**Without bones**

There are many bones in the human body.

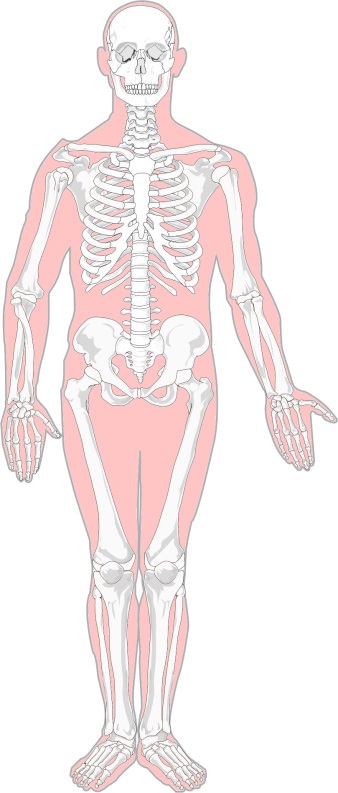
But imagine if there weren’t any…

**Part 1**

The statements in the table suggest what might happen if there were no bones in the human body.

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** | We would be like a floppy jellyfish on the floor. |  |  |  |  |
| **2** | The heart and lungs could get damaged easily. |  |  |  |  |
| **3** | We would not be able to walk around. |  |  |  |  |
| **4** | We would not be able to breathe. |  |  |  |  |
| **5** | We would not be able to make blood. |  |  |  |  |

**Without bones**

There are many bones in the human body.

But imagine if there weren’t any…

**Part 2**

The boxes below describe what would happen if there were no bones in the human body.

Draw straight lines to join each **description** to the correct **explanation**.

|  |  |  |
| --- | --- | --- |
| **Description**  **of what would happen** |  | **Explanation**  **for why it would happen** |
|  |  | The skeleton provides support for the body. |
|  |  |  |
| We would be like a floppy jellyfish on the floor. |  | Bones are hard. |
|  |  |  |
| The heart lungs could get damaged easily. |  | Muscles in the chest move the ribcage. |
|  |  |  |
| We would not be able to walk around. |  | Muscles move bones in the legs. |
|  |  |  |
| We would not be able to breathe. |  | The ribcage protects organs in the chest. |
|  |  |  |
| We would not be able to make blood. |  | The heart makes blood cells. |
|  |  |  |
|  |  | Bones make blood cells. |

*Biology> Big idea BCL: The cellular basis of life > Topic BCL2: From cells to organ systems > Key concept BCL2.3: The human skeleton and muscles*

|  |
| --- |
| **Diagnostic question** |
| **Without bones** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Bones and muscles are tissues that work together with organs in organ systems to support the life processes of cells to keep organisms alive. |
| Observable learning outcome: | Recall that the human body contains a skeleton and muscles for support, protection and movement. |
| Question type: | Confidence grid, linking ideas |
| Key words: | bones, muscles |

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

**What does the research say?**

By age 11, students should know from science lessons that the bodies of humans and other animals have different parts with specific functions, including bones and muscles (AAAS Project 2061, 2009; Department for Education, 2013).

While young children only recognise the supportive and protective (static) functions of the skeleton, older children understand that the skeleton is necessary for movement (Caravita et al., 1988). A number of studies have used students’ drawings to probe their understanding of what is inside the human body. When children up to age 15 were asked to draw what it inside the human body, most drew organs but very few drew muscles, and when muscles were drawn they were commonly only depicted in the limbs (Reiss et al., 2002; Bartoszeck, Machado and Amann-Gainotti, 2011).

**Ways to use this question**

Students should complete the confidence grid and linking boxes tasks 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 questions 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**

*Part 1*

1. We would be like a floppy jellyfish on the floor – **right**
2. The heart and lungs could get damaged easily – **right**
3. We would not be able to walk around – **right**
4. We would not be able to breathe – **right**
5. We would not be able to make blood – **right**

*Part 2*

|  |  |  |
| --- | --- | --- |
| **Description** |  | **Explanation** |
|  |  | The skeleton provides support for the body. |
|  |  |  |
| We would be like a floppy jellyfish on the floor. |  | Bones are hard. |
|  |  |  |
| The heart lungs could get damaged easily. |  | Muscles in the chest move the ribcage. |
|  |  |  |
| We would not be able to walk around. |  | Muscles move bones in the legs. |
|  |  |  |
| We would not be able to breathe. |  | The ribcage protects organs in the chest. |
|  |  |  |
| We would not be able to make blood. |  | The heart makes blood cells. |
|  |  |  |
|  |  | Bones make blood cells. |

**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 the functions of the human skeleton, the following BEST ‘response activity’ challenges students to think about how some of these functions are achieved in organisms without bones, and could therefore be used in follow-up to this diagnostic question:

* Response activity: Standing up

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

Images: adapted by UYSEG from pixabay.com/Clker-Free-Vector-Images (308674)

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