Vitamin K2: New hope for Parkinson's patients?

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Neuroscientist Patrik Verstreken, associated with VIB and KU Leuven, succeeded in undoing the effect of one of the genetic defects that leads to Parkinson's using vitamin K2. His discovery gives hope to Parkinson's patients. This research was done in collaboration with colleagues from Northern Illinois University (US) and will be published this evening on the website of the authorative journal *Science*.

"It appears from our research that administering vitamin K2 could possibly help patients with Parkinson's. However, more work needs to be done to understand this better," says Patrik Verstreken.

Malfunctioning power plants are at the basis of Parkinson's.

If we looked at cells as small factories, then mitochondria would be the power plants responsible for supplying the energy for their operation. They generate this energy by transporting electrons. In Parkinson's patients, the activity of mitochondria and the transport of electrons have been disrupted, resulting in the mitochondria no longer producing sufficient energy for the cell. This has major consequences as the cells in certain parts of the brain will start dying off, disrupting communication between neurons. The results are the typical symptoms of Parkinson's: lack of movement (akinesia), tremors and muscle stiffness.

The exact cause of this neurodegenerative disease is not known. In

recent years, however, scientists have been able to describe several genetic defects (mutations) found in Parkinson's patients, including the so-called PINK1 and Parkin mutations, which both lead to reduced mitochondrial activity. By studying these mutations, scientists hope to unravel the mechanisms underlying the disease process.

Paralyzed fruit flies

Fruit flies (*Drosophila*) are frequently used in lab experiments because of their short life spans and breeding cycles, among other things. Within two weeks of her emergence, every female is able to produce hundreds of offspring. By genetically modifying fruitflies, scientists can study the function of certain genes and proteins. Patrik Verstreken and his team used fruitflies with a genetic defect in PINK1 or Parkin that is similar to the one associated with Parkinson's. They found that the flies with a PINK1 or Parkin mutation lost their ability to fly.

Upon closer examination, they discovered that the mitochondria in these flies were defective, just as in Parkinson's patients. Because of this they generated less intracellular energy – energy the insects needed to fly. When the flies were given vitamin K2, the energy production in their mitochondria was restored and the insects' ability to fly improved. The researchers were also able to determine that the energy production was restored because the vitamin K2 had improved electron transport in the mitochondria. This in turn led to improved energy production.

Conclusion

Vitamin K2 plays a role in the energy production of defective mitochondria. Because defective mitochondria are also found in Parkinson's patients with a PINK1 or Parkin mutation, vitamin K2 potentially offers hope for a new treatment for Parkinson's.

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