

# Risk of Parkinson Disease Associated with Pesticide Exposure and Protection by Probiotics <sup>†</sup>

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**Abstract:** Neurodegenerative diseases are very harmful to human health. Some common neurodegenerative diseases are; Parkinson's disease (PD), Alzheimer's disease (AD), Multiple sclerosis (MS). Their cause is associated with various environmental and genetic factors. Several environmental toxins have been involved in the onset of PD. Some of them increase the risk of PD, such as agriculture, and handling pesticides and heavy metals, cause the death of dopamine-producing neurons. Other environmental factors show reduced risk, for example, electrical vocations and working with extremely low frequency magnetic fields, diesel motor emissions, or solvents that have been examined. Pesticides are the primary class of environmental factors associated with PD. These contain various classes and subclass of herbicides, insecticides, fungicides, rodenticides, and fumigants. Pesticides like paraquat, maneb, and rotenone can increasingly causes Parkinson's disease. Paraquat causes intracellular molecular oxidative stress and damage to cells, Maneb disrupts various biochemical processes within cytoplasm and mitochondria of fungal cells, and rotenone disrupts mitochondrial cells. Pesticides cause genetic alterations in human, which leads to illness. Environmental factors are important to note to detect the prodromal phase of Parkinson's disease. To treat neurodegenerative disease, the gut microbiota should be healthy. There is a microbiota gut-brain axis (MGBA) which joins the brain to the gut via a vagus nerve, which is a bidirectional nerve. Under normal condition, the MGBA help in regulating the digestive system and is also responsible for maintaining homeostasis in metabolic activities. As the gut microbiome becomes badly, the condition becomes stressful. Hence, MGBA function gets disrupted and causes progressive neurodegeneration disease. Not for long-term effects, but to reduce the symptoms of the neurodegenerative disease, the probiotics are useful as they contain good or healthy microbes such as *Lactobacillus*, *Blautia*, *Roseburia*, *Lachnospiraceae*, *Prevotellaceae*, and *Akkermansia*. To treat neurodegenerative disease, various microbes can be used as probiotics.

**Keywords:** neurodegenerative disease; Parkinson's disease; pesticide; dopamine; environmental factor; probiotics.

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## **Conflicts of Interest**

The authors declare no conflict of interest.