

## Inquiry Approaches

### Initial Inquiry

How do you know when you are hungry?

The stomach sends messages to the brain indicating that it's empty. The brain has several responses: the stomach rumbles and salivary glands begin to produce saliva.

How does your body react when you smell and see food?

Sensory receptors in the nose and eyes send messages to the brain to prepare to eat. The brain then sends a message to the salivary glands telling them to produce and release amylase, an enzyme that breaks down starch into sugars. This response is the body's way of getting ready to eat the food.

What is the first step of digestion?

Ingestion—taking a bite of food or a sip of a drink.

### Experimental Procedure Inquiry

What happens inside the mouth once we put food inside?

Once we put food inside our mouth, our body begins sending signals from the mouth to the brain. In turn, the brain sends signals to the salivary glands to release saliva to aid in digestion.

How does the food become soft?

Saliva is mainly water, but contains enzymes which speed up the hydrolysis of starch to sugars. The water in saliva softens the food so that it is easier to swallow. Your teeth and tongue help soften food through the process of chewing.

What happens after you are finished chewing your food?

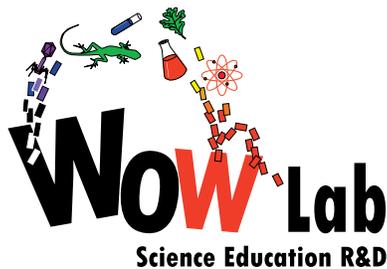
After you finish chewing food, the action of swallowing forces the bolus down the esophagus. Firstly, the upper esophageal sphincter opens under voluntary control. Then peristalsis, a wave of muscle contractions, forces the bolus down the esophagus to the lower sphincter.

In the model, how does the food continue to move down through the esophagus?

Students use their hands to squeeze the bolus down the esophagus, representing the process of peristalsis.

What role does the upper esophageal sphincter play in digestion?

The upper esophageal sphincter opens to allow food to enter the esophagus and closes to prevent backflow of food into the mouth.



a WOW Lab

# BLUEPRINT

## The Glovely Digestion Model - Inquiry Approaches

**Where does the cookie go after it makes it through the esophagus?**

After going through the esophagus, the cookie passes into the stomach. In the stomach, the cookie reacts with gastric acids which break the cookie down even further. In the model, the stomach is represented by the large balloon which is filled with vinegar (acetic acid).

**What role does the lower esophageal sphincter play in digestion?**

The lower esophageal sphincter is important because it keeps the contents of the stomach in the stomach, out of the esophagus and out of the airway. In the activity, the chip bag clip needs to be closed immediately so that the cookies can react with the acid and the gas can accumulate in the large balloon.

**What do you observe happening to the balloon?**

The balloon (stomach) expands because the baking soda in the cookies reacts with the vinegar and produces carbon dioxide in an acid-base reaction. Vinegar is a solution of acetic acid; baking soda is sodium bicarbonate. The two react together to produce carbon dioxide, water and sodium acetate.

**What causes the burping sound?**

The burping sound is caused by the release of the build-up of carbon dioxide gas in the large balloon. When you open the valve, the gas is released via the rubber tubing. The gas flows through the party blower causing the burping sound.

### **In-Depth Inquiry**

**What is the main function of the digestive system?**

The primary function of the digestive system is to break down food into smaller pieces, allowing the body to absorb nutrients and energy.

**How is chemical digestion represented in the model?**

Chemical digestion is the process by which food is chemically broken down by digestive enzymes. The water from the small balloon represents saliva. In the stomach, the cookie reacts with the vinegar, which represents gastric acid.

**How is mechanical digestion represented in the model?**

Mechanical digestion is represented by the crushing of the cookies into smaller pieces in the mouth. In the model, the student's hands are used to crush them, but in reality the teeth and the tongue chew the food to make it smaller. Chewing increases the surface area of the food, making it easier for enzymes to function.