

# Systematic Analysis of the Molecular Mechanisms Mediated by Coffee in Parkinson's disease Based on Network Pharmacology Approach

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## Abstract

Many epidemiological studies have associated coffee consumption with a reduced Parkinson's disease (PD) risk, but the molecular mechanisms remain unclear. In this study, systematic pharmacological and bioinformatics approaches were employed to explore the bioactive components and potential mechanisms mediated by coffee in PD. We identified 12 active compounds in coffee associated with 47 PD-related targets, which might exert synergism because some targets were enriched in multiple signaling pathways and biological processes. The compound-target network and protein-protein interaction network exemplified the multi-component and multi-

**Keywords:** Parkinson's disease; Coffee; Network pharmacology; Bioinformatics; Molecular mechanisms

## Introduction

Parkinson's disease (PD) is a neurodegenerative disorder characterized by the loss of dopaminergic neurons in the substantia nigra. The exact etiology of PD remains unclear, but it is believed to be a complex disease involving genetic and environmental factors. Coffee consumption has been associated with a reduced risk of PD in several epidemiological studies. However, the molecular mechanisms underlying this protective effect are not fully understood. In this study, we employed a network pharmacology approach to systematically analyze the molecular mechanisms mediated by coffee in PD. We identified 12 active compounds in coffee associated with 47 PD-related targets. These targets were enriched in multiple signaling pathways and biological processes, suggesting a synergistic effect of coffee components. The compound-target network and protein-protein interaction network exemplified the multi-component and multi-target nature of coffee's effect on PD. This study provides a comprehensive overview of the molecular mechanisms mediated by coffee in PD, which may help to identify potential therapeutic targets and develop novel treatments for this disease.

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