A protein variant in development by Protalix Biotherapeutics may be capable of alleviating the symptoms of Parkinson's disease, according to a recently published paper on the Journal of Neurodegenerative Diseases' website.

PRX-105, a variant of the protein acetylcholinesterase (AchE), was initially developed for several indications, including as part of a biodefense program: it was meant to act as a countermeasure to nerve gas exposure.

The discovery of the protein variant's relevance in the treatment of Parkinson's was made in a study conducted by Liat Benmoyal-Segal, an Adams Fellowship Fund recipient, within the framework of her doctoral thesis research.

Benmoyal-Segal's study was based on previous research which found low levels of the protein AchE among Parkinson's patients. The previous research had also identified a link between exposure to certain organophosphates, such as those contained in insecticides, and a higher risk factor for the degenerative disease.
Prof. Hermona Soreq, the lead author of the recent paper and former dean of the Faculty of Natural Sciences at the Hebrew University of Jerusalem, is a top researcher of AchE proteins. She says that Benmoyal-Segal's study exposed the mechanism by which changes in the AchE protein's variations - either hereditary or resulting from environmental factors - could stimulate action by the immune system against Parkinson's.

The study involved the insertion of human DNA into a mouse, causing it and its descendants to produce an excess of AchE proteins. During the second phase of the study, Parkinson's patients were injected with PRX-105, causing a pattern of changes in immune system genes that produced better protection against effects of the disease, and without any side effects.

Prof. Soreq pointed out that one million people worldwide are victims of organophosphate poisoning each year, and that 1% of people over 65 years old suffer from symptoms of Parkinson's.

PRX-105 is produced by Protalix through genetically engineered plant cells. Development of the protein variant is based on research by Prof. Soreq and know-how acquired from Yissum Research and Development, a company that helps with the commercialization of Hebrew University's intellectual property, and from the Boyce Thompson Institute for Plant Research, which is affiliated with Cornell University.

When tested on animals, PRX-105 was successful in treating exposure to nerve gas - which, like insecticides, is based on organophosphates - both when the protein was injected shortly before exposure to the gas, and also when injected following exposure.

David Aviezer, CEO of Protalix, said the company is in contact with the U.S. Department of Defense while Phase I clinical trials are being conducted. He added that Protalix would like an agreement on the course of clinical development and the structure of the decisive Phase III trials, which will also be conducted on animals. The company is looking to sign a production and supply contract for the drug, which is expected to be supplied to the U.S. military.

Huge military market

The potential market for a drug treating nerve gas exposure is estimated at hundreds of millions of dollars, based on $1,000 per dose, the price paid for competing products. In 2010 the U.S. defense department announced that it was interested in buying 350,000 doses.

Aviezer added that PRX-105 is safe for mice, based on clinical trials, and that this supports the assessment that the protein could be given to humans. He also pointed out that Protalix intends to enter PRX-105 into its own trials directed at studying the protein variant's effects on Parkinson's disease.

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