Build Your Own Neuron

The brain is made up of billions of cells. One of the most important type of cell is the neuron. Neurons are cells that transmit nerve impulses, sending messages throughout the brain and the body. Each neuron is composed of three parts, the cell body, dendrites and an axon.

This activity will allow you to build a special type of neuron called a pyramidal neuron. This is a type of excitatory neuron found commonly in the brain. To build your own neuron you will need:

- Playdough
- Pipe cleaners cut into various lengths (two different colours if possible to represent dendrites and the axon)
- Paper straws cut into short pieces

Step 1

The first thing that your neuron will need is a cell body. The job of the cell body is to control all of the functions of the cell. Pyramidal neurons are so called because their cell bodies look like pyramids.

Take a small handful of playdough and shape it into a rough pyramid shape. It might be easiest to roll the playdough into a ball first before flattening the sides to create a pyramid shape.

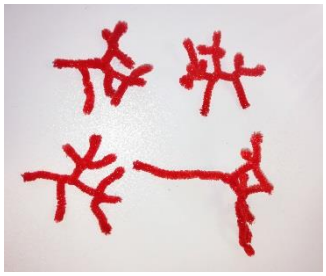
Step 2

The key role of neurons is to send and receive messages. In order to be able to do this, they need to be able to be in contact with any other neurons around it. The cell body is not able to do this on its own. To listen to other neurons, a pyramidal neuron has dendrites. These are highly branching processes that reach out around the neuron to pick up any messages being sent by other neurons.

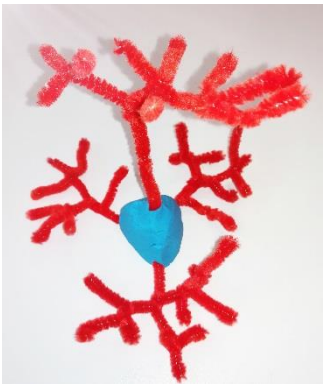
To give your neuron dendrites take some sections of pipe cleaner. With pyramidal neurons, the dendrite at the top (the apical dendrite) is often longer than those coming out of the side (the basal dendrites).

Step 3

In order to reach out and be in contact with as many other neurons as possible, dendrites are highly branched.



Branch out your dendrites by winding pieces of pipe cleaner together to form branches.



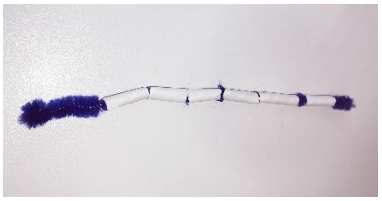
Once you have made your dendrites, add them to your cell body at the points. The longer apical dendrite should stick out of the top of the cell body.

Your neuron is now able to listen to other neurons around it.

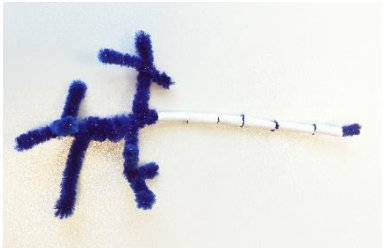
Step 4

As well as listening and receiving messages from other neurons around it, neurons also need to talk. Dendrites are only able to listen or receive messages. In order to talk to other neurons and send messages, a neuron needs a new part. This is called an axon. The axon is typically longer than the dendrites.

Because of its length, an axon will typically need help to send its message quickly and efficiently. This is provided by a myelin sheath formed by helper cells called Schwann cells. The myelin sheath acts as an insulator like the plastic coating on a wire.

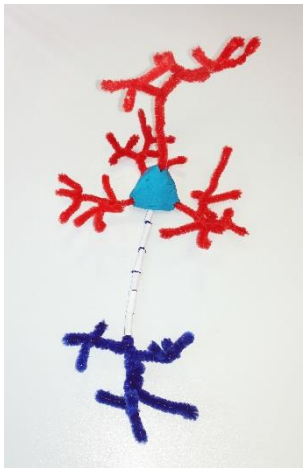


To add an axon to your neuron, take a long piece of pipe cleaner and add some myelin sheaths by threading short sections of a cut up straw, leaving room at either end.



Axons, like dendrites, are branched, but only towards the end. Take a few shorter pieces of pipe cleaner, the same colour as your axon and wind them around near the bottom to create branches for your axon. The axon should branch after the myelin sheath.

Step 5



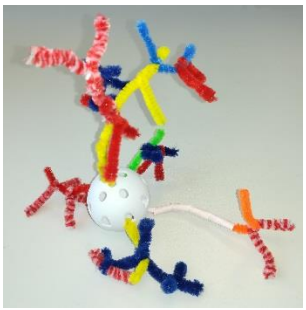
Add your axon to your cell body, with it emerging from the base.

Step back and enjoy your neuron.

Congratulations, you have now made your own 3D pyramidal neuron. It has a cell body to control cell function, it has dendrites to listen to messages from other neurons and it has an axon to talk to other neurons.

Other Ideas

Try creating numerous neurons and put them together to create a neuron field.



If you want to hang up your neurons on display, try replacing the playdough with a small ball with holes to slip the pipe cleaners through. You could even make the cell body out of pipe cleaners.

Just don't be afraid of being big, bold and colourful.