**Biceps and triceps**

The biceps and triceps muscles move some of the bones in the human arm.

**Part 1**

|  |  |
| --- | --- |
| ulna bone  radius bone  triceps muscle  biceps muscle | mass |

The statements in the table describe what happens when we lift a mass, as shown in the pictures.

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** | The biceps muscle pulls on the radius bone. |  |  |  |  |
| **2** | The triceps muscle pushes on the ulna bone. |  |  |  |  |
| **3** | The biceps muscle gets shorter. |  |  |  |  |
| **4** | The triceps muscle gets longer. |  |  |  |  |
| **5** | The biceps muscle contracts. |  |  |  |  |
| **6** | The triceps muscle relaxes. |  |  |  |  |

**Biceps and triceps**

**Part 2**

|  |  |
| --- | --- |
| ulna bone  radius bone  biceps muscle | triceps muscle  mass |

The statements in the table describe what happens when we lower the mass back down again, as shown in the pictures.

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** | The biceps muscle pushes on the radius bone. |  |  |  |  |
| **2** | The triceps muscle pulls on the ulna bone. |  |  |  |  |
| **3** | The biceps muscle gets longer. |  |  |  |  |
| **4** | The triceps muscle gets shorter. |  |  |  |  |
| **5** | The biceps muscle contracts. |  |  |  |  |
| **6** | The triceps muscle relaxes. |  |  |  |  |

*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** |
| **Biceps and triceps** |

**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: | Recognise that muscles, including antagonistic muscles, move bones by contracting. |
| Question type: | Confidence grid |
| Key words: | muscle, bone, tissue |

**What does the research say?**

Several studies have found that children up to age 20 struggle to appreciate that individual bones are not isolated but are connected to make a functional skeleton (Guichard, 1995; Tunnicliffe and Reiss, 1999). While young children only recognise the supportive and protective (static) functions of the skeleton, older children understand that the skeleton is necessary for movement; however, only one fifth of the older children in one study could draw muscles correctly across a joint (Caravita et al., 1988).

Use of real muscles and bones, e.g. raw chicken legs, and models can help children to understand this more effectively, including the idea that muscles can only pull (Haddad, 1995; Goodwyn and Salm, 2007; Fullick, 2011).

**Ways to use this question**

Students should complete the confidence grids 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. The biceps muscle pulls on the radius bone – **right**
2. The triceps muscle pushes on the ulna bone – **wrong** (muscles can only pull, by contracting)
3. The biceps muscle gets shorter – **right**
4. The triceps muscle gets longer – **right**
5. The biceps muscle contracts – **right**
6. The triceps muscle relaxes – **right**

*Part 2*

1. The biceps muscle pushes on the radius bone – **wrong**
2. The triceps muscle pulls on the ulna bone – **right**
3. The biceps muscle gets longer – **right**
4. The triceps muscle gets shorter – **right**
5. The biceps muscle contracts – **wrong** (it relaxes)
6. The triceps muscle relaxes – **wrong** (it contracts, to pull on the ulna)

**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 muscles move bones by contracting, the following BEST ‘response activity’ describes a predict-explain-observe-explain task in which students observe the contraction of a muscle fibre cut from a piece of fresh meat. It could be used to help build understanding in response to this diagnostic question:

* Response activity: PEOE – Muscle fuel

If students have misunderstandings about how antagonistic muscles work across a joint, the following BEST ‘response activity’ describes the use of models (including raw chicken legs and artificial models) to help build understanding in response to this diagnostic question:

* Response activity: Visualising muscles and joints

**Acknowledgments**

Developed by Alistair Moore (UYSEG)

Images: UYSEG

**References**

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