wow, I don't think of medicines as toxins.
- Kamika: They do have side effects. I heard that if you take too large a dose of just about anything it can reach toxic levels.
- Mr. Lee: In many cases, the effects of medicines—good and bad—would last a lot longer if the liver didn't work so hard at breaking them down quickly.
- Rick: I'm just glad I'm gonna make it without a liver transplant.
- Kamika: It's a good thing, because there's a shortage of organs. I know because they put my cousin on a waiting list just in case. I think kidneys are a little easier to get.
- Mr. Lee: Half of the 20,000 or so transplants done in the United States each year are kidney transplants. About one quarter are liver transplants.
- Yolanda: Kidney transplants must be more common because a living person can donate a kidney, since you need only one to survive.
- Rick: Well, we could never survive with just half a liver!
- Yolanda: Yeah, but the liver can do this cool thing. If you take a dead person's liver and put half of it into two people who need livers, the two halves, uh . . .
- Mr. Lee: Regenerate (rih-JEH-nuh-rate). The halves grow back into complete livers. No other complex organ can regenerate. For example, the heart and the brain can't do it.
- Rick: That means a living donor can give half a liver, and the half still left will regenerate.
- Kamika: That's really amazing! I can't wait to tell my cousin about regeneration, in case she needs a transplant someday.

ANALYSIS

1. What are some of the functions of the liver?
2.  People who have cirrhosis of the liver are usually on a strict diet. They have to be careful of what they eat and drink. Why do you think this is?
3.  How can understanding how your liver works help you make decisions about your health?



EXTENSION

For links to more information about the liver, go to the *Issues and Life Science* page of the SEPUP website.