

'Bird brains' are smart on Alzheimer's

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(PhysOrg.com) -- Tel Aviv University research says our feathered friends may hold the key to a treatment for brain-related diseases

"Bird brain" may be an insult, but [genes](#) found in the brains of these animals tell Prof. Hagit Eldar-Finkelman of Tel Aviv University's Sackler Faculty of Medicine something very exciting about Alzheimer's disease and other brain-related neurodegenerative disorders.

Prof. Eldar-Finkelman and zoologist Prof. Anat Barnea of TAU's Department of Natural Sciences have discovered that [birds](#) are missing a variant of a very common gene, known as "GSK," found in most animals and plants. Unlike most life on planet earth, birds appear to be lacking

the "alpha" variant of the GSK gene. Armed with this information, the world of science now has a new tool for discovering what GSK alpha does to the human brain when it appears in significant amounts.

The GSK gene — or a variant of it — causes a build-up of phosphorus in the brain, and this build-up, called phosphorylation, impacts a protein called tau. This is one of the two major causes of Alzheimer's, according to researchers. Until now, the scientific community has been divided as to whether GSK or its variants GSK alpha and GSK beta cause Alzheimer's. The other major contributing factor is amyloid plaque in the brain.

Highlighting alpha's role

In the course of previous research investigating a cure for Alzheimer's, Prof. Eldar-Finkelman suspected that by investigating the behavior of the variants of the GSK gene, she could speed up the drug discovery process.

"We are trying to develop a specific inhibitor as a potential therapy against diabetes and neurodegenerative diseases. Armed with this new information from birds, we may have a powerful tool for better understanding the role of GSK alpha in the brain," says Prof. Eldar-Finkelman.

As animals evolve and become more complicated, gene variants develop. But for some reason, birds stopped creating the GSK alpha version of the enzyme at one point in their evolution. "That's the fascinating part of the story," she says. "The enzyme is a very important target for drug discovery. What's the difference between alpha and beta, and which variant should we develop the drugs for? Our study shines a new light on the role of the alpha variant."

A new drug formula

The researchers were surprised by their discovery that birds lacked the alpha version of the gene. The loss of the alpha variant may also explain some of the highly evolved learning skills that can be found in sophisticated birds like parrots, Prof. Eldar-Finkelman says.

Prof. Eldar-Finkelman is now pursuing research to confirm that the alpha variant is definitely the GSK variant that causes phosphorus build-up in the brain. If that is the case, removing GSK alpha from the human brain may impede the progression of Alzheimer's disease.

However, Prof. Eldar-Finkelman cautions that some GSK alpha is probably needed for other brain functions. She is working on a drug formulation that moderates, but does not completely eliminate, the enzyme, modulating its presence back to the levels of a healthy [brain](#).

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