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Dr Anton Gartner
Researcher

Report

Project Overview

Project title:
Using worms to understand Parkinson's

Lead researcher:
Dr Anton Gartner
University of Dundee, Scotland

Cost:
£196,322.00 over three years

£65,400 is still needed to fund the coming twelve months.

Project background:

In a groundbreaking and innovative project, Dr Gartner's team has been using worms to understand more about dopamine-producing nerve cells.

Initially, the team looked at mutations in a gene called LRRK2, present in some people with the rare inherited form of Parkinson's. They wanted to understand why these mutations cause nerve cells to die and their role in inhibiting the release of dopamine.

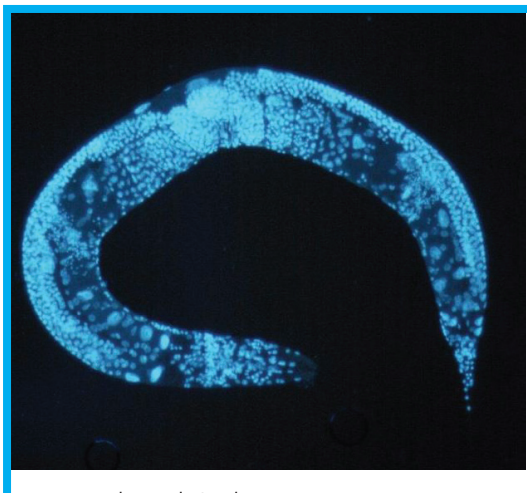
Dopamine is the chemical that nerve cells need to communicate. Without it, someone's movement can become slower and their balance and co-ordination can be affected.

This understanding is vital to the development of new drugs that stop, slow down or ultimately reverse the loss of nerve cells.

What the researchers found:

Using *C. elegans* worms as subjects, the team has been able to build upon an experimental model for Parkinson's to study the loss of dopamine-producing nerve cells – an incredible achievement.

For the first time ever, using their model system, they have managed to isolate a gene that protects the nerve cells that are lost in Parkinson's. So rather than focusing solely on LRRK2, they are now looking in depth at how this new gene works, and searching for further genes that have similar protective behaviours.



An enlarged *C. elegans*

- The team started by studying mutations in the LRRK2 gene, present in some people with inherited forms of Parkinson's.
- Understanding genes that protect neurons lost in Parkinson's provides vital clues as to what is going on inside a dopamine-producing nerve cell when it starts to die, and how to block or slow down this process.
- Ultimately, this could help develop a treatment that protects the very nerve cells that are dying with the onset of Parkinson's – thus stopping the condition in its tracks.

How the research is being carried out

The *C. elegans* worm provides an ideal model, as some of its nerve cells are almost identical to those in the area of the human brain affected by Parkinson's. The worms are grown on Petri-dishes. It takes about three days for one to grow to its full adult size of around a millimetre.

While tiny, these worms have a complete nervous system made up of 302 nerve cells very like those in the human brain (which has billions). By manipulating the genes of the nerve cells in living worms, researchers are able to find out what happens inside these cells when they start to die.

C. elegans has eight nerve cells which are almost identical to those in the human brain that are affected by Parkinson's.

How the study increases our understanding of Parkinson's

Studying worms helps researchers to understand the fundamental mechanisms related to Parkinson's disease; what happens in nerve cells when they die and what makes them vulnerable.

With the discovery of a gene that protects the dopamine-producing nerve cells lost in Parkinson's, researchers are moving ever closer to finding more effective treatments and ultimately a cure.

Finding a gene that protects the nerve cells killed off by Parkinson's is a significant breakthrough, yet as Dr. Gartner admits: 'I wouldn't have been able to go ahead without Parkinson's UK funding'.

What the months ahead might bring

As well as looking for more genes with protective properties, Dr Gartner and his team are working towards taking a human version of the nerve-cell protecting gene (or an equivalent) and putting it into the worm's system to see if it has the same effect.

Other significant results may come out within the next year – hence the importance of continuing this project. The team will be publishing their results, so that the scientific community can take up and build on their findings. These findings will also need to be validated by testing on human genes.

Dr Gartner's project forms a crucial part of our research strategy, namely to fund excellent, fundamental research and to eventually translate its findings into a cure.

Eight of the worm's 302 nerve cells are almost identical to those in the area of the human brain affected by Parkinson's. Along with the fact that they can be maintained and manipulated very cheaply, this makes worms the ideal subject.

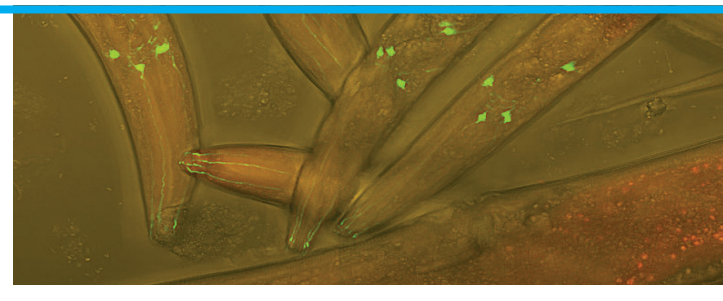


Image: Heiti Paves

By supporting the final year of this study, you'll be helping to build our understanding, so that in the future we can treat the causes of Parkinson's rather than the symptoms.