Lesson Plan: Liver

Summary

In this lesson, students learn about the human liver through a discussion of its unique ability to regenerate, its connection to the umbilical vein and round ligament, and its role in producing cholesterol, storing glycogen, and filtering blood. The transcript also highlights the liver's bare area, the portal system, its size as the largest internal organ, and the truth about detox practices.
https://www.youtube.com/live/-jRWny5nbdY?si=oMnwLpvt6Zz5M1F-

Objective

Students will be able to describe the primary functions and characteristics of the human liver, explain its regenerative ability, and identify its role in human health.

Standards

- NGSS MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- CCSS.ELA-LITERACY.RST.6-8.2: Determine the central ideas or conclusions of a text and provide a summary distinct from prior knowledge or opinions.
- C3 D1.5.6-8: Determine the kinds of sources that will be helpful in answering compelling and supporting questions.

Materials

- Vetted 9 Fun Facts about the Liver
- Worksheet (provided)
- Optional: paper, pencils, diagrams of the human body

Activity

1. Present the 9 Fun Facts about the liver.
2. Discuss each fact, encouraging students to share their reactions or connections.
3. Guide students through the worksheet, focusing on recall and application of the 9 Fun Facts.
4. Facilitate a discussion on misconceptions about detox diets, emphasizing the liver's natural role.

Introduction

Introduce students to the liver as one of the most important organs in the human body. Explain that the liver has many unique qualities that set it apart, including its ability to regenerate and its role in filtering everything we eat and drink.

Assessment

- Participation in discussion of the 9 Fun Facts.
- Completion of the worksheet.
- Demonstrated ability to explain the liver's regenerative ability, role in blood filtration, and importance in maintaining health.

Rubric

Criteria	Excellent (4)	Good (3)	Fair (2)	Poor (1)
Content Understanding	Accurately explains all liver facts	Explains most liver facts with clarity	Explains some liver facts, lacks detail	Limited or inaccurate explanation
Discussion Participation	Actively engages and contributes ideas	Participates with occasional input	Rarely participates	Does not participate
Worksheet Completion	All answers complete and correct	Most answers correct	Some answers correct	Few or no answers correct
Technology Connections	Connects facts to broader concepts	Connects some facts to broader concepts	Limited connections made	No connections made

9 Fun Facts

1. **The liver can regrow from only 25 percent and knows when to stop.** If as little as a quarter of the liver remains, it can regrow to full size within weeks. The real magic is in the stopping: once the liver hits the correct size and blood-flow balance, growth signals switch off. Scientists have even identified special cells that maintain and rebuild liver tissue, showing just how controlled this process really is.
https://cri.utsw.edu/scientists-identify-cells-responsible-for-liver-tissue-maintenance-and-regeneration/

2. **A baby's umbilical vein becomes the round ligament, a scar that links the liver to the belly button.** In the womb, oxygen-rich blood from the mother flows straight to the fetus through the umbilical vein and into the liver. After birth, that vein collapses and leaves behind the round ligament, a cord-like scar that links the liver to the belly button. It is a permanent reminder of our early connection to maternal circulation.
https://www.whattoexpect.com/pregnancy/fetal-development/fetal-digestive-system/

3. **The liver makes cholesterol, necessary for vitamin D, steroid hormones, and bile.** Cholesterol often gets labeled "bad," but the liver produces it because the body cannot live without it. It is the starting material for vitamin D, steroid hormones, and bile acids that digest fats. The problem arises when lifestyle and diet create an overload, not from cholesterol itself.
https://www.heart.org/en/health-topics/cholesterol/about-cholesterol

4. **The liver has a small "bare area" that rests against the diaphragm.** Nearly the whole liver is wrapped in a protective lining called the peritoneum. A small section on the back is uncovered and rests directly against the diaphragm. Growth still halts here because liver size is controlled by internal architecture and blood-flow cues, not just by external wrapping.
https://geekymedics.com/anatomy-of-the-liver/

5. **Everything you eat and drink is filtered by the liver first.** All blood draining from your stomach and intestines first flows to the liver. There it processes nutrients, removes harmful substances, and decides what to store before sending blood to the rest of the body. Every meal and every sip has to pass through this checkpoint.
https://kidshealth.org/HumanaLouisiana/en/kids/liver.html

6. **The portal system sends blood through the liver before it reaches the rest of the body.** Instead of going directly into circulation, blood from the digestive tract and spleen is routed through the portal vein to the liver first. There it is filtered, nutrients are adjusted, and toxins are broken down before the blood moves on. This detour keeps the rest of the body from being hit with unprocessed chemicals in food.
https://www.practo.com/healthfeed/5-functions-of-the-liver-you-should-know-about-42301/post

7. **The liver stores sugar as glycogen to keep blood sugar steady.** Liver cells stockpile glucose in compact granules of glycogen. When blood sugar drops, enzymes release glucose back into the bloodstream to keep energy steady. This healthy system is very different from fat buildup, which can damage and scar the liver over time.
https://www.ncbi.nlm.nih.gov/books/NBK541036/

8. **The liver is the largest internal organ at about 1.5 kilograms.** In adults it weighs about 1.5 kilograms, heavier than the brain or lungs. Its large size reflects the workload of digestion, metabolism, detoxification, and storage. It is the body's central chemical processing plant.
https://www.britannica.com/science/liver

9. **To give your liver a break, eat simple foods and avoid excess alcohol or unnecessary medications.** The liver already transforms toxins into safe compounds the body can excrete. The best way to "detox" is to give it a break: eat simple, minimally processed foods, avoid excess alcohol, and only take medications that are necessary. This reduces the load so the liver can focus on its natural job.
https://www.ncbi.nlm.nih.gov/books/NBK279393/

Worksheet

Name: _____ Date: _____

Review Questions

1. How much of the liver must remain for it to regrow to full size?

2. What does the umbilical vein turn into after birth?

3. What is the purpose of the portal system?

Discussion

4. Why is it important that the liver knows when to stop regenerating?

5. How does understanding the round ligament connect human development to adult anatomy?

Data Analysis

6. Explain how glycogen stored in the liver helps keep blood sugar steady.

7. Why is the liver considered the body's central chemical processing plant?

Reflection

7. Which fact about the liver surprised you most, and why?

8. How might knowing these facts influence your daily health choices?