**Talking about cells, tissues and organs**

Some children discuss their ideas about cells, tissues and organs.

**Harry**

I’m sure body tissues are made up of cells.

**Dan**

Cells, tissues and organs must be roughly the same size.

**Amber**

I think cells contain organs such as lungs for respiration.

**Tyler**

I’m sure plants don’t have organs!

**Mia**

Humans, other animals and plants are all made up of tissues.

**Kate**

The organs in your body are made up of tissues.

**To talk about in your group:**

1. Who do you **agree** with?
2. Who do you **disagree** with, and why?
3. How would you explain the right ideas to these children?

*Biology> Big idea BCL: The cellular basis of life > Topic BCL2: From cells to organ systems > Key concept BCL2.1: Working together – cells, tissues and organ systems*

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| **Response activity** |
| **Talking about cells, tissues and organs** |

**Overview**

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| Learning focus: | The cells of multicellular organisms are organised into tissues, organs and organ systems that work together to keep the cells alive. |
| Observable learning outcome: | Distinguish between cells, tissues, organs and organ systems. |
| Activity type: | Talking heads, discussion |
| Key words: | cell, tissue, organ, organ system |

This activity can help develop students’ understanding by addressing the sticking-points revealed by the following diagnostic question:

* Diagnostic question: Cells, tissues and organs

**What does the research say?**

Young children may think of the human body holistically as a single entity, but by age 10 they more commonly understand that it has different functional parts that work together to maintain life (Carey, 1985; Driver et al., 1994).

From age 11, students could begin to explore some basic ideas that introduce a systems view of life (Capra and Luisi, 2014), including the idea that living systems are organised at different levels (molecules, cells, tissues, organs, organs systems and whole organisms) and that life is a property that emerges from the interactions between the parts that make up these different levels (Skinner, 2011).

Researchers have reported the common misunderstanding in children that the bodies of humans and other animals *contain* cells, perhaps floating in a ‘soup’ of body fluids, rather than being *made up of* cells (Clément, 2007). Dreyfus and Jungwirth (1988) found that many 16-year-olds struggled to explain how cells carry out life processes, with many students thinking that cells contain macroscopic organs such as a digestive tract (e.g. for nutrition) or lungs (e.g. for respiration). Cartoon-like depictions of cells with faces, limbs or speech bubbles implying that they are able to speak may introduce or reinforce misunderstandings about the size and scale of cells and organs.

**Ways to use this activity**

Students should complete this activity in pairs or small groups, and the focus should be on discussion within the group. Students should work together to follow the instructions on either the worksheet or the PowerPoint presentation. Giving each group one worksheet to complete between them is helpful for encouraging discussion, but each member should be able to report back to the class. Listening in to the conversations of each group will often give you insights into how your students are thinking.

If there is disagreement when you take feedback, a good way to progress might be through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs.

*Differentiation*

You may choose to read the speech bubbles and questions to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

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.

**Expected answers**

Students should **disagree with Amber**. Cells are much smaller than organs, which are made up of cells. Cells contain organelles.

Students should **disagree with Dan**. Cells are much smaller than organs, which are made up of tissues, which are made up of cells.

Students should **agree with Harry, Kate and Mia**.

Students should **disagree with Tyler**. Plants have organs, for example the reproductive organs in flowers, leaves are the organs of photosynthesis, and the stem and roots are organs that provide support and transport.

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

**References**

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