**A model of digestion**



Imagine that:

* the brick models you have been given are pieces of food in the digestive tract
* the piece of card is the wall of the digestive tract
* you are a digestive enzyme in the digestive tract.

**To talk about in your group**

1. Which types of food can be absorbed through the wall of the digestive tract into the body?
2. Which types of food need to be digested by an enzyme before they can be absorbed?
3. Which types of food cannot be absorbed, and why?

*Biology> Big idea BCL: The cellular basis of life > Topic BCL2: From cells to organ systems > Key concept BCL2.2: Supplying cells – the human circulatory, digestive and gas exchange systems*

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| **Response activity** |
| **A model of digestion** |

**Overview**

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| Learning focus: | Human life depends upon the tissues and organs of the circulatory, digestive and gas exchange systems working together to support the life processes of the cells from which we are made. |
| Observable learning outcome: | Describe simply the structures and functions of the human digestive system. |
| Activity type: | Modelling, discussion |
| Key words: | digestive system |

This modelling and discussion activity can help overcome students’ misunderstandings about digestion and why only part of the food we eat is absorbed, and can be used in response to the following diagnostic questions:

* Diagnostic question: What happens to the food we eat?

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| **P** | **PRIOR UNDERSTANDING**  This activity explores ideas that are usually taught at age 5-11, to aid transition from earlier stages of learning. |

**What does the research say?**

From an early age, children understand that ‘goodness’ is taken out of food after it is eaten, though there is little understanding of the chemical process of digestion even in older children (Driver et al., 1994; Millar, 2011; AHİ, 2017). Many students think that while food is broken down, its chemical composition remains unchanged (Teixeira, 2000; García-Barros, Martínez-Losada and Garrido, 2011). Several studies have found that most children up to age 7 believe that all the food we eat stays in the body; by age 10, approximately 50-75% of children think part of the food stays and part of it leaves, with the remaining children’s ideas split between all of the food staying and all of it leaving (Teixeira, 2000; AHİ, 2017).

A common misconception held by school children is that digestion (rather than cellular respiration) is the process that releases useful energy from food, perhaps because students incorrectly link two ideas – i.e. that digestion breaks down food, and that organisms get energy from food (Simpson, 1984). Some children incorrectly describe digestion as ‘melting’ or ‘dissolving’ (Çakici and Yilmaz, 2005).

**Ways to use this activity**

Students should complete this activity in pairs or small groups.

Give each group a piece of card or material into which holes have been cut, to represent the wall of the digestive tract. Also give each group several lumps of Lego (or similar) built from numerous bricks, as well as some loose bricks, to represent piece of food.

* The loose bricks should be able to fit through the holes in the card (or net) – they represent molecules of water and minerals that can be absorbed without being digested.
* The larger lumps need to be digested before they can be absorbed – they represent carbohydrates, proteins and fats; the students act as digestive enzymes (or ‘stomach acid’, if you prefer), and break the lumps apart so that the loose bricks can then be absorbed.
* Some of the lumps should have been glued together such that they cannot be broken apart – they represent fibre, which cannot be digested and therefore cannot be absorbed.

You may wish to use different coloured bricks to represent particular things that are absorbed from food – for example glucose, amino acids and so on. Tell the students what each colour represents.

The focus of the activity should be on group discussion to answer the questions on the worksheet. It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each group will often give you insights into how your students are thinking.

After their discussions, each group should be prepared to report the key points of their discussion to another group, or to the class.

*Differentiation*

The quality of the discussions can be improved with a careful selection of groups; or by allocating specific roles to students in the each group. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers. They may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

**Equipment**

For each pair/group:

* one or two lumps of Lego (or similar) built from numerous bricks, which have been glued together so that they cannot be broken apart
* one or two lumps of Lego (or similar) built from numerous bricks, which have not been glued together so that they can be broken apart
* several loose bricks
* a piece of card or material into which holes have been cut, through which loose bricks can pass

**Acknowledgments**

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Images: pixabay.com/Painter06 (3388163)

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