

Neurons hard wired to tell left from right

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It's well known that the left and right sides of the brain differ in many animal species and this is thought to influence cognitive performance and social behaviour. For instance, in humans, the left half of the brain is concerned with language processing whereas the right side is better at comprehending musical melody.

Now researchers from UCL publishing their work in the open access journal *Neural Development* have pinpointed for the first time the left/right differences in how brains are wired at the level of individual cells. To do this, a research team led by Stephen Wilson looked at left and right-sided neurons (nerve cells) in a part of the brain called the habenula.

By causing habenular neurons to produce a bright green fluorescent protein they saw that they form remarkable "spiral-shaped" axons, the long nerve fibres that act as the nervous system's transmission lines.

"It's clear that the left and right halves of the brain process different types of information but almost nothing is known about the differences in the brain's circuitry which achieve this" says Wilson. "One possibility is that totally different types of neuron might be found on the left and right. Alternatively, both sides could contain the same building blocks but put them together in different ways".

The researchers saw that there are two types of habenular neuron and both types can be found on both left and right sides. However, whilst



most left-sided cells have spiral axons shaped into a domed crown, such neurons are not very common on the right. Instead, most right-sided cells form flat, shallow spirals, and these are formed only occasionally on the left.

"In the same way that an engineer can make different electronic circuits from the same set of electronic components, so the left and right halves of the brain use the same types of neuron but in different combinations" explains Isaac Bianco, the student who did this work as part of his PhD studies.

The left and right habenular circuits both connect to the same part of the brain and the researchers found that this target can either combine signals from the left and right or handle them independently.

"Even though language is processed largely on the left side of the human brain, people don't speak with only one half of their mouth. The brain must contain circuits which take information from the left or right and then send it on to targets on both sides of the body" says Wilson.

Source: BioMed Central

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