**Oxygen**

Some children discuss their ideas about how oxygen moves around the human body.

**Chloe**

I think oxygen mixes with the blood in the lungs.

**Ali**

Air tubes carry oxygen from the lungs to the heart, where it mixes with the blood.

**Grace**

Oxygen diffuses through the body from the air in the lungs.

**Naomi**

Oxygen diffuses from the air in the lungs into blood in blood vessels.

**Jacob**

I think air diffuses from the lungs into the blood.

Who gives the **best** explanation of how oxygen moves around the human body?

*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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| **Diagnostic question** |
| **Oxygen** |

**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: | Explain how substances move into and out of the blood. |
| Question type: | Talking heads, simple multiple choice |
| Key words: | circulatory system, gas exchange system, blood, diffusion |

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| **B** | **BRIDGING**  This diagnostic question probes understanding of ideas that are usually taught at age 14-16, to build a bridge to later stages of learning. |

**What does the research say?**

While most children at age 11 are aware that humans need air to survive, some think that air is breathed into the lungs (or, less commonly, just into the head) and is then breathed out unchanged (Yip, 1998; García-Barros, Martínez-Losada and Garrido, 2011; Allen, 2014).

Students at age 11 are usually aware that ‘air tubes’ link the mouth to the lungs, and that humans have two lungs located in the chest (Bartoszeck, Machado and Amann-Gainotti, 2011; Allen, 2014). However, some students also believe that similar ‘air tubes’ connect the lungs to the heart, and that this explains how oxygen from air enters the blood.

**Ways to use this question**

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

*Differentiation*

You may choose to read the speech bubbles and question 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**

**Naomi** – Oxygen diffuses from the air in the lungs into blood in blood vessels.

**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 how molecules of a substance move by diffusion, including how they diffuse through cells across membranes, key concept BCL1.4 *Diffusion and the cell membrane* provides diagnostic questions and response activities to further probe and develop understanding.

**Acknowledgments**

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Images: UYSEG

**References**

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