

## **Abstract**

This study explores the nuanced impact of a gluten-free diet (GFD) in comparison to a standard diet (STD) within the 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) mouse model of human Parkinson's disease, utilizing male C57B16 mice. The research involves the establishment of both acute and chronic MPTP mouse models, accompanied by a battery of flow cytometry assessments, including the proportions of regulatory T cells (Tregs), cytokines - interleukin-10 (IL-10), and interferon-gamma (IFN $\gamma$ ), gammadelta T cells and natural killer (NK) cells in mucosal and non-mucosal lymphoid organs.

To ascertain the behavioral impact, an open field test was conducted, providing valuable insights into the locomotor activity and exploratory behavior of the mice in response to the dietary interventions. Additionally, immunofluorescence was employed to validate the effects of MPTP, offering a visual confirmation of any neuroanatomical alterations induced by the neurotoxin.

Preliminary results suggest a subtle yet promising indication of the positive effects of the gluten-free diet. However, these findings warrant cautious interpretation, and further in-depth studies are imperative to establish a more comprehensive understanding of the observed effects. The integration of behavioral assessments, immunofluorescence histology, and immunological analyses underlines the multidimensional nature of this investigation, setting the stage for future research endeavors in the complex interplay among diet, gut, brain, immune responses, and neuroinflammation.

**Key words:** Parkinson's disease, gluten-free diet, MPTP mouse models, behavioral tests, immunohistochemistry, flow-cytometry, T cells, Tregs, NK cells