**Sam’s symptoms**

Sam is not feeling well.

He has symptoms of an infection.

The symptoms are caused by pathogens inside his body.

Some of Sam’s friends suggest how they think the pathogens are causing his symptoms.

**Ella**

The pathogens are stopping some of his cells and tissues from working properly.

**Maya**

The pathogens are eating him!

**Alfie**

The pathogens are walking around inside his body.

**Ryan**

The pathogens are making toxins that poison him.

Who do you think is right?

You can choose more than one person if you think they are right.

*Biology> Big idea BHD: Health and disease > Topic BHD3: Health and infectious disease > Key concept BHD3.1: Pathogens*

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| **Diagnostic question** |
| **Sam’s symptoms** |

**Overview**

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| Learning focus: | The health of humans, other animals and plants can be affected by infection with pathogens, including viruses and some bacteria and fungi. |
| Observable learning outcome: | Explain simply how pathogens cause symptoms of ill health. |
| Question type: | Talking heads, simple multiple choice |
| Key words: | Health, disease, pathogens, symptoms |

**What does the research say?**

Research suggests that young children’s primary source of health information is their family, television, public health campaigns, and also teachers and friends at school (Maxted, 1984; Brindal et al., 2012). What students learn about microorganisms (often specifically pathogens) from their family, their peers and the media predates and often contrasts with what they learn in school (Bandiera, 2007).

Symptoms of disease appear when the body’s cells or systems have been damaged or are not working normally. Barenholz and Tamir (1987) found that students aged 15-17 could not adequately explain how microorganisms cause symptoms of disease; although they held some correct rudimentary notions such as that microorganisms inside the human body would breed and ‘poison us’, they also held animistic and anthropomorphic views such as that they would ‘walk about’ and ‘eat us’.

**Ways to use this question**

Students should complete the question 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 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**

**Ella** and **Ryan** give correct explanations for how pathogens that have infected the human body can cause symptoms.

Students who choose Alfie or Maya may have animistic and anthropomorphic views of pathogens (and of microorganisms and cells more generally).

**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 (meaning making) through dialogue.

If students have misunderstandings about how pathogens that infected the body can cause symptoms, the following BEST ‘response activity’ enables students to explore their ideas and develop their understanding through small group discussion (with and without prompt cards), and could be used in follow-up to this diagnostic question:

* Response activity: The hole story

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**References**

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