Neurons

British Neuroscience Association

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Background

The aim of this session is to introduce students (aged 5-11) to the brain and the cells inside it, neurons. Students will have the opportunity to discuss what they already know about the brain, learn some basic fun facts and recognise that the brain is made up of billions of neurons. This information sheet should be used in conjunction with the 'Primary– Neurons PPT' PowerPoint presentation.

Introducing the Brain 'Scientist says'

(Slide 1) Title slide. **(2)** A great way to start any session is to get the students moving around. Based on the familiar children's game 'Simon says', 'Scientist says' will introduce the students to the brain, its multiple functions and allow you to explore their previous knowledge and level.

Ask the class to stand up and find some space around them. Although the rules may be familiar to them, reiterate that they must only carry out the action when you begin with 'Scientist says'. Ask each student to sit down when they incorrectly carry out an action without 'Scientist says' included beforehand.

Possible actions could include: Wave your left arm, lift your right leg, wiggle your nose, stick out your tongue.

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When the game is complete, instruct students to sit down and ask them what they think is responsible for carrying out these actions (you may encourage answers of the brain by pointing to your own head). Emphasise that the brain has many jobs, not just in making actions happen but also stopping them as well.

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(3) Ask the students what else they know about the brain. This is also a good opportunity for you to inform the students on some interesting brain facts, including:

- 'The human adult brain is just a bit heavier than a bag of sugar' (1.3kg).'
- 'The top of the brain looks similar to a walnut with a wrinkly part on top. If the brains wrinkles were spread out, it would be about the size of 4 pieces of paper' (A4).
- 'The brain floats around in a clear(ish) liquid, like water, protected by a hard skull because it is soft and may be damaged easily.'

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(4) Ask the students what they think the machine is/ does. Inform them that this is a brain scanner and allows scientists to see inside people's heads and their brains, as shown in the accompanying MRI image.

(5) With the latest technology we can see how the brain is connected, like in this video.

Summarise by informing the students that the brain is the control centre for the body and incredibly important for everything we do. It makes us who we are!

Tip: Visual aids (e.g. model of the brain) may help you keep the attention of the students and boost your own confidence. If a screen is available, you could use a 3D brain model such as the one found at brainfacts.org/3d-brain.

Roche

This activity has been supported by a grant from Roche Products Ltd

Activity - Making a Neuron

In this next activity, students will be introduced to neurons.

(6) You may wish to ask questions to stimulate discussion such as 'Do you know what the brain is made up of?'

At primary level, it is unlikely that the students have encountered the concept of cells. Therefore, it may be useful to start with an analogy based around something they are familiar with e.g. LEGO bricks as pieces of a whole structure.

(7) To give some sense of scale, you can inform students that although neurons differ in size, they are just smaller than the width of a human hair. There are also around 86 billion neurons in an adult brain - more than 10X the number of people on earth.

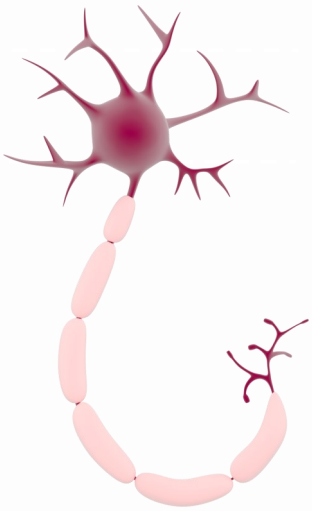
(8) Inform the students that we can look at neurons up close by using microscopes. On the left image, we can see a single neuron with its main body and what look like arms or branches on a tree. On the right image, you can see lots of neurons, all connected together in the brain. Neurons can come in a number of different shapes and have different jobs.

(9) Inform the students that because there are so many branches, it is sometimes difficult to see which neuron they belong to. Therefore, scientists can make each neuron a different colour and see where they go - this is called a 'Brainbow'.

(10) A fun way to explore neurons is by getting the students to make their own. For upper primary school age groups, you may also like to introduce some names/facts/cell components e.g. cell body, dendrites, axon, synapse/terminals.

(11) Take pipe cleaners of different colours and assist the students in constructing their neurons.

If pipe cleaners are not available, you could ask the students to draw the neurons or use modelling clay in petri dishes. The students may wish to take their creations home or they could be displayed in the classroom e.g. hanging from ceiling or stuck to a large outline of the brain.



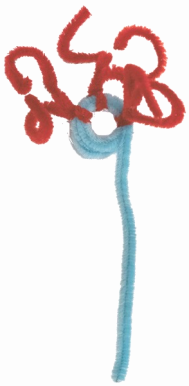
Making a pipe cleaner neuron Step-by-Step

(12) Take one long pipe cleaner and roll half of it into a ball. This is the **cell body**. The other half sticking out is the **Axon**.

Messages travel from the cell body and along the axon.

(13) Take short pieces of pipe cleaner and push them into the cell body, twisting them into the shape of **dendrites**.

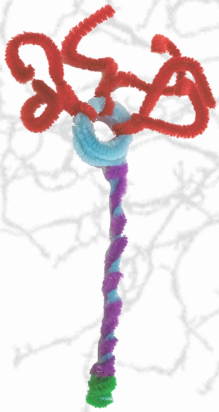
At this point you may wish to stand the neuron on its end and ask what the neuron looks like i.e. if this was hopping around what animal would it be. Similar to a rabbit's ears, the dendrites receive information from other neurons.



(14) Pose the question that, if the neuron is receiving messages from other neurons, what does it also need to be able to do. Encourage of answer of sending on those message to other neurons.

Take another short piece of pipe cleaner and wrap it around the end of the axon to create an **axon terminal**. This can be likened to the 'mouth' of the neuron and allows it to talk/pass on messages to other neurons.

(15) To send the messages faster, neurons have a special coat (**myelin sheath**). Take another short piece of pipe cleaner and wrap it along the axon.



Encourage the students to 'connect' their neuron with another student's - axon terminal to dendrite - to demonstrate how a message is sent.