

# Mere expectation of treatment can improve brain activity in Parkinson's patients

November 25 2014

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Immunohistochemistry for alpha-synuclein showing positive staining (brown) of an intraneural Lewy-body in the Substantia nigra in Parkinson's disease. Credit: Wikipedia

Learning-related brain activity in Parkinson's patients improves as much

in response to a placebo treatment as to real medication, according to a new study by researchers at the University of Colorado Boulder and Columbia University.

Past research has shown that while Parkinson's disease is a neurological reality, the [brain](#) systems involved may also be affected by a patient's expectations about treatment. The new study, published in the journal *Nature Neuroscience*, explains how the placebo treatment—when [patients](#) believe they have received medication when they have not—works in people with Parkinson's disease by activating dopamine-rich areas in the brain.

"The findings highlight the power of expectations to drive changes in the brain," said Tor Wager, an associate professor of psychology and neuroscience at CU-Boulder and a co-author of the study. "The research highlights important links between psychology and medicine."

Parkinson's patients have difficulty with "reward learning," the brain's ability to associate actions with rewards and make motivated decisions to pursue positive outcomes. Reward learning is supported by neurons that emit dopamine when an action, like pushing a particular button, leads to a reward, like receiving money.

Reward learning is impaired in Parkinson's patients because the disease causes the neurons that release dopamine to die. Parkinson's patients can be treated for this condition with a medication that increases the dopamine in the brain, L-dopa.

For the new study, the research team—which also includes Columbia University researchers Liane Schmidt, Erin Kendall Braun and Daphna Shohamy—used functional Magnetic Resonance Imaging (fMRI) to scan the brains of 18 Parkinson's patients as they played a computer game that measures reward learning. In the game, participants discover

through trial and error which of two symbols is more likely to lead to a better outcome, in this case a small monetary reward or simply not losing any money.

The Parkinson's patients played the game three times: when they were not taking any medication, when they took real medication (dissolved in orange juice), and when they took a placebo, which consisted of drinking orange juice that they thought contained their medication. The researchers found that the dopamine-rich areas of the brain associated with reward learning—the striatum and the ventromedial prefrontal cortex—became equally active when patients took either the real medication or the [placebo treatment](#).

"This finding demonstrates a link between brain dopamine, expectation and learning," Wager said. "Recognizing that expectation and positive emotions matter has the potential to improve the quality of life for Parkinson's patients, and may also offer clues to how placebos may be effective in treating other types of diseases."

Provided by University of Colorado at Boulder

Citation: Mere expectation of treatment can improve brain activity in Parkinson's patients (2014, November 25) retrieved 27 April 2024 from <https://medicalxpress.com/news/2014-11-mere-treatment-brain-parkinson-patients.html>

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