

Parkinson's Disease

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1. A Pilot Table Tennis-Based Neurorehabilitation Program to Improve Parkinson's Disease Symptoms.

Authors: Barbera A.; Woodward M.; Buard I.; Sillau S.; Montes R.O. and Feuerstein, J.

Publication Date: 2026

Journal: NeuroRehabilitation , pp. 10538135261468787

Abstract: Background Exercise is the only established disease-modifying intervention in Parkinson's disease (PD), and continued exploration of innovative and engaging exercise modalities may further enhance outcomes for individuals living with PD. Table tennis (TT) is a cognitively engaging, task-specific activity integrating visuospatial processing, anticipatory motor planning, and dynamic postural control. Objective To examine the feasibility, including attendance, retention, and safety, and effects of a 12 week TT-based program, NeuroPong™, on motor and non-motor symptoms in individuals with PD. Methods In this single-arm pilot study, 30 participants were enrolled and 26 completed 12 weeks of twice-weekly, 2-h TT sessions. The primary outcome was the Movement Disorders Society-Unified Parkinson's Disease Rating Scale Part III (MDS-UPDRS III). Secondary outcomes included the Berg

Balance Scale (BBS), Timed Up and Go (TUG), Six-Minute Walk Test (6MWT), Montreal Cognitive Assessment (MoCA) and several patient-reported outcomes. Pre-post comparisons were conducted using paired T-tests. Results Improvements were observed in the MDS-UPDRS Part III (mean change -5.73, 95% CI -9.02 to -2.44, $p = 0.0014$), BBS (mean change +3.08, 95% CI 1.987 to 4.17, $p < 0.0001$), TUG (mean change -1.04, 95% CI -1.69 to -0.38, $p = 0.0032$), and 6MWT (mean change 66.77, 95% CI 49.82 to 83.71, $p < 0.0001$). Self-reported depression decreased (Hospital Anxiety and Depression Scale, HADS-D mean change -1.12, 95% CI -1.97 to -0.26, $p = 0.0129$). Attendance averaged approximately 90%, and no adverse events were reported. No significant changes were observed in other outcomes. Conclusions A 12-week TT-based program, NeuroPong™, was feasible and associated with improvement in motor function, balance, walking endurance and self-reported depression in PD. The multidimensional motor and cognitive demands of table tennis may contribute to these observed benefits. Larger randomized controlled trials are warranted.

2. Allergic disease as a risk factor for Parkinson's disease: a possible role of eosinophil.

Authors: Chang H.J.; Ha S.H.; Lee S.H.; Lee S.; Jeong C.; Shin J.H.; Kim H.J. and Park, H. W.

Publication Date: 2026

Journal: Npj Parkinson's Disease 12(1) (pagination), pp. Article Number: 171. Date of Publication: 01 Dec 2026

Abstract: Neuroinflammation is central to Parkinson's disease (PD) pathogenesis and allergic inflammation may contribute to PD risk, but evidence is limited. Using the Korean National Health Insurance Service database, we conducted a cohort study of 5,036,518 adults aged ≥ 40 years who underwent health examination in 2009 and identified incident PD from 2010 to 2019, excluding prior PD. Asthma, allergic rhinitis, and atopic dermatitis were defined by ICD-10 codes and healthcare utilization, and severity by annual outpatient visits. Cox proportional hazards models estimated hazard ratios (HRs) adjusting for demographics, lifestyle, and comorbidities. We compared eosinophil and neutrophil counts between 234 hospital-based PD patients and 468 controls. During follow-up, 44,621 PD cases occurred (0.9/1000 person-years). PD incidence was increased in asthma (HR 1.16; 95% CI 1.07-1.24) and allergic rhinitis (HR 1.18; 95% CI 1.14-1.22), but not atopic dermatitis. Risk increased with multiple allergic conditions (ptrend = 3/year: HR 1.26; 95% CI 1.16-1.38). In the hospital cohort, PD patients showed higher eosinophil and neutrophil counts, elevated eosinophil/neutrophil ratio, and more frequent eosinophilia ≥ 200 cells/microL (all $p = 3$ /year: HR 1.26; 95% CI 1.16-1.38). In the hospital cohort, PD patients showed higher eosinophil and neutrophil counts, elevated eosinophil/neutrophil ratio, and more frequent eosinophilia ≥ 200 cells/microL (all p Copyright © The Author(s) 2026.

3. Nationwide outcomes of cardiovascular surgery in patients with Parkinson disease.

Authors: Diz Ferre, Jose L.; Cabulong, Alexander; Zhou, Guangjin; Maigrot, Jean-Luc A.; Koroukian, Siran M.; Schiltz, Nicholas; Blackstone, Eugene H. and Soltesz, Edward G.

Publication Date: Jun ,2026

Abstract: Background: Notably, movement disorders like Parkinson disease (PD) are not currently included in the Society of Thoracic Surgeons risk stratification models. This study aimed to provide large-scale contemporary data describing cardiovascular surgery outcomes in patients with PD. Methods: Between 2016 and 2019, the Nationwide Inpatient Sample included 1,051,725 discharges for coronary artery bypass grafting (CABG), valve, aortic, or other cardiovascular surgery. Among these were 4675 patients (0.44%) with a diagnostic code for PD. Balancing-score matching and logistic regression were used to evaluate the influence of PD on cardiovascular surgery outcomes. Results: Patients with PD were more often male, white, age >65 years, and on Medicare and were more likely to undergo CABG. Among balancing score-matched pairs, patients with PD had similar in-hospital mortality (2.3% vs 2.4%; $P = .8$), but more often experienced complications (46% vs 39%; adjusted odds ratio [aOR], 1.30; 95% confidence interval [CI], 1.13-1.50), including ischemic stroke, pneumonia, and delirium, and had more frequent nonhome discharges (54% vs 32%; aOR, 2.46; 95% CI, 2.13-2.84). They also had a longer median length of stay (9 days vs 8 days; $P = .005$). Conclusions: Cardiovascular surgery can be performed safely on patients with PD with no increased hospital mortality, but these procedures are associated with more frequent complications, more frequent nonhome discharges, longer hospital length of stay, and higher costs. Surgeons may consider involving neurologic disorder experts to optimize the care of this vulnerable population. Copyright © 2026 The Author(s).

4. Inhaled Levodopa for the Management of OFF Episodes in Parkinson's Disease: A Cost-Effectiveness Analysis.

Authors: Evans D.;Mistry C.;Knight H.;Shah R.;GuerraPrimo L.;Gadeberg H.C.;Perni S.;Clarke W.;Brown J.;Pietsch G.A.;Silas U. and Carroll, C.

Publication Date: 2026

Journal: Pharmacoeconomics (pagination), pp. Date of Publication: 2026

Abstract: Introduction: OFF episodes in Parkinson's disease (PD), where symptoms worsen despite symptomatic treatment, are associated with significant burden on patients, carers and healthcare providers. There is an unmet need for an effective, on-demand treatment for OFF episodes that provides fast-acting symptom relief. This study estimated the cost-effectiveness of inhaled levodopa (LD) compared with relevant alternatives from a UK National Health Service and Personal Social Services perspective. Method(s): A Markov model was developed comparing inhaled LD with subcutaneous (SC) apomorphine, sublingual (SL) apomorphine, dispersible LD and no on-demand treatment (no-ODT) in adults with advanced PD treated with LD and carbidopa and experiencing OFF episodes. A lifetime time horizon was adopted. Within-trial and beyond-trial models were applied for initial treatment and subsequent therapy, respectively. Model structure comprised 12 health states: ten 'Off' states, an 'On' state and death. Clinical trials and a network meta-analysis informed clinical inputs, with natural history progression applied from year 3. UK national databases and published literature informed costs (2025) and utility data. A 3.5% yearly discount rate is applied to costs and outcomes. Sensitivity analyses and three scenarios exploring alternative progression through health states, caregiver costs and disutilities, as well as subsequent therapy adverse events, were

conducted. Result(s): In base-case analysis, inhaled LD dominated versus dispersible LD and no-ODT and was associated with lower cost and lower quality-adjusted life years (QALYs) versus SC and SL apomorphine. Nevertheless, inhaled LD resulted in net monetary benefit (NMB) of 14,226 and 25,939 compared with SC and SL apomorphine, respectively, at a 25,000 willingness-to-pay threshold. Key model drivers were subsequent therapy costs, discontinuation rates and health state utility values. The probabilistic sensitivity analysis highlighted uncertainty in the model; however, mean probabilistic sensitivity analysis results, along with two scenario analyses, remained consistent with the base case. Conclusion(s): Inhaled LD may be an economically dominant treatment strategy when compared with dispersible LD and no-ODT. When compared with SC and SL apomorphine, cost-savings with inhaled LD may outweigh potentially fewer QALYs, resulting in an NMB. Copyright © The Author(s) 2026.

5. Safety, tolerability, and efficacy of flexible-dose tavapadon for Parkinson's disease (TEMPO-2): a phase 3, randomised, placebo-controlled, double-blind trial.

Authors: Fernandez H.H.; Bhatia P.; Cloud L.; Fietzek U.M.; Matarazzo M.; Molho E.; Peckham E.; Tarakad A.; Combs C.; Leoni M.; Chang I.; Tringali S.; Boiser J.; Sanchez R. and Zadikoff, C.

Publication Date: 2026

Journal: The Lancet Neurology 25(8), pp. 721–730

Abstract: Background: Current dopaminergic therapies for Parkinson's disease carry significant limitations: levodopa can cause long-term motor complications, while D2/D3 receptor-targeting dopamine agonists can produce non-motor adverse effects. Tavapadon is an oral, once-daily, selective D1/D5 agonist that might improve Parkinson's disease motor symptoms. We aimed to evaluate the safety, tolerability and efficacy of flexible-dose tavapadon in people with early-stage Parkinson's disease. Method(s): TEMPO-2 was a phase 3, randomised, double-blind, placebo-controlled trial conducted at 75 clinical sites (both hospital or academic and community settings) across 13 countries. Adults aged 40–80 years with early-stage Parkinson's disease (Method(s): TEMPO-2 was a phase 3, randomised, double-blind, placebo-controlled trial conducted at 75 clinical sites (both hospital or academic and community settings) across 13 countries. Adults aged 40–80 years with early-stage Parkinson's disease (Finding(s): Between Jan 6, 2020, and Feb 22, 2024, 473 individuals were screened and 304 were randomly assigned to receive tavapadon 5–15 mg (n=151) or placebo (n=153). The majority of participants were male (169 [56%] of 304 male; 135 [44%] of 304 female), the mean age was 62.9 (SD 9.2) years, and the mean disease duration was 0.86 (0.79) years. 80 (26%) of 304 participants discontinued from the trial (57 [38%] of 151 on tavapadon and 23 [15%] of 153 on placebo), most commonly due to adverse events (42 [14%] of 304; 36 [24%] of 151 on tavapadon and six [4%] of 153 on placebo). The primary endpoint of change from baseline to week 26 in the MDS-UPDRS Parts II and III combined score was significantly improved with tavapadon versus placebo (least squares mean [LSM] decrease of 10.3 [95% CI -12.2 to -8.3] points vs 1.2 [-2.9 to 0.6] points; LSM treatment difference -9.1 [95% CI -11.7 to -6.5]; p10% of participants) were nausea (45 [30%] of 151) vs five [3%] of 153), headache (25 [17%] vs eight [5%]), and dizziness (24 [16%] vs five [3%]). Interpretation(s): Tavapadon showed significant and clinically meaningful improvements in Parkinson's disease motor symptoms, with low incidence of

somnolence and impulse control disorders. However, the short observation period limits conclusions about long-term tolerability. An ongoing extension study aims to confirm its long-term safety and efficacy. Funding(s): AbbVie. Copyright © 2026 Elsevier Ltd. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

6. Early assessment, diagnosis and treatment of Parkinsonism and Related Syndromes study (ExPRESS): a protocol for an observational study on incident parkinsonism.

Authors: Fumi, Riona Giulia;Caraiscos, Isabella;Jabbari, Edwin;Rittman, Timothy;Rowe, James B.;Ben-Shlomo, Yoav;Hu, Michele T. and Morris, Huw R.

Publication Date: Jul 29 ,2026

Journal: BMJ Open 16(7), pp. e123017

Abstract: INTRODUCTION: Existing evidence from cohort studies of atypical parkinsonism has demonstrated that median time from symptom onset to diagnosis is 3.4 years for progressive supranuclear palsy (PSP) and 3.1 years for multiple system atrophy (MSA). This compares to only 1.0-1.2 years in Parkinson's disease (PD). Earlier diagnosis is essential to facilitate recruitment to disease-modifying treatment trials. In the Early Assessment, Diagnosis and Treatment of Parkinsonism and Related Syndromes study, we will prospectively assess patients across the UK with incident parkinsonism and determine the best predictors to improve early diagnosis of the 'Parkinson-plus' syndromes (PPS) and build a trial-ready cohort. METHODS AND ANALYSIS: In this longitudinal prospective clinical cohort study, we will recruit 500 people with incident parkinsonism or syndromes associated with later PPS. Participants must be within 12 months of their first secondary care appointment for either motor disturbance or other symptoms of prodromes to PPS. Participants will return a self-completed questionnaire about their symptoms and have a structured neurological assessment by a clinician capturing key clinical features, clinical diagnostic criteria and quantitative clinical scales. Blood for DNA and plasma will be collected at baseline. 120 participants recruited to a subset of study sites will be invited to undergo detailed biomarker assessments such as additional blood collection, lumbar puncture, skin biopsy, MRI, cognitive assessments and digital biomarker assessments. We will stratify participants according to their most likely clinical diagnosis at 4 years post-baseline as the gold standard clinical diagnosis. This will be supplemented by neuropathological examination where available. We will use multivariable logistic modelling to identify early predictors of atypical PPS versus PD. Lifetime follow-up will be carried out using medical records linkage with participant consent. ETHICS AND DISSEMINATION: Ethical approvals have been granted by the Queen Square Research Ethics Committee (Ref: 14/LO/1575), with approval from the Health Research Authority and each participating site. Findings from the study will be published in academic journals and presented at UK-wide and international conferences, as well as disseminated via patient advocacy groups and charities including the PSP Association, Cure PSP, Rare Dementia Support and the MSA Trust. Copyright © Author(s) (or their employer(s)) 2026. Re-use permitted under CC BY. Published by BMJ Group.

7. What are the experiences and challenges people with Parkinson's disease and their carers have with their Parkinson's medications? A focus group study

Item Type: Conference Proceeding

Authors: Jones S., van Wamelen D., Chaudhuri K.R. and Patel, J.

Publication Date: 2026

Publication Details: International Journal of Pharmacy Practice. Conference: Health Service Research and Pharmacy Practice Conference. Belfast United Kingdom. 34(Supplement 1) (pp i50-i51); Oxford University Press,

Abstract: Introduction: There are no cures or disease modifying agents for Parkinson's disease (PD). Disease management is based on symptom control through individualised medication regimens.[1] Although medications are central to PD management, little research has been conducted to understand the lived experience and challenges of medications from the perspective of people with PD and their carers.[2]

Aim: To explore and understand the experience people with PD and their carers have with their PD medications. Method(s): We performed a qualitative study employing focus groups. People with PD and their carers from across England were invited through professional networks including Parkinson's UK Excellence Network to participate in focus groups conducted virtually (via Microsoft Teams). A topic guide was used to prompt discussion to explore experience, difficulties and impact of PD on taking medications. Data were analysed using inductive thematic analysis supported by NVivo v14 software.

Result(s): Ten people with PD (7 female) and five carers (3 female) all aged between 55 and 84 years old took part in four different focus groups between March 2024 and January 2025. Analysis of themes identified four key challenges people with PD experience with their medications: (i) complexity: encompassing challenges with taking medications multiple times a day including remembering and managing interactions with food and other medications, e.g. 'I take six different things and they all clash with each other'; (ii) information provision: whereby information about medications received was felt to be insufficient, and problems with communication between healthcare professionals added to confusion, e.g. 'it was never explained to us properly'; (iii) response to medications: including side effects and variation in effects of each dose which were difficult to manage e.g. 'sometimes the tablets decide it for you'; and (iv) logistics of medication intake: which were clearly onerous including administrative tasks to ensure continued supplies, and physical challenges with packaging e.g. 'I'm constantly ordering the next lot'.

Conclusion(s): Our work highlights key challenges faced by people with PD and their carers in managing their PD medications, including complexity, lack of information, response to medication, and actions involved. These findings underline the need for more personalised and supportive approaches in relation to PD medication management. Whilst we reached saturation of themes, the work represents a small sample of people with PD. Further work to validate these themes in a large population would help to inform effective interventions to improve medication experience.

8. MRI-Based Texture Analysis of the Extraocular Optic Nerve in Idiopathic Parkinson's Disease.

Authors: Karakucuk, Seda Nida; Baykara, Murat and Tugan Yildiz, Cemile Buket

Publication Date: Jul 09 ,2026

Journal: Journal of Clinical Medicine 15(14)

Abstract: Objective: To evaluate microstructural and morphological alterations of the extraocular optic nerve in patients with idiopathic Parkinson's disease (IPD) using MRI-based texture analysis and to compare these findings with those of healthy controls. Methods: This retrospective study included 74 participants (37 IPD patients and 37 age- and sex-matched controls). IPD diagnosis was established according to the UK Parkinson's Disease Society Brain Bank criteria. Coronal T2-weighted images obtained from a 1.5-T MRI system were retrospectively analyzed. A round region of interest was placed on the intraorbital extraocular segment of the optic nerve for histogram-based and radiomic texture analyses. Optic nerve sheath diameter (ONSD) was also measured. As no significant differences were observed between right and left eyes, the mean value of both eyes was used for statistical analyses. Statistical analyses included independent samples t-test, Mann-Whitney U test, and chi-square test. Results: No significant differences were observed between groups regarding age or sex ($p > 0.05$). ONSD was significantly greater in the IPD group than in healthy controls (5.2 ± 0.8 mm vs. 3.2 ± 0.5 mm, $p < 0.001$). Conclusions: MRI-based texture analysis reveals significant structural and microstructural alterations in the extraocular optic nerve in IPD, supporting its potential role as a non-invasive imaging biomarker for subclinical visual pathway involvement.

9. Dual Dopaminergic and Limbic-Cognitive Contributions to Gait Parameters in De Novo Parkinson Disease.

Authors: Kim, Sung-Woo; Lee, Myung Jun; Kim, Jin Woo; Yoo, Jang; Kim, Han-Kyeol; Hong, Jin Yong; Liberman, Mark Yoffe and Baek, Min Seok

Publication Date: Aug 11 ,2026

Journal: Neurology 107(3), pp. e218223

Abstract: BACKGROUND AND OBJECTIVES: Parkinson disease (PD) is a progressive neurodegenerative disease in which gait impairment is a common and disabling clinical feature. We aimed to characterize the independent and mediated contributions of striatal dopamine transporter (DAT) availability and gray matter (GM) volume to quantitative gait impairment in de novo PD. METHODS: In this prospective study, we consecutively recruited patients with de novo PD fulfilling the UK Brain Bank clinical criteria and healthy controls (HCs) without focal neurologic symptoms and parkinsonism at Wonju Severance Christian Hospital. All participants underwent GAITRite-based gait analysis, and patients further underwent brain MRI for GM volumetry, 18F-FP-CIT PET for striatal DAT availability, and motor and cognitive assessments. After exploratory gait-related correlation analyses, causal mediation analyses tested whether the effects of neuroimaging biomarkers on gait parameters were mediated by cognition or motor symptom severity. RESULTS: A total of 122 patients with de novo PD

(mean age, 69.66 years; 45.90% female) and 177 HCs (mean age, 72.07 years; 51.41% female) were enrolled. Compared with HCs, patients with PD showed slower velocity, shorter step/stride lengths, reduced swing and single-support time, increased double-support time, and greater dispersion across multiple gait domains. Limbic-related GM volumes were associated with step/stride lengths and temporal phase composition, and these associations were substantially mediated by global cognition (representative ACMEs [95% CIs] for stride length: posterior cingulate cortex, 1.9559 [0.5606-4.2238]; hippocampus, 3.6722 [1.0707-8.2118]; thalamus, 2.8794 [0.0408-7.2535]; amygdala, 4.9696 [1.8241-10.3405]; proportions mediated, 19%-50%). Lower putaminal DAT availability was associated with greater stance time and double-support time variability, whereas lower caudate DAT availability was associated with longer swing and single-support time and altered phase parameters. These associations were not significantly mediated by bradykinesia/rigidity scores; direct effects remained significant (ADEs [95% CIs]: caudate-swing time, -0.0237 [-0.0428 to -0.0086]; putamen-double-support time variability, -2.0249 [-3.1445 to -0.8835]). **DISCUSSION:** These findings support a dual-pathway model of gait regulation in patients with de novo PD, where striatal dopaminergic denervation directly affects gait rhythmicity, whereas limbic system atrophy affects gait through direct and cognition-mediated pathways. This medication-naïve cohort may limit generalizability to the broader PD spectrum.

10. Parkinson's disease genetics across diverse ancestries: an observational genetic study of causal and risk variants with translational implications.

Authors: Lange, Lara M.;Fang, Zih-Hua;Makarious, Mary B.;Kuznetsov, Nicole;Atterling Brolin, Kajsa;Ballard, Shannon;Bardien, Soraya;Doquenina, Maria Leila;Heutink, Peter;Houlden, Henry;Iwaki, Hirotaka;Jasaityte, Simona;Jones, Lietsel;Junker, Johanna;Kaiyrzhanov, Rauan;Koretsky, Mathew J.;Kumar, Kishore R.;Leonard, Hampton L.;Levine, Kristin S.;Lim, Shen-Yang, et al

Publication Date: Aug ,2026

Journal: Lancet Neurology 25(8), pp. 741–754

Abstract: **BACKGROUND:** The genetic architecture of Parkinson's disease varies considerably across ancestries, yet most previous genetic studies have focused on individuals of European ancestry. We aimed to characterise the distribution of established Parkinson's disease causal variants, as well as risk-associated variants with clinical implications (ie, variants in genes involved in pathways targeted by ongoing clinical trials), across ancestrally diverse populations. **METHODS:** We conducted a multi-ancestry, observational, cross-sectional genetic study using retrospective data from the Global Parkinson's Genetics Program (GP2) release 11 (released in December, 2025). The study investigated causal and risk variants, including copy number variants, in established Parkinson's disease and parkinsonism-associated genes, following the recommendations of the Movement Disorder Society (MDS) Task Force on the Nomenclature of Genetic Movement Disorders, including GBA1, LRRK2, SNCA, VPS35, RAB32, PINK1, PRKN, PARK7, ATP13A2, DCTN1, DNAJC6, FBXO7, JAM2, RAB39B, SLC20A2, SYNJ1, VPS13C, and WDR45. Individuals with Parkinson's disease were diagnosed based on established clinical criteria, including the Parkinson's UK Brain Bank or MDS diagnostic criteria (or both), and healthy control participants were defined as individuals without evidence of neurodegenerative disease and

unrelated to participants with Parkinson's disease. We analysed genome and exome sequencing and array genotyping data of 99 783 individuals, including 58 559 individuals with Parkinson's disease and 41 224 controls, from 11 genetically inferred ancestries (African, African admixed, Ashkenazi Jewish, Latino and Indigenous people of the Americas, central Asian, complex admixture, east Asian, European, Finnish, Middle Eastern, and south Asian), defined using reference population-based ancestry inference methods. We calculated allele frequencies for all investigated variants in individuals with Parkinson's disease and controls, both overall and stratified by ancestry. FINDINGS: Approximately 29% of individuals (29 001 of 99 783; 15 443 [26.4%] of 58 559 individuals with Parkinson's disease and 13 558 [32.9%] of 41 224 controls) were from under-represented populations (ie, non-European and non-Ashkenazi Jewish). Our findings indicated both shared genetic contributors across ancestries as well as ancestry-specific differences in variant frequencies and the spectrum of variants within Parkinson's disease-associated genes. Overall, 1217 (2.1%) of 58 559 individuals with Parkinson's disease carried a causal variant, with substantial variations across ancestries ranging from ten (0.4%) of 2844 African individuals to 251 (10.7%) of 2343 individuals of Ashkenazi Jewish ancestry. Risk variants in GBA1 and LRRK2 were identified in 6893 (11.8%) of 58 559 individuals with Parkinson's disease and 3578 (8.7%) of 41 224 controls. GBA1 risk variants were most frequent overall and identified across all ancestries, but variant frequency and spectra differed substantially between ancestries, from 195 (4.1%) of 4773 in the east Asian ancestry group to 1505 (52.9%) of 2844 in the African ancestry group. Similarly, LRRK2 causal and risk variants showed ancestry-specific enrichment, with the highest frequencies of causal variants in the Ashkenazi Jewish (250 [10.7%] of 2343) and Middle Eastern (59 [4.4%] of 1347) ancestry groups, whereas risk variants were predominantly identified in the east Asian ancestry group (601 [12.6%] of 4773). Carriers of biallelic causal variants in PRKN, commonly including deletions and duplications, were also identified across all ancestries except Ashkenazi Jewish; the highest frequency was in the Middle Eastern ancestry group (17 [1.3%] of 1347), and frequencies in all other ancestries were less than 1%.

INTERPRETATION: This large-scale, multi-ancestry genetic study offers crucial insights into the population-specific genetic architecture of Parkinson's disease. Whereas clinical trials targeting GBA1 and LRRK2 variant carriers are primarily performed in Europe and the USA, increased ancestral diversity in Parkinson's disease research will be crucial to improve diagnostic accuracy, enhance our understanding of disease mechanisms across populations, and ensure equitable application of and access to emerging genetically informed therapies.

FUNDING: Aligning Science Across Parkinson's (ASAP) through the Global Parkinson's Genetics Program (GP2). Copyright © 2026 The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY 4.0 license. Published by Elsevier Ltd.. All rights reserved.

11. Identification of a robust multitarget protein panel for Parkinson's disease via absolute quantification and large-scale external replication.

Authors: Lee, Ho-Won;Choi, Youngtae;Lee, Shinrye;Kim, Jung-Eun;Jeon, Min-Tae;Jo, Myungjin;Park, Gyuri;Park, Jin-Sung;Kim, Do-Geun;Cheon, Mookyoung and Kim, Hyung-Jun

Publication Date: 2026

Journal: Brain Communications 8(4), pp. fcag282

Abstract: This study aimed to identify and validate a robust, generalizable panel of plasma protein biomarkers to improve diagnostic precision in Parkinson's disease. We analysed plasma samples from 12 patients with [18F]-FP-CIT PET-confirmed Parkinson's disease and 15 healthy controls using the Olink Target 96 Inflammation Panel to identify differentially expressed proteins. Candidate biomarkers were subsequently validated through absolute quantification using Luminex and Olink Flex platforms in an independent cohort of 46 patients with Parkinson's disease and 33 amyloid-negative and cognitively normal control participants. To assess generalizability, the findings were replicated across multiple heterogeneous populations using large-scale datasets from the UK Biobank and Global Neurodegeneration Proteomics Consortium (GNPC) cohorts. Markers of neurodegeneration [neurofilament light chain (NfL)] and Alzheimer's disease [phosphorylated tau (pTau181), amyloid beta [Abeta]42, Abeta40] co-pathology were measured using the single molecule array platform. Our analyses revealed elevated levels of interleukin (IL)-10 and IL-17C and reduced levels of urokinase plasminogen activator (uPA) and neurotrophin-3 (NTF3) in patients with Parkinson's disease. These findings were confirmed in the validation cohort. Multitarget models demonstrated superior diagnostic performance over individual markers, with the combination of IL-17C and uPA achieving the highest discrimination (area under the curve = 0.780). External validation in the UK Biobank and GNPC datasets confirmed consistent directional changes of three candidates (IL-17C, NTF3 and uPA), reinforcing the biological relevance of these markers. Notably, while NfL levels were significantly elevated in Parkinson's disease, no significant differences were observed for pTau181 levels or Abeta42/Abeta40 ratios. These findings identify a specific plasma protein panel, particularly the combination of IL-17C and uPA, as a robust and generalizable diagnostic signature that captures fundamental pathophysiological aspects of Parkinson's disease and enhances diagnostic precision alongside established biomarkers. Copyright © The Author(s) 2026. Published by Oxford University Press on behalf of the Guarantors of Brain.

12. Differential Proteomic Response to Smoking Exposure Underlies Reduced Parkinson's Disease Risk in Women.

Authors: Lehrer, Steven and Rheinstein, Peter

Publication Date: Jun ,2026

Journal: Cureus 18(6), pp. e111146

Abstract: Background The inverse association between cigarette smoking and Parkinson's disease (PD) risk, often termed the "smoker's paradox," remains one of the most reproducible observations in neuroepidemiology. Although multiple biological mechanisms have been proposed, the molecular correlates of smoking exposure in large human populations remain incompletely characterized. Methods We analyzed proteomic data from the UK Biobank Olink Explore 3072 platform to evaluate associations between cumulative smoking exposure and circulating proteins implicated in proteostasis, cellular stress responses, and neuronal biology. Sex-stratified linear regression models were performed with adjustment for age at recruitment. Results Among female participants, cumulative smoking exposure was associated with significantly higher circulating HSPA1A (HSP70) levels ($p = 1.82 \times 10^{-6}$), while BAG3 demonstrated a nominal positive association ($p = 0.02$). Independent analyses demonstrated that both smoking exposure ($p = 0.0125$) and circulating estradiol concentrations.

13. Associations of accelerometer-derived daily step counts with future health risks: A phenome-wide association study among over 60,000 UK adults.

Authors: Liu H.Y.;Liu Y.Y.;Ge X.X.;Zhang L.W.;Bai J.Z.;Li Q.M.;Liu L.;Gong T.T.;Wu Q.J.;Sun W. and Gao, S. Y.

Publication Date: 2026

Journal: International Journal of Nursing Studies 183(pagination), pp. Article Number: 105638. Date of Publication: 01 Nov 2026

Abstract: Background: Physical inactivity is a critical global public health concern. While guidelines often focus on moderate-to-vigorous physical activity, step-based targets are more feasible for contemporary lifestyles and provide a practical tool for clinicians and nurses to support patient education, lifestyle counseling, and long-term health management. However, evidence linking wearable device-measured daily steps to a broad spectrum of specific incident disease phenotypes remains limited. Objective(s): To systematically examine the associations between accelerometer-derived daily step counts and the risk of more than 400 incident diseases. Design(s): A prospective, population-based cohort study using a Phenome-Wide Association Study approach. Setting(s): The UK Biobank, a large-scale resource with participants from England, Wales, and Scotland. Participant(s): We included 61,047 to 69,853 UK Biobank participants providing a full week of acceleration data between 2013 and 2015. Method(s): Daily steps were calculated using the validated Verisense algorithm from seven-day accelerometer data. Disease phenotypes were derived from electronic health records and categorized via Phecode Map v1.2 based on standard International Classification of Disease, 10th revision codes. Cox proportional hazards models were used to analyze 435 disease phenotypes (grouped by Phecodes) with ≥ 120 events. Models were adjusted for age, sex, ethnicity, education, smoking, alcohol, body mass index, deprivation, and self-reported health. Dose-response relationships were explored using restricted cubic splines. Result(s): During a median follow-up of 7.9 years, an increase of 5000 steps/day was associated with a lower risk of 64 incident diseases (HR range: 0.57 to 0.95). The strongest inverse associations were observed for type 2 diabetes (HR 0.80, 95% CI 0.76-0.84), acute renal failure (HR 0.82, 95% CI 0.78-0.86), Parkinson's disease (HR 0.57, 95% CI 0.49-0.67), essential hypertension (HR 0.93, 95% CI 0.91-0.95), and cholelithiasis (HR 0.77, 95% CI 0.71-0.83). For these conditions, the minimum dose for substantial benefit ranged from 8697 to 13,240 steps/day. Conversely, five conditions showed higher risk with increased steps, primarily musculoskeletal issues like internal derangement of the knee (HR 1.15, 95% CI 1.07-1.23) and osteoarthritis (HR 1.15, 95% CI 1.06-1.24). The remaining 366 disease phenotypes showed no significant associations. Conclusion(s): Higher daily step counts are associated with a 5% to 43% lower risk for a wide array of diseases across the human phenome. These findings support the use of step-based metrics as a simple, effective tool for clinical monitoring and health promotion, providing accessible alternatives to traditional intensity-based physical activity guidelines and offering potential applications for healthcare professionals in patient counseling and lifestyle management. Copyright © 2026 Elsevier Ltd. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

14. Multitype hand writing as a digital marker for Parkinson's disease.

Authors: Liu, Hao;Deng, Huishan;Wang, Lan;Wang, Xinlu and Mo, Mingshu

Publication Date: 2026

Journal: Clinical Parkinsonism & Related Disorders 15, pp. 100480

Abstract: Background: Handwriting impairment is a distinctive symptom of movement disorders (MDs), such as Parkinson's disease (PD) and Parkinsonian syndrome (PDS). Objectives: Custom-designed digital handwriting (DHW) tools were developed to strengthen the diagnosis of MDs. Methods: Participants with MDs from the Neurology and PET departments at the First Affiliated Hospital of Guangzhou Medical University were recruited to perform digital handwriting (DHW) tasks, which included drawing a line and a cube, and writing a sentence in Chinese (Ch), English (E), and Korean (K). AV133 PET-CT/MRI was used to detect the expression of vesicular monoamine transporter 2 (VMAT2) in the brain. An attention-based one-dimensional convolutional neural network (1D-CNN) model was developed to evaluate DHW indicators for PD diagnosis. Results: A total of 197 participants with MDs and 160 matched controls were included, among whom 55 MD patients underwent AV133 PET-CT/MR for VMAT2 quantification. The machine learning model demonstrated that the DHW scores showed excellent discrimination between MDs and controls, with an area under the receiver operating characteristic curve (AUC) of 0.982. In subgroup analyses, the L + E + K and L + E + K + Cu task combinations effectively distinguished PD from PDS, with AUC values of 0.727 and 0.717, respectively. The diagnostic agreement between the DHW and PET-VMAT2 results reached 85.45%. PET-AV133 imaging revealed a significant 33.7% downregulation of VMAT2 expression throughout the putamen in PD patients compared with PDS patients, with dramatic reductions in the posterior putamen. DHW scores from the L + E + K + Cu task combination were significantly correlated with VMAT2 expression in the caudate nucleus ($q = 0.0005$), specifically within the bilateral caudate heads and bodies. Conclusions: Custom-designed DHW tasks can serve as effective digital markers for PD diagnosis. Copyright © 2026 The Authors. Published by Elsevier Ltd.

15. Understanding the Meaning of a Good Death for People Living With Parkinson's Disease: Qualitative Study.

Authors: Martins L.;Mikelyte R.;Carvalho R.S.;Ferraz H.B.;Oliveira D.;Vanelli J.M.;Tardelli N.R.;Fukushima F.B. and Vidal, E. I. O.

Publication Date: 2026

Journal: Journal of the American Geriatrics Society (pagination), pp. Date of Publication: 2026

Abstract: Background: Parkinson's disease is the second most common neurodegenerative disorder globally. Despite growing attention to palliative care in Parkinson's disease, little is known about what constitutes a "good death" from the perspective of people living with Parkinson's disease (PLwPD). Objective(s): To explore the meaning of a good death for PLwPD. Method(s): In this cross-sectional multicentre qualitative study, we conducted semi-structured interviews with 30 PLwPD recruited through purposive sampling from four geriatric

and neurology outpatient clinics between May 2021 and December 2022. Transcripts were analyzed using inductive thematic analysis. The process involved independent coding and iterative discussions grounded in a constructionist paradigm. Result(s): The sample was diverse in terms of race, gender, age, religious affiliation, educational background, and disease stage. We identified two major themes related to the participants' last days of life: Fears and Coping. Reported fears included experiencing disability, pain and discomfort, fear of feeling shame, fear of being a burden, fear of being abandoned and left helpless. Coping was a multidimensional theme, comprising the relational experience of feeling well cared for (defined by being valued, receiving clear and honest communication, and being treated with love and kindness) alongside the active strategies of finding opportunities for joy and drawing on religiosity and spirituality. Religiosity/spirituality appeared as a key factor in emotional regulation, fostering a sense of purpose and acceptance in the face of death. Conclusion(s): Our findings suggest that improving palliative care for PLWPD requires an approach that actively addresses specific fears and strengthens the multiple dimensions of coping, which include fostering opportunities for joy, supporting spirituality, and enhancing the relational experience of feeling well cared for. This study illuminates often-overlooked aspects of care and provides a basis for the development of person-centered interventions aimed at enhancing the quality of dying-and of life-in this population. Copyright © 2026 The Author(s). Journal of the American Geriatrics Society published by Wiley Periodicals LLC on behalf of The American Geriatrics Society.

16. Clinical and autonomic correlates of chronic Sialorrhea in Parkinson's disease: a questionnaire-based study with cluster analysis of autonomic and dysphagia burden.

Authors: Okusa, Shohei;Nukariya, Tomonori;Nihei, Yoshihiro;Nakahara, Jin and Seki, Morinobu

Publication Date: 2026

Journal: Clinical Parkinsonism & Related Disorders 15, pp. 100467

Abstract: Introduction: Chronic sialorrhea is common in Parkinson's disease (PD), but its clinical correlates and patient awareness of treatment options remain unclear. We examined factors associated with drooling, focusing on autonomic dysfunction and dysphagia, and assessed perceptions of botulinum toxin therapy. Methods: We conducted a questionnaire-based study of consecutive PD outpatients at Keio University Hospital from October to December 2025. Drooling was defined using MDS-UPDRS Part II item 2. Autonomic symptoms were assessed with SCOPA-AUT and swallowing with the Swallowing Disturbances Questionnaire (SDQ). Clinical variables and 123I-metaiodobenzylguanidine myocardial scintigraphy indices were extracted from medical records. Multivariable logistic regression identified factors independently associated with drooling. K-means clustering ($k = 3$) was also performed among droolers using standardized SCOPA-AUT and SDQ scores. Results: Among 208 patients, 116 (55.8%) were classified as droolers. Droolers were more often male and had longer disease and treatment duration, higher Hoehn and Yahr stage, higher levodopa equivalent daily dose, higher SDQ scores, more severe autonomic symptoms, and lower MIBG heart-to-mediastinum ratios. In multivariable analysis, higher SCOPA-AUT and SDQ scores remained independently associated with drooling. Only 34.5% of droolers perceived drooling as problematic, 14.7% were aware of botulinum toxin therapy, and 21.6% were willing to

receive injections. Clustering identified three phenotypes: low autonomic/low dysphagia, high autonomic/high dysphagia, and high autonomic/low dysphagia. Conclusion: Chronic sialorrhea in PD is associated with dysphagia burden and broader autonomic dysfunction, suggesting heterogeneous mechanisms. Limited awareness highlights the need for systematic screening and patient education. Copyright © 2026 The Authors.

17. Clinical and Cost-Effectiveness of the "UCL Live Well With Parkinson's" Toolkit: A Randomised Controlled Trial.

Authors: Schrag A.;Kantilal K.;Rookes T.;Gardner B.;Ambler G.;Hunter R.;Davies N.;Atkinson C.;Schartau P.;Adeleke M.;Gonzalez L.;Wang J.;Carmody M. and Walters, K.

Publication Date: 2026

Journal: The Lancet Regional Health - Europe 68(pagination), pp. Article Number: 101762.
Date of Publication: 01 Se 2026

Abstract: Background: Self-management approaches in people with Parkinson's disease (PD) have potential to improve patient outcomes and reduce complications leading to hospital admissions. We aimed to evaluate the clinical and cost-effectiveness of the UCL Live Well with Parkinson's toolkit, a facilitated self-management intervention for people with PD. Method(s): This two-arm randomised controlled trial in England (Trial Registration: ISRCTN92831552) recruited community-dwelling people with PD from NHS sites and self-referral. They were randomly assigned to the intervention or treatment as usual (TAU), and assessed at baseline, 6- and 12-month follow-up. The primary outcome was the PDQ-39 score, a PD-specific health-related quality of life measure, at 12-months with planned subgroup analyses. Secondary outcomes included non-motor and motor activities of daily living (MDS-UPDRS part I&II), utility values and QALYs derived from the EQ-5D-5L, and total health and social care costs over 12-months. The economic evaluation was based on cost-utility analysis using cost per QALY. All assessors were blinded to group allocation. Analysis was by intention to treat. Finding(s): 166 participants were randomised to the intervention and 180 to TAU, with 12-month follow-up assessments available in 141 (84.9%) and 164 (91.1%), respectively. The primary endpoint (PDQ-39 score) was similar for patients in the intervention and TAU groups (-1.03; 95% CI (-3.03 to 0.97)). Subgroup analyses of PDQ-39 scores in underserved groups however favoured the intervention (-4.0; 95% CI (-6.8 to -1.1)). The combined MDS-UPDRS part I + II score was improved in the intervention compared to the TAU group (-2.61; 95% CI (-4.58 to -0.64)). QALYs were not different between groups (0.018; 95% CI (-0.006 to 0.042)) but total health and social care costs over 12-months were lower in the intervention group compared to TAU (-1282; 95% CI (-2700 to -118)), driven mainly by reduced unplanned hospital admissions. Adverse events were similar in both groups. The Live Well with Parkinson's intervention alongside TAU was 99% cost-effective compared to TAU at a decision threshold of 20,000 per QALY and 98% at 30,000. Interpretation(s): The UCL Live Well with Parkinson's toolkit did not significantly improve health-related quality of life scores overall but improved activities of daily living and reduced health-care costs in comparison to TAU, mainly through reduced unplanned hospital admissions. Funding(s): National Institute for Health and Care Research RP-PG-1016-20001. Copyright © 2026 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license. <http://creativecommons.org/licenses/by/4.0/>

18. A paradoxical plus for Parkinson's in UK's new 'generational smoking ban'.

Authors: Schwarzschild M.A.;Macklin E.A.;Morain S.R.;Bjornevik K.;Olsen A.L.;Chen X.;Gomperts S.N.;Dorsey E.R.;Proitsi P.;Noyce A.J.;Darweesh S.K.L. and Bloem, B. R.

Publication Date: 2026

Journal: Journal of Parkinson's Disease , pp. 1877718X261469373

Abstract: The United Kingdom's recently enacted Tobacco and Vapes Bill introduces a "generational smoking ban," prohibiting tobacco sales to anyone born after 2008. While this landmark legislation is intended to reduce the country's burden of cancer, cardiovascular disease, and stroke, it also may have an unintentional impact on the incidence of Parkinson's disease (PD). Convergent data from observational and genetic studies indicate that non-smokers have approximately double the risk of developing PD compared to smokers. Together with preclinical data, these epidemiologic results support a potential neuroprotective effect of tobacco constituents. The new UK public health policy creates a valuable opportunity to assess prospectively whether reduction in smoking leads to a measurable increase in the age-adjusted incidence of PD, in addition to a much larger decrease in diseases known to be caused by smoking. This natural experiment may paradoxically help prevent PD, both in the long-term by enhancing our understanding of its causes, and in the short-term by motivating efforts to investigate candidate neuroprotective influences within smoked tobacco. Importantly, these benefits may be realized even if the results suggest a causal relationship between smoking and reduced PD risk. Ideally, the insights gained will accelerate development of targeted, non-toxic therapeutic interventions that slow PD without the adverse health consequences associated with tobacco use.

19. Clinical and Kinematic Analysis of Swimming Disorders in Parkinson's Disease.

Authors: Smolentseva I.G.;Kuzmina A.V. and Levin, O. S.

Publication Date: 2026

Journal: Neuroscience and Behavioral Physiology (pagination), pp. Date of Publication: 2026

Abstract: Background. Recent years have seen an increase in complaints of swimming impairments in patients with Parkinson's disease (PD), apparent as partial or complete loss of this motor skill. Research into study of these impairments is of significant scientific and practical interest, as they can significantly limit daily activities, reduce quality of life, and increase the risk of drowning. Objective. To study the incidence of swimming impairments in patients with PD and to conduct a clinical and kinematic analysis of these impairments. Materials and methods. The study included 100 patients with PD Hoehn and Yahr stages I-III. Patients were divided into two groups: those with swimming impairments (study group, n = 67) and those without swimming impairments (reference group, n = 33). Groups were comparable in terms of sex, age, disease duration, and stage ($p > 0.05$). Patients in the study group differed significantly from those of the reference group in having more marked motor impairments as assessed on part III of the MDS-UPDRS scale ($p = 0.033$) and reductions in daily activities on the Schwab and England scale Activities of Daily Living Scale ($p = 0.041$).

Swimming assessment methods: all participants underwent video recording of swimming in a pool with synchronous recording of movements using inertial sensors (accelerometer + gyroscope) and underwater video cameras. Additional methods: clinical and neurological examination, assessment using standard scales (MDS-UPDRS, Schwab and England scale, scales for assessing cognitive and affective functions). Results. Swimming impairments were found to be among the common manifestations of PD and could develop at an early stage. The study results established a connection between the development of a variety of movement disorders during swimming and axial motor impairments. Further research is needed for thorough investigation of this unusual manifestation and methods of its correction. Copyright © The Author(s), under exclusive licence to Springer Nature Switzerland AG 2026.

20. Surgical Outcomes of Degenerative Cervical Myelopathy in Patients with Parkinson Disease: A Systematic Review.

Authors: Takenaka S.; Ishiguro H.; Yoshii T.; Yamada K.; Takasawa E.; Nori S.; Kato S.; Kitamura K.; Furuya T.; Nakashima H.; Wakao N.; Nakanishi K.; Fujiwara Y.; Yoshida M.; Watanabe M. and Chikuda, H.

Publication Date: 2026

Journal: Global Spine Journal (pagination), pp. Date of Publication: 2026

Abstract: Study Design: Systematic review. Objective(s): To synthesize outcomes, complications, and healthcare utilization after surgery for degenerative cervical myelopathy (DCM) in patients with Parkinson disease (PD). Method(s): PubMed/MEDLINE, EMBASE, and the Cochrane Library were searched from inception to March 2026. Eligible studies evaluated adults with PD undergoing cervical decompression with or without fusion for DCM; studies not specifically defining myelopathy but reporting cervical outcomes within broader PD spine cohorts were retained as indirect supportive evidence. Two reviewers independently screened studies, extracted data, and appraised quality using standard checklists. Because of marked heterogeneity, findings were synthesized narratively, with greater weight given to myelopathy-defined cohorts. Result(s): Eleven studies were included: 5 myelopathy-defined cohorts and 6 supportive studies. In myelopathy-defined cohorts, PD patients improved after surgery, but some studies showed smaller gains in modified Japanese Orthopaedic Association (mJOA) or Nurick scores, lower odds of clinically important mJOA improvement, and less EQ-5D improvement compared with non-PD controls. Database studies showed higher complication rates, longer hospital stays, non-home discharge, and a dysphagia/aspiration signal. Supportive studies suggested similar increases in hospitalization and medical complications and raised concern for long-term mechanical failure or reoperation. Conclusion(s): The most direct evidence suggests that patients with PD undergoing surgery for cervical myelopathy may improve neurologically, although functional recovery may be smaller or less clinically meaningful in some cohorts. Perioperative risk and healthcare utilization also appear higher. Indirect supportive evidence further suggests that dysphagia or aspiration-related events and long-term mechanical failure or reoperation are important concerns in this population. Copyright © The Author(s) 2026. This article is distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 License (<https://creativecommons.org/licenses/by-nc-nd/4.0/>) which permits non-commercial use, reproduction and distribution of the work as published without adaptation or alteration, without further permission provided the original work

21. Integrated palliative care service for Parkinson's disease in the UK: impact on place of death.

Authors: Thorman E.;Wright B.;Mundy C.;Baker A.;Wilson E.;Mullins S. and Richfield, E. W.

Publication Date: 2026

Journal: BMJ Supportive and Palliative Care (pagination), pp. Date of Publication: 2026

Abstract: Objectives: Patients with advanced Parkinson's disease and related disorders (PDRD) experience significant symptom burden, yet access to specialist palliative care (SPC) is often limited. The Bristol service uses existing resources to form a multidisciplinary meeting (MDM) attended by both movement disorders and palliative care specialists. This integrates primary and SPC and allows sharing of expertise to holistically address unmet palliative care needs. Here, we evaluate this model. Method(s): We conducted a retrospective review of case notes of patients discussed in the Parkinson's Disease Palliative Care MDM between February 2020 and April 2025. Result(s): Of 106 patients (mean age 77.3 years), 87% were referred by the specialist movement disorders team. The primary reasons for referral included symptom control (74%) and emotional/psychological support (43%). Almost two-thirds (64%) were not previously known to hospice services. During follow-up, 66% of patients died, with a median time to death of 118 days (-10 to 1182). These occurred most commonly at home (43%) or in nursing homes (40%), with few hospital deaths (13%). Conclusion(s): An integrated palliative care service for those with PDRD is sustainable, improves access for groups otherwise unknown to SPC services and may facilitate preferred place of death and reduce hospitalisation at end of life. This requires further evaluation. Copyright © Author(s) (or their employer(s)) 2026. No commercial re-use. See rights and permissions. Published by BMJ Group.

22. Association of Peripheral TNF-alpha and IFN-gamma Expression With Serum Uric Acid Levels and Clinical Disease Severity in Patients With Parkinson's Disease: A Cross-Sectional Study.

Authors: Wilson, Joby Jr;Mallampati, Seetha Rami Reddy;Parawala, Burhanuddin;G, Varunkrishnan and Raja, Arun

Publication Date: Jun ,2026

Journal: Cureus 18(6), pp. e111772

Abstract: Background Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by dopaminergic neuronal loss, neuroinflammation, and oxidative stress. Pro-inflammatory cytokines such as TNF-alpha and IFN-gamma contribute to neuronal injury, whereas uric acid acts as an important endogenous antioxidant. The interaction between inflammatory cytokines and antioxidant status in PD remains incompletely understood. Methods This hospital-based cross-sectional observational study included 44 patients with

clinically diagnosed PD. Disease severity was assessed using the Webster Rating Scale (WRS) and the Hoehn and Yahr (H&Y) staging system. Serum uric acid levels were estimated using the uricase-peroxidase method. Peripheral blood TNF-alpha and IFN-gamma gene expression levels were quantified using quantitative real-time polymerase chain reaction (qRT-PCR) and analyzed using the 2^{-ΔΔCT} method. Correlation analysis and logistic regression were performed to evaluate associations between biomarkers and disease severity. Results The mean age of participants was 73.16 +/- 8.80 years, with a male predominance of 29 (65.9%). TNF-alpha and IFN-gamma expression levels progressively increased with advancing disease severity among patients with PD. Both cytokines demonstrated significant positive correlations with WRS and H&Y scores. In contrast, serum uric acid levels progressively declined with increasing disease severity and showed significant inverse correlations with TNF-alpha and IFN-gamma expression. On multivariate logistic regression analysis, elevated TNF-alpha and IFN-gamma expression remained independently associated with advanced disease severity, whereas higher serum uric acid levels demonstrated a protective association. Conclusion Higher TNF-alpha and IFN-gamma expression, along with lower serum uric acid levels, were associated with greater disease severity. These findings suggest their potential utility as candidate biomarkers, which require validation in larger longitudinal studies. Copyright © 2026, Wilson et al.

23. Vascular Disease, Non-Steroidal Anti-Inflammatory Drugs and Risk of Parkinson's Disease.

Authors: Wotton C.;Hermon C.;Floud S.;Reeves G. and Barnes, I.

Publication Date: 2026

Journal: Annals of Clinical and Translational Neurology (pagination), pp. Date of Publication: 2026

Abstract: Objectives: A history of vascular disease has been shown to be associated with an increased risk of Parkinson's disease, but this may be due to reverse causation. In addition, non-steroidal anti-inflammatory drugs are thought to reduce Parkinson's disease risk, but evidence is inconsistent and confounding by prior vascular disease is possible. Our objective was to examine these associations in the UK prospective Million Women Study. Method(s): A total of 819,575 women were followed from median year 2001 for first hospital admission or death from Parkinson's disease. A history of ischaemic heart disease and of cerebrovascular disease was ascertained through hospital admission records and self-report at baseline. Use of the two non-steroidal anti-inflammatory drugs, aspirin and ibuprofen, was ascertained through self-report at baseline. Cox regression was used to estimate adjusted hazard ratios. Result(s): During an average follow-up of 18 years, 10,364 cases of Parkinson's disease occurred. Women with prior ischaemic heart disease had an increased risk of Parkinson's disease (Hazard ratio 1.45, 95% confidence interval 1.35-1.54), as did women with prior cerebrovascular disease (1.51, 1.32-1.73); both associations were still pronounced 10 or more years after baseline. There was little association of aspirin use with risk of Parkinson's disease (1.06, 1.00-1.13) after adjustment for vascular disease, and no association with ibuprofen use (1.04, 0.97-1.11). Interpretation(s): Ischaemic heart disease and cerebrovascular disease are both positively associated with subsequent risk of Parkinson's disease and these associations are unlikely to be solely due to reverse causation. In contrast, use of non-steroidal anti-

24. Development and validation of a nomogram prediction model for sleep disorders in elderly Parkinson disease patients based on multidimensional data: A retrospective case-control study.

Authors: Wu L.;Zhang L. and Wu, Y.

Publication Date: 2026

Journal: Medicine (United States) 105(27), pp. e49580

Abstract: Sleep disturbances are highly prevalent among elderly patients with Parkinson disease (PD), substantially impairing their quality of life. This study aimed to identify associated risk factors and to develop and validate a nomogram risk prediction model based on multidimensional data, providing a practical tool for early clinical identification and intervention. A retrospective case-control study was conducted on 340 elderly PD patients admitted to a tertiary hospital between June 2023 and June 2025. Multidimensional data were collected through self-designed questionnaires, standardized clinical scales, and electronic medical records. Patients were classified into a sleep disorder group and a non-sleep disorder group using the second version of the Parkinson Disease Sleep Scale (PDSS-2) with a cutoff score of ≥ 18 . Univariate and multivariate logistic regression analyses were performed to identify independent risk factors, which were subsequently incorporated into the nomogram model. Model discrimination was assessed by the receiver operating characteristic (ROC) curve, while calibration was evaluated using bootstrap resampling and calibration plots. The prevalence of sleep disturbances in elderly hospitalized PD patients was 61.2%. Multivariate analysis identified advanced Hoehn-Yahr stage, higher UPDRS-II score, severe nocturnal pain, increased nocturia frequency, and elevated HADS-depression scores as independent predictors of sleep disturbances. The developed nomogram demonstrated good discriminative ability, with an area under the ROC curve (AUC) of 0.867, sensitivity of 0.884, and specificity of 0.765. The Hosmer-Lemeshow test indicated satisfactory model calibration. Sleep disturbances are common in elderly hospitalized PD patients and are influenced by multiple clinical factors. The proposed nomogram model exhibits favorable predictive performance and calibration, offering an effective clinical tool for risk stratification and facilitating early intervention. Copyright © 2026 the Author(s). Published by Wolters Kluwer Health, LLC.

25. A study of the correlation between cognitive function and thyroid hormones in patients with Parkinson's disease.

Authors: Zhang B.;Zeng D.;Luo M.;Zhang Y.;Zhu Y. and Yang, X.

Publication Date: 2026

Journal: Neurological Sciences 47(8) (pagination), pp. Article Number: 628. Date of Publication: 01 Aug 2026

Abstract: Objective: The aim of the present study was investigating the relationship between thyroid hormone levels and cognitive function in Parkinson's disease (PD). Method(s): 431 PD patients were continuously enrolled from The First Affiliated Hospital of Kunming Medical University between January 2019 and December 2024. This study classified PD patients into PDNC and PDMCI groups based on the PDMCI diagnostic criteria defined by MDS. Clinical information including age, gender, length of illness, BMI, education, and levodopa equivalent daily dose (LEDD), and the presence of underlying diseases such as hypertension and diabetes mellitus were collected from all subjects, and all subjects completed the assessment of UPDRS-III score, H-Y staging, MMSE, MoCA (Beijing version), HAMA, and HAMD scale and underwent the evaluation of thyroid hormone serum T3, T4, FT3, FT4, TSH, TG, TAb, and aTG levels. The differences in general clinical data and thyroid hormone levels between the two groups were compared, and the correlation between thyroid hormone levels and each clinical data and different cognitive domains was analyzed. Result(s): Patients in the PDMCI group were older, had a higher proportion of females, had a longer disease duration but fewer years of education, and had higher UPDRS-III, H-Y staging, HAMA, HAMD scores, and LEDDs and lower TSH (all p < 0.05). Conclusion(s): This study suggests that thyroid hormone dysregulation may be associated with cognitive function in Parkinson's disease patients, though this relationship requires further investigation to confirm. This highlights the need for future research to evaluate whether therapeutic modulation of thyroid function could influence cognitive outcomes during the progression of Parkinson's disease. Copyright © Fondazione Societa Italiana di Neurologia 2026.

26. Disease-predominant loci across Alzheimer's disease, Parkinson's disease and Lewy body dementia: evidence from the UK Biobank prospective cohort, conditional GWAS and colocalization.

Authors: Zhang, Ying; Zhang, Zhishuai; Qiu, Shizheng and Hu, Yang

Publication Date: 2026

Journal: Frontiers in Genetics 17, pp. 1865257

Abstract: Background: Alzheimer's disease (AD), Parkinson's disease (PD) and Lewy body dementia (LBD) overlap clinically, pathologically and genetically, complicating interpretation of cross-disorder genome-wide association study (GWAS) signals. Methods: We analysed 322,963 UK Biobank participants with bidirectional time-varying Cox models, one-year and two-year lag analyses, and competing-risk sensitivity models to quantify AD-PD clinical co-occurrence. We then analysed European-ancestry AD, PD and LBD GWAS summary statistics using linkage disequilibrium score regression (LDSC), GCTA-mtCOJO/GSMR, MAGMA, stratified LDSC, brain eQTL/mQTL SMR with HEIDI filtering, and Bayesian colocalization for selected methylation probes. Conditional loci were compared with original GWAS loci to separate shared liability from retained disorder-predominant associations. Results: PD was associated with subsequent AD (fully adjusted HR 2.27, 95% CI 1.94-2.65; P = 6.40E-25), and

AD was associated with subsequent PD (HR 3.14, 95% CI 2.56-3.85; $P = 2.10 \times 10^{-28}$). Lag and competing-risk sensitivity analyses remained concordant. LDSC estimated positive genetic correlations for AD-PD ($r_g = 0.20$; $P = 0.0086$) and PD-LBD ($r_g = 0.61$; $P = 0.0005$). Conditioning reduced genome-wide significant loci from 14 to 9 for AD, from 24 to 21 for PD and from 5 to 2 for LBD. Retained loci included AD signals near CR1, BIN1, CLU, SPI1, MS4A, PICALM, ABCA7 and APOE; PD signals near GBA, NUCKS1, TMEM163, STK39, GAK/TMEM175, BST1, SNCA, LRRK2, MAPT and RIT2; and LBD signals near SNCA/MMRN1 and APOE. MAGMA and S-LDSC highlighted amyloid, lipid, immune, synaptic-vesicle and brain-tissue enrichment patterns. Brain QTL analyses prioritized retained eQTL and mQTL signals, and colocalization supported shared PD-GWAS/mQTL signals at HLA-DRB5, ARHGAP27, CRHR1, MAPT and KANSL1. Conclusion: AD and PD show bidirectional clinical co-occurrence, whereas conditional genetic analyses retain a smaller set of disease-predominant loci and regulatory signals across AD, PD and LBD. These findings refine cross-disorder interpretation and nominate loci for independent genetic and functional validation. Copyright © 2026 Zhang, Zhang, Qiu and Hu.

27. Transcranial magnetic stimulation combined with virtual reality improves quality of life in patients with Parkinson's disease with depression.

Authors: Gu R. and Zeng, G.

Publication Date: 2025

Journal: Frontiers in Neurology 16(pagination), pp. Date of Publication: 11 Jun 2025

Abstract: Purpose - To determine whether combining transcranial magnetic stimulation (TMS) with virtual reality (VR) provides superior improvement in quality of life, depression and anxiety symptoms, cognitive function, and motor performance in patients with Parkinson's disease with depression (PD-D), compared with TMS alone. Methods - We prospectively analyzed 234 cases of Parkinson's disease with depression (PD-D) admitted to our hospital from January 2022 to December 2024, of which 17 cases did not meet the inclusion criteria, 23 cases were excluded by the exclusion criteria, and 4 cases withdrew halfway, and finally 190 cases of PD-D were included. One hundred and ninety patients with PD-D as the subjects of this study. According to the patients' treatment willingness, they were categorized into TMS group (TMS treatment, $N = 106$), TMS + VR group (TMS combined with VR treatment, $N = 84$). Clinical baseline data such as gender, age, body mass index (BMI), duration of PD, history of smoking, history of alcohol consumption, history of diabetes mellitus, history of hypertension, education level, place of residence, marital status, and H-Y staging were collected from all subjects. Results - Compared with the pre-treatment, the HAMA-14, HAMD-17, UPDRS-III scores and PDQ-39 total scores and their sub-scores decreased significantly in both groups after treatment, and their MoCA, MMSE, and ADL-BI scores increased significantly (all $p < 0.05$). Conclusion - The combination of TMS and VR significantly improved the depression and anxiety symptoms, motor function and quality of life of PD-D patients, and the safety was good, which opened up a new path for personalized treatment of PD-D. Copyright © 2026 Gu and Zeng.

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