TEACHER'S NOTES
WHAT'S GOING ON IN YOUR GUTS?

OVERVIEW

Aimed at key stage 4 pupils. They will review the different processes involved in digestion and focus on the role of the enzymes released from the pancreas.

LEARNING OBJECTIVES

- To review the different processes involved in the digestive system as a fun activity and particularly focus on the role of enzymes
- To introduce the way that people with cystic fibrosis (CF) have problems with their digestive system, as the pancreas often cannot release its enzymes

CURRICULUM LINKS

- **KS4**: The ways in which organisms function are related to the genes in their cells
- **KS4**: Human health is affected by a range of environmental and inherited factors, by the use and misuse of drugs and by medical treatments

YOU WILL NEED

- 8m of tubular elastic dressing (Tubigrip)
- Round object to represent food – for example, plastic ball or apple
- Whoopee cushion (optional!)

PREPARATION

- You could dye the Tubigrip pink to make it look more authentic.

Activity

- Review the role of the digestive system
- Invite volunteers to put their hands on the Tubigrip and explain that they are going to act as the muscles pushing the food along as a wave
- Push the 'food' (plastic ball or apple) into one end of the tube and discuss what happens at each stage as it moves along (you could attach labels to different sections of the system)
- You could ask someone to use a whoopee cushion as the ball/apple reaches the other end of the tube
- Explain that the digestive system is often dysfunctional when someone has CF
- Show the film of Ryan's story on **www.genesareus.org**
- Give out the pupil worksheets and ask them to complete the questions

ANSWERS

1. Which part of the digestive system does the pancreas release enzymes into?

Small intestine

2. Complete the table below about the enzymes produced by the pancreas:

Name of enzyme	*Breaks down...*	*...into which building blocks?*
Protease	Protein	Amino acids
Amylase	Starch	Sugars
Lipase	Fat	Fatty acids and glycerol

3. What do you think would be the consequences of these enzymes not being released by the pancreas?

There are a number of consequences:

1. People cannot get the nutrients and energy they need from food. This can lead to them being malnourished and losing a lot of weight.

2. A high calorie diet is needed and people also need to take tablets to provide digestive enzymes so they can break down and absorb food.

4. Complete the table below about enzymes:

Statement	*True or false?*
Enzymes are a type of fat	FALSE
Enzymes are a type of sugar	FALSE
Enzymes are a type of protein	TRUE
Each enzyme has a specific role	TRUE
Each enzyme has a number of different roles	FALSE
An enzyme catalyses a chemical reaction	TRUE
An enzyme blocks a chemical reaction	FALSE
Enzymes are only found in the digestive system	FALSE
Enzymes are found all over your body	TRUE
Enzymes are only found in humans	FALSE

5. Name five foods that would allow people with CF to achieve this diet?

Pupils should suggest foods that are high fat, sugar and starch; for example chocolate, nuts, crisps, cheese, fried foods, biscuits, cakes, pizzas, cream, chips, bread, pasta, potatoes, jam, syrup, oily fish, bananas and orange juice.

FURTHER information

- The CF Trust provides excellent information about the condition and about the diet that is recommended for people with CF **www.cftrust.org**.
- An American website called 'Your Genes, Your Health' has animations and films to explain the cause of CF, inheritance, etc. It is pitched above GCSE-standard but would be accessible to able pupils **www.ygyh.org**.

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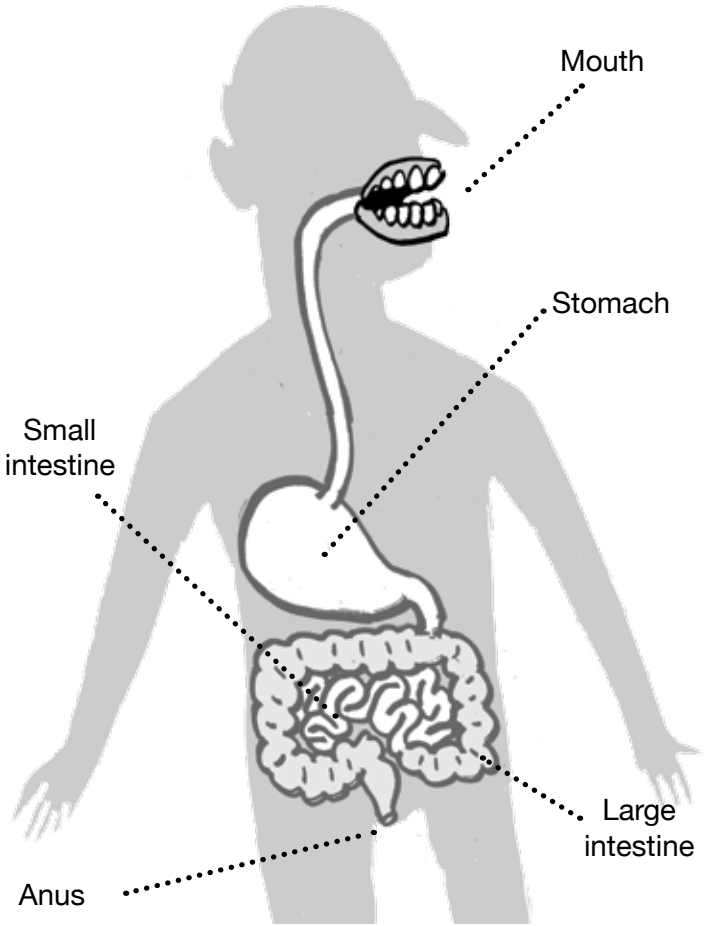
STUDENT WORKSHEET

WHAT'S GOING ON IN YOUR GUTS?

Your digestive system is pretty amazing. Physical and chemical processes break down your food into a form that can be absorbed into your blood. The whole of your digestive tract is approximately 9 metres long and lots of different things happen along its length.



Food travels along the following route and much of the water, energy and nutrients within it are removed, but any waste takes about 1-3 days to complete the journey out of the body.

People with cystic fibrosis (CF) often have problems with their digestive system. A lot of the system works well, but their pancreas is often blocked by thick mucus. The pancreas has an important role in releasing enzymes to help digest your food.

How much do you know about your pancreas? Answer the following questions:

1. ***Which part of the digestive system does the pancreas release enzymes into? (hint it's one of the five areas of the digestive system listed above)***

2. ***Complete the table below about pancreatic enzymes:***

Name of enzyme	*Breaks down...*	*...into which building blocks?*
	Protein	
Amylase		
		Fatty acids and glycerol

When someone has CF, his or her enzymes are often prevented from being released from the pancreas. This means that the three key enzymes produced by the pancreas cannot be used to help break down the food.

3. ***What do you think would be the consequences of these enzymes not being released by the pancreas?***

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4 ***Complete the table below about enzymes:***

Statement	True or false?
Enzymes are a type of fat	
Enzymes are a type of sugar	
Enzymes are a type of protein	
Each enzyme has a specific role	
Each enzyme has a number of different roles	
An enzyme catalyses a chemical reaction	
An enzyme blocks a chemical reaction	
Enzymes are only found in the digestive system	
Enzymes are found all over your body	
Enzymes are only found in humans	

People with CF are usually advised to have a high-fat diet, with 20-50% more calories than the general population. They have higher energy needs than most people because they do not absorb their food as easily and fighting infections also means they require more energy.

5 ***Name five foods that would allow people with CF to achieve this diet?***