

INVESTIGATING
Body Systems

Investigating the DIGESTIVE SYSTEM



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Crabtree
Forest

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The Body's Production Line

Everyone runs late some days and it's easy in the rush to forget your lunch. By noon, you might be losing energy. You are so hungry, your stomach actually hurts and then it rumbles so loud everyone hears. Luckily, your best friend agrees to share their lunch with you. Now you have the energy for a pick-up basketball game. That feeling of hunger, stomach rumbling, and then surge of energy are all signs of your digestive system at work.

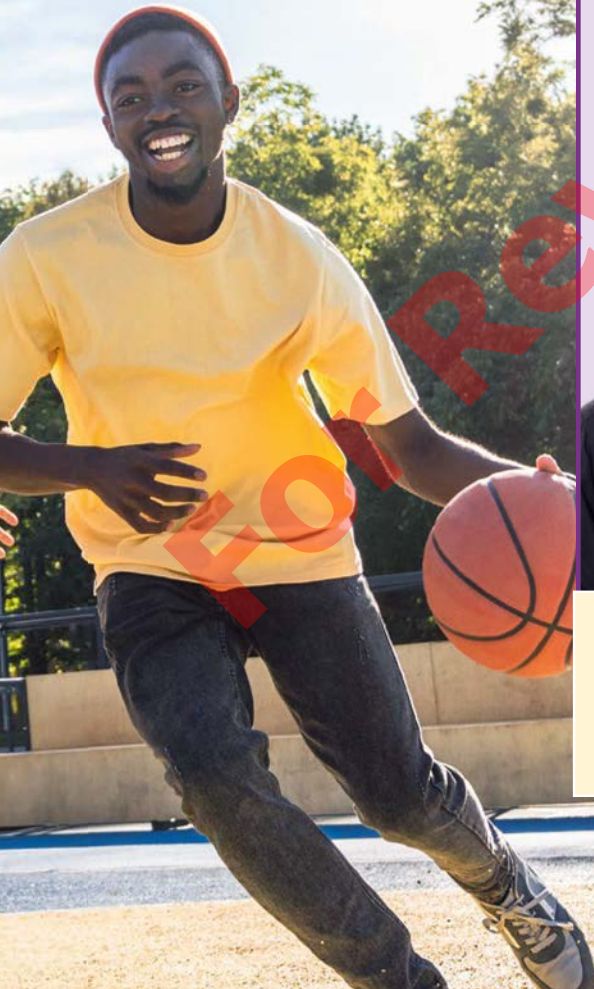
Your digestive system is like a production line. Nutrients in food, drinks, or vitamins begin their journey through the system at the entrance: the mouth. From there they travel through tubes, filters, and holding rooms while body chemicals such as **enzymes**, acids, and hormones, work on the products to **extract** what is needed. Then leftover material is removed from the body, making room for the next batch.

Our bodies need food energy to play sports.

Our digestive system works 24 hours a day, seven days a week. We need a constant supply of nutrients, minerals, proteins, fats, **carbohydrates**, and water to keep all our body systems working. Without a digestive system to filter, move, and use things we consume, we would soon lose weight and get weak. Eventually our bodies would break down and organs would fail. A faulty digestive system can affect every other system in the body and it is vital that we keep it healthy and efficient.

Make me gag!

Gagging is our body's natural reaction to protect us. We gag to prevent ourselves from choking on something or from consuming something unpleasant. Anything touching a sensitive spot at the back of our mouth triggers gagging. We can also gag at a nasty **smell** or strange texture of food or drink. We can even gag when we just *think* of something gross!



The gag, or pharyngeal reflex, is a natural reaction. It happens when something touches the roof of the mouth, or the back of the tongue, tonsils, or throat. It helps prevent us from choking.

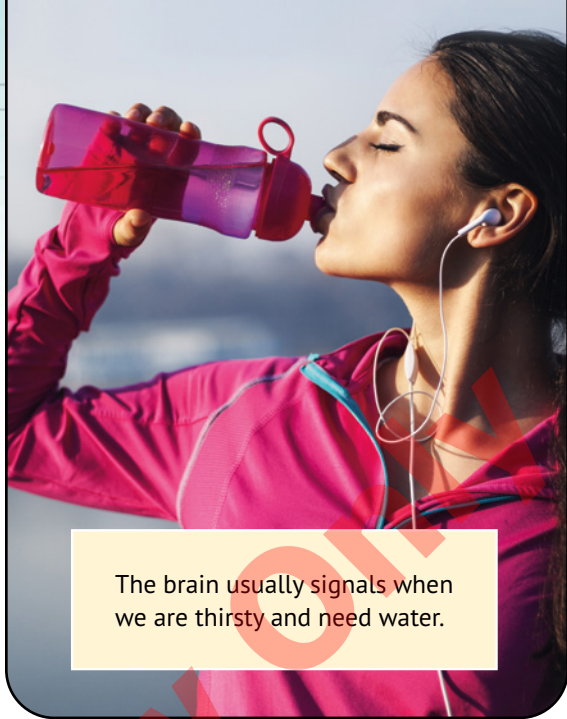
Hard at Work

The digestive system is an amazing network that interacts with every other system. It is like a distribution center that collects and delivers the supplies needed.

The first sign that the digestive system needs attention is feeling hungry or thirsty. Nerves in the stomach tell the brain how empty the stomach is. Chemicals in the blood, called hormones, tell the brain the body needs energy. When the body starts to run low on water, changes in our blood or tissues are noted. A special area of the brain, the lamina terminalis, then sends signals to other parts of the brain to tell us to drink.

Nausea is the uneasy feeling in your stomach that you want to vomit. Vomiting is the forceful removal of the contents of your stomach through your mouth and nose. One important function of these reactions is as an early warning signal of the digestive system. It warns the body not to **ingest** something that may be toxic, such as food that has gone bad.

Most people don't like to talk about having to go to the bathroom. But this is critical to your health. If the body could not get rid of waste material and toxic materials, our intestines could fill up and **rupture**. Toxins, waste, and bacteria would travel all through our bodies and cause infection and even death.



The brain usually signals when we are thirsty and need water.

How do we know that our digestive system is working?

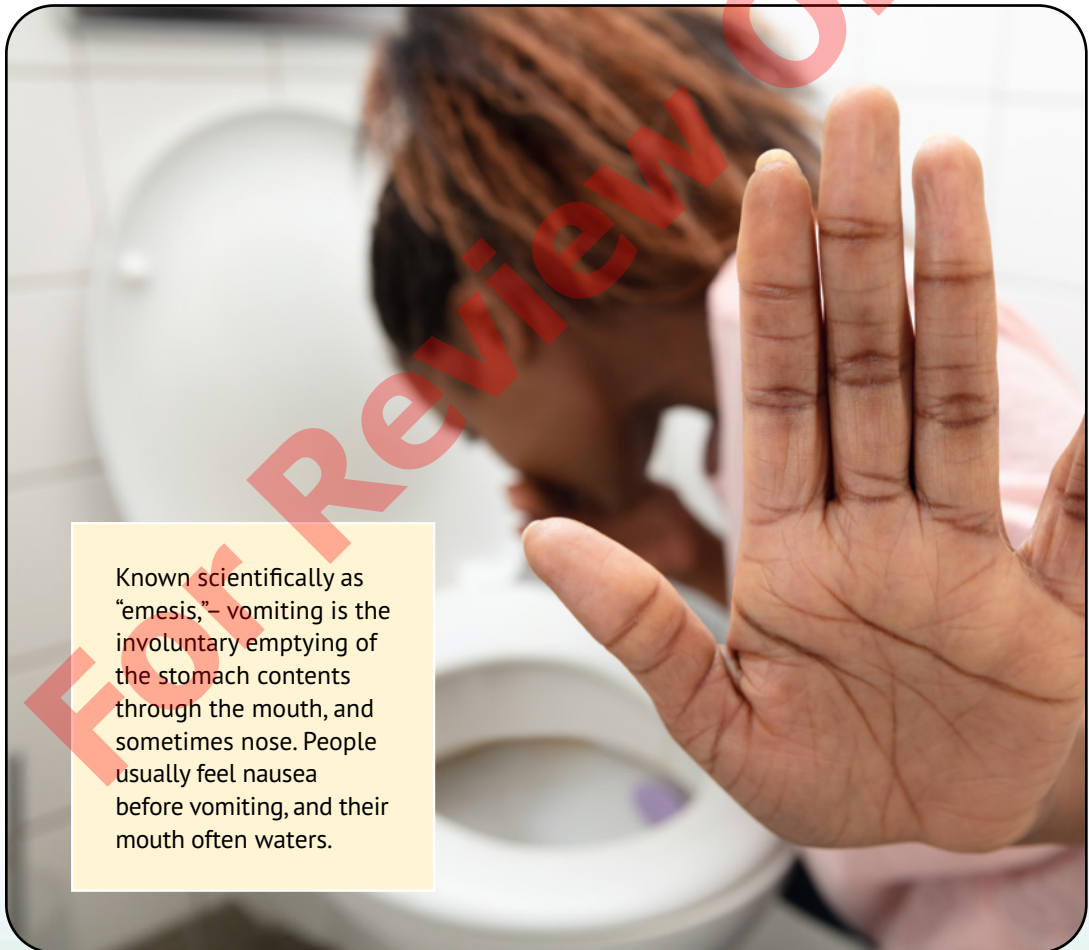
Some signs are:

- a rumbling stomach
- feeling hungry or thirsty
- feeling full
- putting on or losing weight
- nausea and vomiting
- growing taller
- trips to the bathroom

Fact check

Stomach rumbling means you're hungry.

FACT: Stomach rumbling, called borborygmi, is a normal sign of the digestive system and actually happens all the time. However, when your stomach is empty it is more obvious as nothing muffles the sound.



Known scientifically as “emesis,”– vomiting is the involuntary emptying of the stomach contents through the mouth, and sometimes nose. People usually feel nausea before vomiting, and their mouth often waters.

How Do We Know?

Ancient and medieval physicians **had** a basic knowledge of the **digestive system**. This is probably **because** they experienced hunger pains, **could** feel a full stomach, and, **had** to go to the **bathroom**.

These early doctors knew that food **went into** their bodies and waste came out the other end. They reasoned that food contained something that the body needed. Ancient Islamic medical philosophers focused on the importance of a healthy diet for the body. They also believed the stomach was vulnerable to illness. They noticed that anxiety and stress could cause problems in the stomach and then affect the whole body.

The Romans had their own ideas about how and why we need food. Galen, who was a private physician to Roman emperor Marcus Aurelius, thought the stomach was a “thinking” organ. He believed it could feel its own emptiness and generate the feeling of hunger. He thought the stomach was a storehouse of nutrition and it could tell what is good for the body from what is not. The stomach could then send anything bad out of the body and distribute the good to the rest of the body through the veins.

Galen of Peramon **was** considered the **founder** of **experimental** medicine.



Marcus Aurelius

Many ancient civilizations had rules against cutting open dead human bodies to study them. Roman law banned Galen from directly studying human anatomy. Instead, he carried out dissections on apes. These involved surgically cutting into dead bodies to study organs and other internal parts. He assumed that the inner workings of ape bodies were similar to human bodies. Early Europeans **understood** that digestion also involved other organs such as the gallbladder and liver. But their knowledge stalled during the **Middle Ages**. The Catholic Church was very powerful then and had a lot of authority over everyday life. The church was against **dissecting** bodies because it considered the human body sacred. For centuries, this slowed down the scientific information gained from looking inside the human body.



Andreas Vesalius was a physician in the 1500s who wrote books on anatomy. His research and books were based on human dissections instead of animal ones.

Duamutef

Ancient Egyptian embalmers removed organs from bodies before burial. These four organs were the liver, lungs, intestines and stomach. These organs were stored in **canopic jars** that were topped with a head representing a different god. For example, the jackal-headed god, Duamutef, was the guardian of the stomach.

