New research raises hope for solving Parkinson's disease puzzle

February 28 2011

Anumantha Kanthasamy has been working to understand the complex mechanisms of Parkinson's disease for more than a decade. He believes this recent discovery offers hope for the cure. Credit: ISU photo by Bob Elbert

A protein pathway that may hold the secret to understanding Parkinson's disease has been discovered and explained by Iowa State University researchers.

Anumantha Kanthasamy, a distinguished professor of biomedical sciences and the W. Eugene and Linda R. Lloyd Endowed Chair in Neurotoxicology at the ISU College of Veterinary Medicine, has been working to understand the complex mechanisms of the disease for more than a decade. He believes this recent discovery offers hope for the cure.

The research was funded by the National Institutes of Health and is

published in the Journal of Neuroscience.

Parkinson's disease sufferers lack a sufficient amount of a brain chemical called dopamine. In previous research, Kanthasamy has shown that a novel protein -- known as protein kinase-C (specifically PKCδ) - kills essential dopamine-producing cells in the brain.

Now, Kanthasamy has shown how to modify the production of the kinase-C, and, more important, how to inhibit it.

The process begins with a protein called alpha-synuclein (ά-synuclein) that - after interacting with other proteins in cells - becomes part of the protein complex that modifies kinase-C level in the cells.

One of the proteins that alpha-synuclein interacts with inside the cell is known as p300.

By changing the activity of p300 protein, Kanthasamy believes that production of the destructive kinase-C will be inhibited.

"We have identified an essential pathway that regulates the survival of dopamine-producing nerve cells," he said.

"This p300 is an intermediate protein that is implicit in the Parkinson's disease," he said. "By modifying this protein, we can potentially reduce the expression of kinase-C and the associated destructive effects on dopamine-producing cells."

"We found the mechanism," said Kanthasamy of the pathway. "Now we can focus on finding chemicals that may be able to control the mechanism."

Parkinson's disease strikes around 50,000 people each year, and

approximately 1 million people have the disease. Parkinson's sufferers include actor Michael J. Fox and former boxing champion Muhammad Ali.

Currently, there is no cure for Parkinson's and available therapies only treat the symptoms.

Symptoms of Parkinson's disease include trembling in hands, arms, legs, jaw, and face; rigidity or stiffness of the limbs and trunk; slowness of movement; and impaired balance and coordination. As these symptoms become more pronounced, patients may have difficulty walking, talking, or completing other simple tasks.

Because the disease typically affects people over the age of 50, the National Institutes of Health anticipates the incidence of Parkinson's will increase as the nation's population ages.

Provided by Iowa State University