

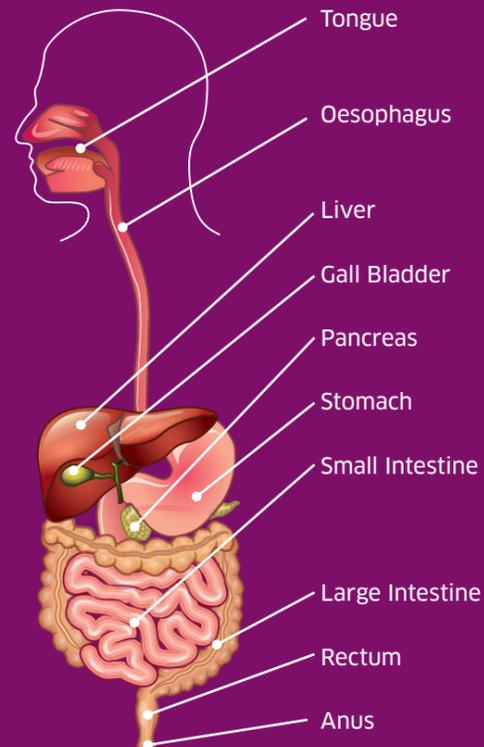
THE SCIENCE BEHIND THE SHOW

Digestion is a process which breaks down food into smaller and smaller pieces until our bodies can access and use the nutrients it contains. The digestive system is made up of the mouth, stomach, small and large intestines plus other abdominal organs such as the liver and pancreas.

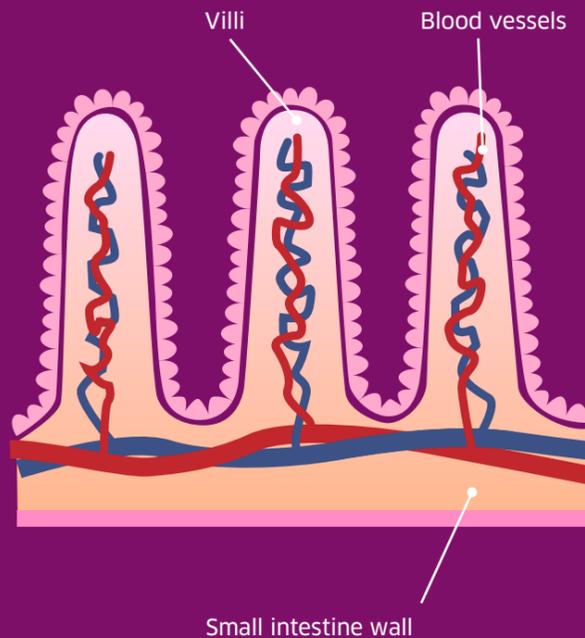
Digestion begins in the mouth where our food is chewed and broken down into smaller pieces by mechanical and chemical digestion. Mechanical digestion occurs because of the teeth and tongue physically moving the food about. Chemical digestion occurs because of the saliva and enzymes in our mouths. Enzymes are special chemicals which help to break down food into smaller pieces. Saliva helps to lubricate food and make it easier to swallow.

After the mouth, food travels through the oesophagus to the stomach. The oesophagus is a muscular tube which pushes food through it using waves of muscular contractions called peristalsis.

In the stomach the food is broken down further by mechanical and chemical digestion. The stomach is a muscular sac which churns the food around to provide mechanical digestion. The stomach also secretes stomach acid which helps enzymes to break down proteins by chemical digestion. The liquid food in the stomach is called chyme.



The Villi



Chyme then moves into the small intestine where bile (from the liver) and pancreatic juices (from the pancreas) help to neutralise the acid. The chyme is also broken down into even smaller molecules which can be absorbed through structures called villi on the wall of the small intestine, like the diagram to the left. Villi are like tiny little fingers which increase the surface area available to absorb nutrients.

After all the nutrients have been absorbed in the small intestine, the remaining liquid and waste food moves into the large intestine where water, salts and minerals are absorbed. The absorption of water results in poo which is stored in the end of the large intestine until you go to the toilet.

The food we eat provides important nutrients, vitamins and minerals to our bodies through the process of digestion. These nutrients are distributed around our bodies by our blood to keep us healthy and well. However, it is also important for the health of our digestive system that we eat a balanced diet which consists of a variety of foods.

USEFUL LINKS:

www.foodafactoflife.org.uk/

EDINBURGH INTERNATIONAL
science festival

EAT FOR IT!

WELCOME TO LIVE FOR IT!

Brought to you by Edinburgh International Science Festival and Diabetes UK Scotland, Live For It! is a programme of workshops and activities designed to help students make healthy lifestyle choices now and in the future.



WHAT WE DO

Each workshop is fully equipped and delivered by trained science communicators. We create fun, interactive environments where everyone gets out of their seats and gets involved. Our inspiring demonstrations and engaging activities are linked to the Curriculum for Excellence, explaining key concepts in a unique and memorable way.

EVENT DESCRIPTION

Eat for It! is the first workshop in the Live for It! series which allows pupils to explore the science of digestion. Pupils follow the journey of a meal right through the digestive system. By experimenting with stomach acid, investigating the small intestine and producing poo samples, pupils gain an understanding of why we eat and the importance of healthy food to our digestive system.

CURRICULUM LINKS

Eat for It! complements the following experiences and outcomes:

SCN 2-12a: By investigating body systems and potential problems which they may develop, I can make informed decisions to help me to maintain my health and wellbeing.

SCN 3-12a: I have explored the structure and function of organs and organ systems and can relate this to the basic biological processes required to sustain life.

HWB 2-15a: I am developing my understanding of the human body and can use this knowledge to maintain and improve my wellbeing and health.

LEARNING OUTCOMES

- Identify the purpose of digestion
- Describe what happens at each stage of digestion
- Recall how and where absorption of nutrients occurs
- Recall the importance of a balanced diet for a healthy digestive system
- Describe the importance of water in the digestive process

Live for it! has been developed by Edinburgh International Science Festival with support from Diabetes UK Scotland

www.sciencefestival.co.uk/education

DIABETES UK
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SCOTLAND

MEASURE YOUR DIGESTIVE SYSTEM

You will need:

- Roll of till receipt (i.e. from a cash register) or roll of crepe paper/streamers
- Metre Stick
- Ruler or Measuring Tape (string can also be useful)
- Scissors
- Pencil and/or colouring pencils



WHAT TO DO:

1. With a partner and the table below for help, measure and record the length of each stage of your digestion process.
2. Once finished help your partner measure theirs.

1 Mouth	Measure from corner of mouth to nearest earlobe
2 Oesophagus	Measure from bottom of chin to bottom of sternum
3 Stomach	Measure from tip of thumb to tip of little finger
4 Intestine (small)	Measure height, multiply by 4
5 Intestine (large)	Measure height
3. Take a length of paper which is approximately 6 times your height.
4. Starting at one end, measure and mark out the length of each section of your digestive system in order.
5. Once finished cut the paper at the end of the large intestine and stick it down on the floor
6. Label each section.
7. Add up the lengths of each section to find out the total length of your digestive tract.

DISCUSSION IDEAS:

- Classes can compare digestive tracts on a large chart or write a narrative of what happens to a piece of food as it works its way from plate to toilet bowl.
- Show on the paper where the pancreas, liver and gall bladder interact with the digestive process.

EXPLANATION:

Considering the length and size of our bodies, the digestive track is surprisingly long and as a result the organs used in digestion have been packed very effectively to make sure they all fit in. For example, the intestines are so long that to fit them inside the body they are folded over multiple times.

Our digestive system helps to break down the food we eat into small enough pieces for our body to absorb it's energy and nutrients. When we eat food it travels from our mouth, down our oesophagus and into the stomach. After the stomach it moves into the small intestine and then into the large intestine, before any waste leaves the body as poo. It is important that we maintain a healthy, balanced diet to keep our digestive system healthy.

WHICH DRINK AM I?

You will need:

- Labels which say a selection of drinks such as those listed below. (NB: Water has intentionally been left out)

Apple Juice	Skimmed Milk	Coffee	Cranberry Fruit Drink
Orange Juice	Chocolate Milk	Energy Drink	Sports Drink
Tea	Strawberry Milk	Diet Cola	Iced Tea
Lemonade	Strawberry Milkshake	Chocolate Milkshake	Banana Smoothie
Soda Water	Yoghurt Smoothie	Vanilla Milkshake	Herbal Tea
Whole Milk	Vegetable Juice	Decaffeinated Coffee	Orange Squash
Semi-skimmed Milk	Hot Chocolate	Tropical Fruit Drink	Irn Bru

WHAT TO DO:

1. The object of the game is to guess the name of the food or drink that you are wearing without looking at the label (i.e. place it on your forehead or on your back). Your classmates can see your label.
2. Walk around the classroom, find a partner and ask a 'yes' or 'no' question.

Example questions: Am I a fruit or vegetable? Am I a dairy food? Am I usually cooked? Do you need a spoon to eat me?
3. You can only ask one question per partner and should continue until you determine what your label says.
4. Once you have guessed your label, stand at the front of the classroom or sit down to wait for the rest of the class.
5. At the end of the game everyone will reveal their identity as different types of drinks.
6. Line up in order from "most healthy" to "least healthy" drink choice. Move around and discuss with each other the correct order.
7. Discuss the order as a class.

DISCUSSION IDEAS:

- Is there anything missing from the line? Where would water be in the line? Why is it important to drink water? Do drinks other than water count towards our daily requirements?
- Use your Live for It! food diary to record what you drink each day for a week, compare results across the class.

EXPLANATION:

There is no exact answer in this activity without making a detailed comparison of the nutritional information for each drink; it should just provide an opportunity for discussion around the choices of drinks we make.

Water is an essential nutrient for a healthy balanced diet. We need water to survive as our bodies are made mostly of water. Water is essential for our vital organs to function correctly and also helps food move through the digestive system. All liquids count towards our daily water requirements; this also includes water in our food (i.e. soups). Some drinks even gives us more than just water (i.e. milk provides a dairy serving; juice provides 1 of our 5 a day). However, some drinks are healthier than others and we should consider the choices we make.

