

What roles do inflammation and iron play inside the Parkinson's brain?



Project information

Lead researcher	Dr David Dexter
Location	Imperial College London
Cost	£35,000 over 12 months
Start date	tbc
Type of project	Innovation Grant
Project code	K-1004

Project background

Iron is essential for life and helps the brain to work normally. It's used for several vital processes including brain development and for producing certain chemicals that nerve cells use to communicate with each other. However too much iron in the brain can cause damage to nerve cells. Past research has found that dopamine-producing nerve cells in people with Parkinson's contain excess iron but we don't yet know why. These are the nerve cells that die in Parkinson's, resulting in the major symptoms of the condition. Finding out what causes the excess of iron could give us a new target for drug treatments that could slow or stop the progress of Parkinson's by protecting the dopamine-producing nerve cells.

- **Excess iron inside nerve cells is found in other brain-related conditions.** For example, Alzheimer's, like Parkinson's, is a condition in which protein builds-up inside nerve cells that stop working normally. And like in Parkinson's, the nerve cells affected in Alzheimer's contain greater than usual amounts of iron.

- **Inflammation may be the trigger that increases iron in the brain.** It's known to play a part in Alzheimer's, and recent research suggests it's also involved in Parkinson's. Cells called microglia sit in amongst nerve cells and activate inflammation, which is a chain of chemical events needed to help cells to repair themselves. Inflammation also increases the amount of iron inside cells.
- **'Free radicals' are natural by-products made inside cells as a result of generating energy.** They can be very toxic to cells when they react with iron as the reaction reduces a cell's ability to make enough energy. Healthy cells are able remove free radicals when they're produced. However cells that contain excess iron may have this balance disrupted. For example cells that are affected by inflammation for an extended period of time may enter a vicious circle in which they can't make enough energy to remove the free radicals, which in turn react with iron to cause more damage.

What the researchers are doing

Dr Dexter's team at Imperial College are trying to find out exactly what role inflammation plays in bringing iron into the nerve cells that die in Parkinson's. We need to know exactly which chemicals are involved and how they work, so the team will try blocking the action of various likely chemicals in nerve cells grown in a lab dish and study the effects.

How the research will help people with Parkinson's

At the end of the project we will know much more about the role that excess iron may play in the death of dopamine-producing nerve cells in Parkinson's. This could then lead on to further research in animals with Parkinson's-like symptoms to find out how the effect happens in a working brain. In other words, it will give us fundamental knowledge that could help develop a treatment to stop nerve cells from dying in people with Parkinson's.

For more information, please talk to the Research Team

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