**Cells, tissues and organs**

The bodies of humans are made up of cells, tissues, organs and organ systems.

Read the statements in the table.

Tick **one** box for each statement.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Statements** | | I am **sure** this is right | I **think** this is right | I **think** this is wrong | I am **sure** this is wrong |
| **1** | Cells contain organs that carry out life processes. |  |  |  |  |
| **2** | Cells, tissues and organs are roughly the same size. |  |  |  |  |
| **3** | Tissues are made up of cells. |  |  |  |  |
| **4** | Organs are made up of tissues. |  |  |  |  |
| **5** | Plants are also made up of tissues. |  |  |  |  |
| **6** | Plants do not have organs. |  |  |  |  |

*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*

|  |
| --- |
| **Diagnostic question** |
| **Cells, tissues and organs** |

**Overview**

|  |  |
| --- | --- |
| 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. |
| Question type: | Confidence grid |
| Key words: | cell, tissue, organ, organ system |

**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 question**

Students should complete the confidence grid individually. This could be a pencil and paper exercise, or you could use the presentation with an electronic voting system or mini white boards.

*Differentiation*

You may choose to read the question and statements 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.

**Expected answers**

1. Cells contain organs that carry out life processes – **wrong**
2. Cells, tissues and organs are roughly the same size – **wrong**
3. Tissues are made up of cells – **right**
4. Organs are made up of tissues – **right**
5. Plants are also made up of tissues – **right**
6. Plants do not have organs – **wrong**

**How to respond - what next?**

If there is a range of answers, you may choose to respond 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. Responses often work best when the activities involve paired or small group discussions, which encourage social construction of new ideas through dialogue.

If students have misunderstandings about the relationship between cells, tissues and organs, and whether these are present in plants as well as animals, the following BEST ‘response activity’ describes a small group discussion activity that could be used in follow-up to this diagnostic question to build understanding:

* Response activity: Talking about cells, tissues and organs

**Acknowledgments**

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Images: pixabay.com/geralt (254120)

**References**

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