

Lesson 8: Muscular and Digestive Systems and Hepatitis B

Glossary

1. **bile**: a fluid made by the liver that helps your body to digest and use nutrients (like fats) from your food
2. **carbohydrates**: nutrients that give your body energy to use immediately (found in sugars, starches, and fibers in food like bread, rice, pasta, fruits, vegetables, etc.)
3. **cardiac muscles**: muscles only found in the heart that pump blood through the heart and body
4. **esophagus**: food moves down this tube after you swallow
5. **fats**: nutrients that give your body energy to store and use later, and help protect your organs (found in oils, butter, nuts, etc.)
6. **gallbladder**: this organ stores bile and sends it into the small intestine to break down the fat in foods
7. **Hepatitis B (HBV)**: a virus that makes the liver swollen and can cause severe liver damage
8. **large intestine (also called bowel or colon)**: undigested food goes here after it leaves the small intestine; extra water and nutrients are taken into the body and everything else becomes waste
9. **liver**: this organ makes bile and also cleans your blood by removing harmful substances ("toxins")
10. **muscle strain**: occurs when a muscle tears or stretches too much, or when the muscle separates from a tendon
11. **muscular system**: this system includes all your muscles and works with the skeletal system (bones) to make your body move
12. **nutrients**: parts of food (like carbohydrates, fats, and proteins) that your body needs to stay alive, grow, and stay healthy
13. **proteins**: nutrients that help build and repair muscles, skin, and organs (found in meat, fish, eggs, beans, nuts, etc.)
14. **rectum and anus**: waste from the large intestine leaves the body through these body parts
15. **skeletal muscles ('voluntary muscles')**: type of muscles that are used for movements you can control (like picking up a cup or walking)
16. **small intestine**: food moves here after the stomach; most digestion happens here, and nutrients (like carbohydrates, fats, and proteins) are taken into the body
17. **smooth muscle ('involuntary muscles')**: type of muscles found in all systems of the body that control movement you don't have to think about (like moving food through your body)
18. **stomach**: organ where strong acid (hydrochloric acid) breaks down nutrients (like proteins) in your food

Lesson 8: Muscular and Digestive Systems and Hepatitis B

Reading Comprehension

Hepatitis B Virus (HBV)

Biological Background¹

The liver does several important things for the body. For example, the liver:

- Makes and stores energy
- Cleans the blood by taking out toxins (harmful materials)
- Makes **bile**, a fluid that helps with digestion
- Breaks down medicines

What is Hepatitis B?

Hepatitis B (HBV) is a virus that attacks the liver. It causes the liver to become swollen. Over time, the liver can become badly damaged. A damaged liver does not work well. Liver failure causes serious health complications and sometimes death. People with Hepatitis B are also more likely to develop liver cancer, which may cause death.

There are two types of Hepatitis B infection³:

Acute: Acute HBV infection usually last less than 6 months. The immune system gets the virus out of the body quickly. Someone with acute HBV is able to recover from the disease. People infected with HBV as adults usually have acute HBV and are able to recover from the illness.

Chronic: People with chronic Hepatitis B are unable to fight off the virus with their immune system. They must live with the virus for life. Individuals living with chronic HBV are at risk for liver cancer, cirrhosis (liver scarring), and other serious illnesses. Children who are infected with HBV at a young age (age 1 to 5) are more likely to develop chronic HBV.

Why is Hepatitis B prevention and treatment so important?

^{4,5}

- 1) Untreated Hepatitis B can lead to liver failure, liver cancer, and death.

¹ <https://kidshealth.org/en/kids/liver.html>

² <https://www.niddk.nih.gov/health-information/liver-disease/viral-hepatitis/hepatitis-b>

³ <http://www.mayoclinic.com/health/hepatitis-b/DS00398/DSECTION=causes>

⁴ <http://www.webmd.com/digestive-disorders/digestive-diseases-liver-failure>

⁵ <https://www.plannedparenthood.org/learn/stds-hiv-safer-sex/hepatitis-b>

- 2) For now, there is no cure for chronic Hepatitis B, but there is a vaccination to prevent getting it.

What are some symptoms of Hepatitis B?

Hepatitis B often has no symptoms. Only half of people infected with the virus show symptoms.

Symptoms of HBV may include:

-extreme fatigue (tiredness)	-not feeling hungry
-sore muscles	-diarrhea
-upset stomach, stomach pain	-dark-yellow urine
-fever	(pee)
-jaundice (yellow skin and eyes)	-light-colored stools (poop)

Hepatitis B symptoms may appear weeks or months after someone gets the virus.⁷ If you notice symptoms of Hepatitis B, talk to your doctor immediately.

How is Hepatitis B diagnosed?

Hepatitis B is diagnosed through blood tests given by your doctor.

How is Hepatitis B spread?

People with acute or chronic HBV can spread the virus to other people. Hepatitis B is spread through the exchange of bodily fluids like blood, semen, and vaginal fluids.

Some common ways HBV is spread:

- From mother to baby during childbirth
- Unprotected sex
- Injection drug use (the virus lives on needles and other equipment used by an infected person)
- Sharing personal items that may have blood on them, like razors and toothbrushes¹⁰

⁶ <https://www.niddk.nih.gov/health-information/liver-disease/viral-hepatitis/hepatitis-b>

⁷ <https://www.cdc.gov/hepatitis-b/signs-symptoms/index.html>

⁸ <https://www.hepb.org/what-is-hepatitis-b/what-is-hepb/acute-vs-chronic/>

⁹ <https://www.hepb.org/assets/Uploads/Hepatitis-B-Fast-Facts-5-12-22.pdf>

¹⁰ <https://www.plannedparenthood.org/learn/stds-hiv-safer-sex/hepatitis-b>

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Reading Comprehension

How is Hepatitis B treated?¹¹

Acute HBV: People with acute HBV usually get better without treatment, because the body's immune system fights off the infection. Most adults and children over the age of 5 get better without treatment. Rest and care for symptoms are usually enough to help an individual get better. Follow-up blood tests are done to make sure the person no longer has HBV.

Chronic HBV: Those with chronic Hepatitis B take medication that slows the damage done by the virus. A liver transplant may be needed for people with severe liver damage. People with chronic HBV should see the doctor regularly for check-ups.

Who is at risk for Hepatitis B?¹²

Everyone is at risk for Hepatitis B, and some individuals are at greater risk:

- Infants born to people with hepatitis B
- People born in certain countries where Hepatitis B is common
- People born in the US who were not vaccinated as infants and whose parents were born in countries with high rates of hepatitis B
- Sex partners of people who have Hepatitis B
- People who live with someone who has hepatitis B
- Health care and public safety workers who are exposed to blood on the job

How can I protect myself against Hepatitis B?^{13 14}

- Get vaccinated against HBV.
- If a pregnant woman has Hepatitis B, her baby can be vaccinated as soon as it is born to help make sure the baby does not get Hepatitis B.¹⁵
- Follow safer sex practices by using condoms and dental dams.
- Use gloves when touching other people's blood and body fluids.
- Wash hands well with soap and water, especially after contact with blood or body fluids.
- Disinfect surfaces that have been contaminated with blood or body fluids.
- If you think you've been exposed to HBV, call your doctor immediately. Receiving a special injection right away can help prevent you from developing hepatitis B.¹⁶

¹¹ <https://www.cdc.gov/hepatitis-b/hcp/clinical-overview/index.html>

¹² <https://www.hepb.org/prevention-and-diagnosis/transmission/>

Write short answers based on the reading.

1. What is Hepatitis B?

2. Name 3 symptoms of Hepatitis B.

3. How is Hepatitis B spread?

4. How is Hepatitis B treated?

Critical thinking skills:

1. Think about the question.
2. Talk about the answer with a partner.
3. Write a brief paragraph to answer the question.

How can you protect yourself against Hepatitis B?

¹³ <https://www.hepb.org/treatment-and-management/adults-with-hepatitis-b/protect-your-loved-ones/>

¹⁴ <https://www.nationwidechildrens.org/conditions/hepatitis-b>

¹⁵ <https://www.cdc.gov/hepatitis-b/prevention/index.html>

¹⁶ <http://www.mayoclinic.com/health/hepatitis-b/DS00398/DSECTION=treatments-and-drugs>

Lesson 8: Muscular and Digestive Systems and Hepatitis B

Reading and True and False

What is the purpose of the muscular system?

The **muscular system** works with the skeletal system to make the body move. The body moves when **muscles** contract, or shorten. Some movements are outside the body — for example, lifting a weight. Other movements are inside the body, like the muscular contractions that make the heart beat. Here are some other examples of what the muscular system does:

- Muscles allow you to stand up
- Muscle movement makes breathing possible
- Muscles in blood vessels help move blood through the body
- Eating and digesting food happens through muscle movement
- 85% of body heat comes from muscle contraction. This heat helps keep your body at a healthy temperature.

Muscular System Background¹

The muscular system is made up of muscle fiber cells. Muscles are attached to bones, internal organs, and blood vessels. There are different types of muscles:

- **Skeletal muscles:** Sometimes called voluntary muscles, skeletal muscles usually control voluntary movement (like picking up a cup).
- **Cardiac muscles:** Cardiac muscles are only found in the heart. They pump blood through the heart and body.
- **Smooth muscle:** Known as involuntary muscle, smooth muscle is found in all systems of the body. Smooth muscles control unconscious movement. For example, smooth muscle in the intestinal wall helps push food through the intestines.²

What is an example of a muscle problem?

Muscle strain is a type of muscle injury. A strain occurs when the muscle tears or stretches too much, or when the muscle separates from a tendon. (Remember that tendons connect muscle to bone). This usually happens when the muscle is already weak or hasn't been warmed up before exercise.

It is common for people to strain lower back muscles, which can become weak from too much sitting. Back muscles can be strained when lifting something heavy. The hamstring muscle, located at the back of the thigh, is a common site of strain for soccer players and other athletes.

Why is exercise and stretching important for healthy muscles?³

- Healthy muscles allow a person to move freely without difficulty or pain. Muscles that are not used will atrophy. This means that the muscle becomes smaller and weaker. This may lead to muscle strains. Injured muscles make work difficult.
- Muscles help to protect joints. If the muscles around a joint are weak, injury to the joint is more likely.
- If you suffer an injury and have to rest for a while, you will probably go through physical therapy to strengthen your muscles to prevent another injury.

Read each sentence. Then circle True or False.

1. Muscle movement makes breathing possible. True False
2. There is only one type of muscle. True False
3. Cardiac muscles are found in the heart. True False
4. Muscles help protect joints. True False
5. Smooth muscles are known as voluntary muscles. True False
6. Muscle strain injuries occur when there is a tear or stretch in the muscle. True False

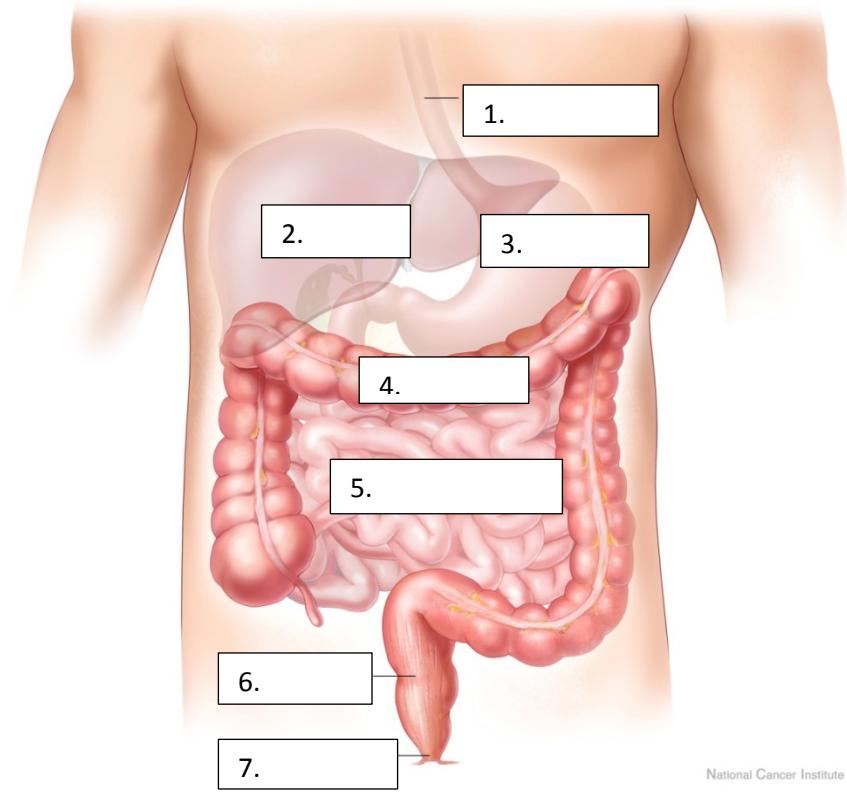
¹ <http://training.seer.cancer.gov/anatomy/muscular/>

² www.bbc.co.uk/science/humanbody/body/factfiles/skeletalsmoothandcardiac/heart_beat.shtml

³ <https://www.niams.nih.gov/health-topics/educational-resources/health-lesson-learning-about-muscles>

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Label the Chart



Label the digestive system chart. Use the words in the box below to help you. Then write the words on the lines.

rectum	anus	liver	small intestine	esophagus	stomach	colon
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1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

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Sequencing and Writing

Why is the digestive system important?

The **digestive system** turns food into basic nutrients. The nutrients are used to fuel your body. Your body needs this fuel for energy to complete daily activities.

How does the digestive system work?

Food travels through the mouth, **esophagus, stomach, small intestines**, and the **large intestines**. The small intestines absorb nutrients. The large intestines take out water and nutrients from undigested food. What your body does not need is considered waste. The waste leaves the body through the **rectum** and **anus**.

After reading the passage above, read and think about the sentences below. Then number the sentences in order (1-7 to describe the cycle in which food is digested in the body.

- _____ What the body does not need is considered waste.
- _____ Finally, the waste leaves the body through the rectum and anus.
- _____ The small intestines absorb the nutrients.
- _____ Then the food travels through the small intestines and the large intestines.
- 1_____ First, the food travels through the mouth, esophagus, and stomach.
- _____ Next, the large intestines take out water from undigested food.

Now write the sentences from above in the correct order.

1. First, the food travels through the mouth, esophagus and stomach. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

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Vocabulary Card Match

Mouth	Esophagus	<p>With your mouth, you chew food into smaller pieces. Chemicals in your saliva help to digest these food pieces.</p>	Food moves down this tube-like body part after you swallow, with the help of muscle contractions. A little flap covers the windpipe to prevent you from choking!
Stomach	Liver	<p>Strong acid (hydrochloric acid) in this organ breaks down proteins in your food.</p>	This organ makes a fluid called bile which helps release nutrients from your food. It also takes toxins out of the blood.
Gallbladder	Small Intestine	<p>This organ stores bile from the liver and releases it into the small intestine, which helps break down the fat in foods.</p>	Food moves from the stomach to this organ. Major digestion happens here, and nutrients are absorbed into the circulatory system.
Large Intestine	Rectum and Anus	<p>Undigested food from the small intestine ends up here. Extra water is absorbed by the body, and vitamins K and B are created.</p>	Food from the large intestine passes through these body parts. This is where waste leaves the body.

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Vocabulary Card Match

Copy the words and their definitions after you match all of the cards.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

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Conversation

Ali is at the doctor's office because he is having digestive issues. Listen to what advice the doctor has for Ali about maintaining a healthy digestive system.

Doctor: Ali, your test results are normal, so that's good news. I'd like to give you some advice on how to keep a healthy digestive system.

Ali: Thank you. I'd appreciate that.

Doctor: Make sure you eat a healthy diet, with lots of vegetables, fruits and, whole grains. Exercise regularly.

Ali: I could do better when it comes to exercise.

Doctor: It's never too late to start exercising! Also, avoid smoking, because it increases the likelihood of digestive problems like liver disease.

Ali: I have been smoke-free for the last 12 years!

Doctor: That's great! Keep it up. Also, do you know if you have been vaccinated for Hepatitis B?

Ali: I'm not sure.

Doctor: I'll ask your previous clinic to send your medical records. We can vaccinate you if you have not had it yet.

Ali: Good. I like to protect my health.

Doctor: It was good to talk with you, Ali. Call our clinic if you have any more digestive symptoms, such as diarrhea, constipation, bloating, or cramping.

Ali: OK, I'll do that. Thanks for your help.

Talk with your partner and write a short answer to the following question.

What did the doctor recommend for Ali to maintain a healthy digestive system?

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Quiz

Read the questions. Then circle A, B, C or D.

1. What is the purpose of the muscular system?

- A. to allow you to stand up
- B. to make breathing possible and move blood through the body
- C. to allow you to eat and digest
- D. all of the above

2. What is a muscle strain?

- A. a tear or stretch in the muscle
- B. building muscle mass
- C. working out
- D. a tired muscle

3. To what body part does food move after you swallow?

- A. stomach
- B. esophagus
- C. liver
- D. gall bladder

4. How can you prevent Hepatitis B?

- A. wash hands with water only
- B. don't practice safe sex
- C. get vaccinated
- D. clean up blood spills with water only

5. Why is Hepatitis B prevention and treatment so important?

- A. untreated Hepatitis B can lead to liver failure, liver cancer, and death
- B. there is no cure for Hepatitis B
- C. both A and B
- D. neither A nor B

6. Where are nutrients absorbed?

- A. mouth
- B. esophagus
- C. anus
- D. small intestine

7. What is **not** a symptom of Hepatitis B?

- A. increased appetite
- B. jaundice (yellow skin and eyes)
- C. dark yellow urine
- D. light-colored stools

8. How can you find more information about Hepatitis B?

1. _____
2. _____
3. _____

Student Survey: Muscular and Digestive Systems / Hepatitis B Unit

1. Did you learn more information about Hepatitis B and digestive health from studying this lesson?

1	2	3	4	5
no		some		yes

2. Would you share this information with family and friends?

1	2	3	4	5
no		maybe		yes

3. After studying this lesson, are you more likely to ask your health care provider about Hepatitis B and digestive health?

1	2	3	4	5
no		somewhat		yes

4. Do you know where to find more information about Hepatitis B and digestive health if you have more questions?

1	2	3	4	5
no		somewhat		yes

5. Did you like the class activities?

1	2	3	4	5
no		somewhat		yes

We value your opinions! Could you tell us what you liked or give us some suggestions on how to improve this lesson?

Thank you!