

INPLASY

A systematic review and meta-analysis of the diagnostic accuracy of fluid biomarkers in Parkinson's Disease

INPLASY202630044

doi: 10.37766/inplasy2026.3.0044

Received: 13 March 2026

Published: 13 March 2026

Nguyen, STT; Ruiz Tejada, J; Tran, D; Rajmohan, R; Phielipp, N.

Corresponding author:

Nicolas Phielipp

nphielip@hs.uci.edu

Author Affiliation:

UC Irvine.

ADMINISTRATIVE INFORMATION

Support - Departmental Support (UC Irvine Health Department of Neurology).

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202630044

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 March 2026 and was last updated on 13 March 2026.

INTRODUCTION

Review question / Objective Our objective is to analyze current efforts of tissue and fluid biomarkers in Parkinson's Disease (PD) to offer insight into their utility for diagnosis and prognosis of the disease in individual patients.

Rationale Although there have been many research efforts to find objective biological markers (biomarkers) in Parkinson's Disease, studies have often not been replicated in research. Objective biological markers with better sensitivity and specificity and quantifying tools to inform the risk of conversion to the motor phase and prognosis are still needed, and therefore our intent is to gather these efforts and assess the data available to examine their utility for diagnosis of PD in patients.

Condition being studied The condition being studied is Parkinson's Disease. Parkinson's Disease (PD) is considered the second most frequent neurodegenerative disorder overall, with

an estimated prevalence of 315 cases per 100,000 people (Pringsheim et al., 2014). In the clinical setting, Parkinsonism is determined based on responses to levodopa, motor fluctuations, positive sympathetic cardiac denervation through MIBG scans, and olfactory loss. However, the prodromal or pre-motor phase of PD may begin years before diagnosis, and initiation of interventions during this time may be ideal, making biomarker identification relevant (Kouli et al., 2018).

METHODS

Participant or population The participants included in this review are People with PD (PwPD) and Healthy Controls (HC). PwPD are participants with clinically established PD. HC are defined as participants who do not have a diagnosis of PD or any other related neurodegenerative disorders.

Intervention We did not evaluate interventional studies.

Comparator As we did not evaluate interventional studies, there is no comparator.

Study designs to be included We followed the PRISMA 2020 guidelines.

Eligibility criteria Our inclusion criteria included studies written in English, investigating biomarkers collected from CSF, blood, skin, or stool samples. Our search includes studies written between June 2005 and June 2025. We excluded meta analyses and reviews, studies which were not available publicly or through institution-provided access, studies with primary focuses other than PD biomarkers, studies that did not compare PD and HC, and studies missing one or more of our critical items for analysis (measure of association, strength of association, and outcome).

Information sources Studies were identified on: PubMed Search, and Elicit AI Search, as well as via manual search by biomarker on PubMed.

Main outcome(s) The main outcomes are identifying the most sensitive and specific biomarker tests from the data available to us..

Quality assessment / Risk of bias analysis We used the Newcastle-Ottawa Scale to assess risk of bias.

Strategy of data synthesis Data will be analyzed via a meta-analysis specific R coding package.

Subgroup analysis We did not include PD subtyping studies.

Sensitivity analysis To analyze sensitivity and specificity, we compared AUC (as well as 95% CI of them, if available) of all our included studies..

Language restriction English.

Country(ies) involved United States of America.

Keywords Parkinson; Movement Disorders; Biomarker.

Contributions of each author

Author 1 - Sydney Nguyen - Author 1 contributed to the project through article identification, screening, review and selection, as well as data extraction and abstraction, analysis, evidence synthesis, interpretation of results, and drafting and revising the manuscript. Author 1 also assisted in the organization and presentation of the findings.

Email: sydnetn2@uci.edu

Author 2 - Jesus Ruiz Tejada - Author 2 contributed to the project through article review and selection, data abstraction, evidence synthesis, statistical analysis, interpretation of results, and drafting and revising the manuscript, as well as assisted in the organization and presentation of the findings and approval of the final manuscript.

Email: jruiztej@hs.uci.edu

Author 3 - Dana Tran - Author 3 contributed to the project through article review and selection as well as data abstraction.

Email: danatran450@gmail.com

Author 4 - Ravi Rajmohan - Author 4 contributed to the project by assisting in organization and planning of the project, revising the manuscript, and approving the final manuscript.

Email: rrajmoha@hs.uci.edu

Author 5 - Nicolas Phielipp - Author 5 contributed to the organization and planning of the project, statistical analysis, and revising the manuscript as well as final approval of the manuscript.

Email: nphielip@hs.uci.edu