

Parkinson's Disease

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April 2026

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1. Association of Impulse Control Disorders with Cognitive Performance and Frontal Dysfunction in Patients with Parkinson's Disease.

Authors: Bougia M.;Papadaniil A.;Smaragdaki E.;Papagiannakis N.;Simitsi A.M.;Beratis I.;Kontaxopoulou D.;Fragkiadaki S.;Alefanti I.;Sfikas E.;Alexandratou I.;Antonelou R.;Papageorgiou S.G.;Stefanis L. and Koros, C.

Publication Date: 2026

Journal: Journal of Clinical Medicine 15(5) (pagination), pp. Article Number: 1698. Date of Publication: 01 Mar 2026

Abstract:

Background: Frontal lobe circuit dysfunction, including the mesolimbic network, plays an important role in learning reward behaviors and is involved in the development of impulsive compulsive disorders (ICDs) in Parkinson's disease (PD). ICDs in PD are characterized by disinhibited, reward-driven behaviors performed with poor impulse control, often linked to dopaminergic treatment. The purpose of the present study was to assess the presence of these behaviors in relation to frontal dysfunction and overall cognitive status in a cohort of patients with sporadic PD. Method(s): The study consisted of 55 patients (n = 55), 36 males (65.5%), diagnosed with Parkinson's disease, assessed at the First Neurological Clinic of Eginition University Hospital in Athens. The participants had a mean age of 62.6 (+/-13.54) years, with an average of 11.94 (+/-3.00) years of education and a mean disease duration of 7.17 (+/-5.90) years. The evaluation tools used to assess the participants were the Questionnaire for Impulsive-Compulsive Disorders in Parkinson's Disease (QUIP), Montreal Cognitive Assessment (MoCA), Frontal Assessment Battery (FAB), and Geriatric Depression Scale (GDS). Result(s): The mean score on the QUIP was 0.64 (+/-1.05), with a threshold of 1. Of the total number of patients (n = 55), 18 (32.72%) showed behaviors related to ICDs. The

most commonly reported impulsive compulsive behavior was an excessive preoccupation with hobbies (n = 7, 38.9%), followed by a tendency toward gambling (n = 6, 33.3%). The mean score on the MoCA scale was 24.69/30 (+/-4.25), while the mean score on the FAB scale was 14.70/18 (+/-2.45). Pearson's correlation analysis revealed a moderate positive correlation between total MoCA score and FAB (r = 0.588, p Result(s): The mean score on the QUIP was 0.64 (+/-1.05), with a threshold of 1. Of the total number of patients (n = 55), 18 (32.72%) showed behaviors related to ICDs. The most commonly reported impulsive compulsive behavior was an excessive preoccupation with hobbies (n = 7, 38.9%), followed by a tendency toward gambling (n = 6, 33.3%). The mean score on the MoCA scale was 24.69/30 (+/-4.25), while the mean score on the FAB scale was 14.70/18 (+/-2.45). Pearson's correlation analysis revealed a moderate positive correlation between total MoCA score and FAB (r = 0.588, p Conclusion(s): Lower global cognitive function, as measured by the MoCA, was strongly associated with reduced frontal lobe function, as measured by the FAB, in Parkinson's patients. Additionally, lower scores on the MoCA, particularly in the attention subtests, showed a weak to moderate correlation with increased impulsive compulsive behaviors, as measured by the QUIP. Copyright © 2026 by the authors. Access or request item here:

2. Machine learning analysis of population-wide plasma proteins identifies hormonal biomarkers of Parkinson's disease.

Authors: Chaudhry, Fayzan; Kim, Tae Wan; Elemento, Olivier and Betel, Doron

Publication Date: 2026

Journal: Frontiers in Aging Neuroscience 18, pp. 1730550

Abstract:

With the number of Parkinson's patients expected to rise due to an aging population, there is an increasing need to identify new diagnostic markers. These markers should be affordable and suitable for routine use to monitor the population, help stratify patients for treatment pathways, and provide new avenues for therapy. Genetic predisposition and familial forms account for approximately 10% of Parkinson's disease (PD) cases, leaving a large fraction of the population with minimal effective markers for identifying high-risk individuals. The establishment of population-wide omics and longitudinal health monitoring studies provides an opportunity to apply machine learning approaches to these unbiased cohorts to identify novel PD markers. In this study, we present the application of three machine learning models to identify protein plasma biomarkers of PD using plasma proteomic measurements from 43,408 UK Biobank subjects as the training and test set and an additional 103 samples from the Parkinson's Progression Markers Initiative (PPMI) as external validation. We identified a group of highly predictive protein plasma markers, including known markers Dopa decarboxylase (DDC) and Calbindin 2 (CALB2) as well as new markers involved in the JAK-STAT and PI3K-AKT pathways and hormonal signaling. We further demonstrated that these features are well correlated with UPDRS severity scores and stratified these into protective and risk-associated features that potentially contribute to the pathogenesis of PD. Copyright © 2026 Chaudhry, Kim, Elemento and Betel. Access or request item here:

3. Brain patterns linked to neuropsychiatric genetic risk mirror those seen in disease.

Authors: Chou, Chun-Ju;Del Re, Elisabetta C.;Wang, Hao;Hamada, Kareem;Tian, Xiaoguang;lakunchykova, Olena;Wang, Yunpeng;Fiecas, Mark and Chen, Chi-Hua

Publication Date: 2026

Journal: Imaging Neuroscience (Cambridge, Mass.)

Abstract:

Analyzing brain morphological changes across individuals with varying genetic risk scores may reveal patterns of brain alterations from health to disease. This study investigates gray matter structural alterations in individuals with clinical diagnoses compared with those with genetic risk alone. UK Biobank MRI and genotypes (N = 34,720) were used to derive brain measures and polygenic risk scores, creating genetic risk brain maps for 14 neuropsychiatric disorders. Eight disorders from ENIGMA were used to construct disease brain maps. Brain maps of genetic risk and clinical diagnosis show overall alignment for ADHD, schizophrenia, bipolar disorder, and autism. Other conditions, including Alzheimer's disease, show specific brain regions linked to genetic risk aligning with established patient patterns. Incomplete data for some conditions limit analyses. ADHD and PTSD polygenic burden was associated with smaller global brain sizes, while Parkinson's disease was linked to larger brain volume. Mendelian randomization analyses revealed unidirectional relationships where the brain influences ADHD and Parkinson's disease, while a bidirectional causal association was observed for schizophrenia. Focusing on schizophrenia and bipolar disorder, we found that individuals with high genetic risk combined with smaller brain structures were more likely to have these diagnoses. Overall, the study demonstrates marked similarities in brain changes between clinical diagnoses and genetic risk for several disorders, albeit with mild effect sizes in the latter. These findings underscore the importance of genetic risk in influencing brain anatomy and the progression of neuropsychiatric disorders. Copyright © 2026 The Authors. Published under a Creative Commons Attribution 4.0 International (CC BY 4.0) license. Access or request item here:

4. A mixed methods study exploring factors that impact physiotherapy participation for people with Parkinson's disease.

Authors: Cunningham B.;Hepnar L.;Lamont R.;Brauer S.;O'Sullivan J.D.;Adam R.;Katz M.;Upadhyay S.;De Oliveira J. and Window, P.

Publication Date: 2026

Journal: Disability and Rehabilitation , pp. 1–13

Abstract:

PURPOSE: It is unclear if people with Parkinson's disease (pwPD) are accessing sufficient and timely physiotherapy. This study aimed to determine the need for physiotherapy for pwPD, understand if this need is being met and identify barriers and enablers to accessing physiotherapy. **METHOD(S):** A two-stage mixed-methods approach was undertaken. In Stage 1, a retrospective audit of medical records from 80 pwPD attending a publicly funded movement disorders outpatient clinic in Australia was conducted, followed by phone interviews to quantify need, referral, and uptake of physiotherapy. Stage 2 involved semi-structured

interviews and focus groups with staff and patients to explore factors influencing physiotherapy access. Focus group and interview data were transcribed and analysed using thematic analysis. RESULT(S): Audited records revealed that most pwPD were deemed in need of physiotherapy (83%), but many (61%), were not recommended physiotherapy. Three major themes were identified as contributing; (1) how can physiotherapy help and what is available? (2) too hard basket and (3) financially, that's not feasible. CONCLUSION(S): Access to physiotherapy for pwPD is limited and occurs later in the disease process. The findings suggest that early individualised education, staff training, identification and provision of suitable physiotherapy services close to patients' homes could improve access. Access or request item here:

5. Latent-profile analysis of sleep disturbances, cognitive performance and neuropsychiatric symptoms reveals subtypes of Parkinson's disease.

Authors: El Haffaf L.M.;Domellof M.E.;Ronat L.;Monchi O.;Walton L.;Backstrom D.;Boraxbekk C.J.;Forsgren L.;Nyberg L.;Neely A.S. and Johansson, J.

Publication Date: 2026

Journal: Frontiers in Neurology 17(pagination), pp. Article Number: 1765246. Date of Publication: 2026

Abstract:

Objective: Given the clinical heterogeneity of Parkinson's disease (PD), identification of early-stage subgroups with shared non-motor symptom (NMS) profiles may clarify its pathophysiology. This study used latent-profile analyses (LPA) to define subgroups based on sleep disturbances, cognitive performance and neuropsychiatric symptoms, and examined dopaminergic function and brain volume differences between them. Method(s): We analyzed data from 51 cognitively normal non-PD older adults and 105 early-stage PD participants from the iPARK trial, including 19 who underwent [11C]-raclopride PET/MR. Participants completed the Hospital Anxiety and Depression Scale, the short version of the Karolinska Sleep Questionnaire and a battery of neuropsychological tests. LPA were used in PD to identify subgroups based on NMS profiles, which were then characterized and examined in relation to dopaminergic integrity and brain morphology. Result(s): LPA identified a two-cluster solution as the best fit. Group 1 (N=49) showed poorer working memory, executive function and processing speed along with greater daytime sleepiness, depression and anxiety. Group 2 (N=56) exhibited less affected cognitive function and minimal NMS. Groups were similar in demographics, disease duration, motor symptom severity and medication, but differed on UPDRS-1 NMS. Group 1 demonstrated significantly reduced [11C]-raclopride binding potential compared to Group 2 in the left putamen at both ROI-and voxel-wise analysis. Conclusion(s): These findings indicate clinically distinct subgroups in early-stage PD. Greater NMS burden is linked to impaired dopaminergic integrity, suggesting a potential neurobiological signature. Early identification of such subgroups may improve understanding of disease heterogeneity and support personalized management and interventions. Clinical trial registration: identifier (NCT03680170).Copyright © 2026 El Haffaf, Domellof, Ronat, Monchi, Walton, Backstrom, Boraxbekk, Forsgren, Nyberg, Neely and Johansson. Access or request item here:

6. Early bone health assessment is indicated in Parkinson's: Risk factor analysis in a UK population-based cohort study.

Authors: Gandhi S.E.;Grosset K.A.;Iruthayaraj P.A.;Lee L.;Doyle C. and Grosset, D. G.

Publication Date: 2026

Journal: Journal of Parkinson's Disease , pp. 1877718X261429758

Abstract:

BackgroundOsteoporosis and major osteoporotic fracture are more common in PD than controls, but evaluation of sociodemographic factors and preventive treatment is limited.MethodsIn a UK population-based nested case-control study, incidence rates of osteoporosis and major osteoporotic fracture were calculated, and risk factors and bone health treatments analyzed by multivariable regression.ResultsFalls, osteoporosis and major osteoporotic fracture were more likely before a diagnosis of PD compared to controls ($P < 0.0001$). After diagnosis, incident osteoporosis, HR 1.96 (1.90, 2.02) and incident fractures, HR 2.16 (2.11, 2.21) were more likely in PD than controls, both $P < 0.005$. Risks of fracture were increased in PD cases during 3 consecutive time periods post-diagnosis: 0-7 years, HR 2.15 (2.09, 2.21), 7-14 years, HR 2.36 (2.24, 2.48), and 14-21 years, HR 1.88 (1.62, 2.17), all $P < 0.0001$. Risks of osteoporosis and fracture increased with older age, female sex, greater deprivation and White ethnicity. In PD, anti-osteoporosis treatment was underutilized in men, OR 0.25 (0.24, 0.26) versus women, being lower than the relative risks of osteoporosis in men, HR 0.35 (0.32, 0.37) and fracture in men, HR 0.60 (0.57, 0.63). There was also underutilization of anti-osteoporosis treatment in the most deprived quintile, HR 0.85 (0.80, 0.90), despite significantly higher rates of osteoporosis, HR 1.14 (1.01, 1.28) and fracture, HR 1.17 (1.06, 1.30).ConclusionThe increased bone health risks at all stages including the prodrome, and across multiple risk categories, emphasizes the need for early bone health assessment and increased anti-osteoporosis treatment rates. Access or request item here:

7. When caution becomes neglect: Deep brain stimulation and cognitive impairment in Parkinson's disease.

Authors: Lewis, S. J.

Publication Date: 2026

Journal: Journal of Parkinson's Disease , pp. 1877718X261428282

Abstract:

Over the past 25 years, a prevailing clinical dogma has held that significant cognitive impairment constitutes a contraindication to the use of Deep Brain Stimulation in Parkinson's disease. Whilst multiple studies, excluding such patients, have repeatedly emphasised the motoric benefits of this approach, less consideration has been given to the consequences of excluding this cohort. However, emerging evidence suggests that Deep Brain Stimulation in Parkinson's Disease patients with moderate cognitive impairment not only allows for significant reductions in dopaminergic therapy (typically alleviating many non-motor symptoms) but also favours survival and reduced admissions into institutional care. These small studies have not demonstrated significantly increased surgical or stimulation related complications in such patients and would suggest that further prospective studies, specifically evaluating this

approach are warranted. Indeed, in the absence of a successful disease modifying therapy, exclusion from Deep Brain Stimulation often commits these advanced patients to a trajectory of ineffective pharmacological complexity. Alternative infusion therapies are associated with high discontinuation rates whilst escalating dopaminergic therapy, frequently exacerbates non-motor complications, including orthostatic hypotension, hallucinations, somnolence, and cognitive fluctuations. This flawed treatment strategy further accelerates functional decline, hospitalisation, and institutionalisation. Therefore, a reluctance or failure to offer Deep Brain Stimulation, where appropriate, may inadvertently consign patients to poorer long-term outcomes. Access or request item here:

8. Subtyping Alzheimer's disease and Parkinson's disease using longitudinal electronic health records.

Authors: Lian J.;Fan Z.;Petrazzini B.O.;Fan W.;Rao S.;Yang Q.;Zeng G.;Ahmed N.;Tabassi Mofrad F.;Wamil M. and Rahimi, K.

Publication Date: 2026

Journal: Nature Aging 6(3), pp. 612–625

Abstract:

Neurodegenerative diseases such as Alzheimer's disease (AD) and Parkinson's disease (PD) are clinically heterogeneous, hampering the success of nonselective treatment strategies. Here we apply a transformer-based unsupervised clustering framework to longitudinal electronic health record data from over 100,000 patients across two UK cohorts, Clinical Practice Research Datalink Aurum and UK Biobank, to identify, validate and characterize subtypes of AD and PD. We uncover five reproducible subtypes for each condition, characterized by distinct comorbidity patterns, symptom trajectories, outcomes and genetic profiles. These include a high-mortality AD subtype with motor and cardiovascular features, and a genetically susceptible but clinically resilient PD subtype. We also identify metabolic-inflammatory and vascular-psychiatric phenotypes shared across AD and PD, suggesting cross-disease mechanisms. By integrating routinely collected electronic health record data with genetic analyses, our study provides a scalable framework for early, biologically informed subtyping, laying the groundwork for future targeted interventions in neurodegenerative diseases. Copyright © The Author(s) 2026. Access or request item here:

9. Parkinson's Disease Patients Face Higher 90-Day Readmission, Reoperation, and Infection Risk Following Total Knee Arthroplasty.

Authors: Maman, David;Steinfeld, Yaniv and Berkovich, Yaron

Publication Date: Apr ,2026

Journal: Arthroplasty Today 38, pp. 101970

Abstract:

Background: Parkinson's disease (PD) is an increasingly common comorbidity in patients undergoing total knee arthroplasty (TKA), yet its impact on readmissions remains poorly defined. Methods: Using the Nationwide Readmissions Database 2020-2022, we identified

11. Immediate Effects of a Jewett Brace on Posture and Dynamic Balance in Parkinson's Disease-Associated Camptocormia: A Case Report.

Authors: Nakamoto, Chisato;Bando, Kyota;Mukai, Yohei;Takahashi, Yuji;Seki, Kazuhiko and Hara, Takatoshi

Publication Date: Jan ,2026

Journal: Cureus 18(1), pp. e102612

Abstract:

Camptocormia (CC) in Parkinson's disease (PD) is a disabling axial postural deformity characterized by involuntary thoracolumbar flexion. Although trunk orthoses are used for management, correcting the flexed posture may disrupt compensatory strategies for postural instability and potentially worsen dynamic balance. We report the case of a man in his 80s with PD (Hoehn & Yahr stage 3) who exhibited upper CC. We evaluated the immediate effects of a Jewett brace on posture and balance using a three-dimensional motion analysis system (Vicon, Oxford Metrics Ltd., Oxford, UK). Outcome measures included the trunk flexion angle during a three-minute standing task, Center of Gravity (COG) sway, and stepping responses during the Push and Release Test (PRT). Assessments were performed with the orthosis, followed by without it. The orthosis attenuated the increase in trunk flexion during standing (+5.1degree with the orthosis vs. +12.3degree without). No deterioration was observed in the COG sway range or PRT time variables (step initiation, first contact, and final stabilization) between conditions. In this case, the Jewett brace stabilized static posture without compromising dynamic balance or compensatory stepping responses. These findings suggest that trunk orthoses may be a safe intervention for postural correction in CC, provided that individual balance function is carefully assessed. Copyright © 2026, Nakamoto et al. Access or request item here:

12. Striatal Dopamine Transporter and Rest Tremor in Parkinson Disease: A Clinical Validation.

Authors: Niemi, Kalle J.;Jaakkola, Elina;Myller, Elina Maaria;Eklund, Mikael R. E.;Nuuttila, Simo;Mertsalmi, Tuomas;Murtomaki, Kirsi-Marja;Levo, Reeta;Noponen, Tomm;Ihalainen, Toni;Scheperjans, Filip;Joutsa, Juho and Kaasinen, Valtteri

Publication Date: Apr 14 ,2026

Journal: Neurology 106(7), pp. e214811

Abstract:

BACKGROUND AND OBJECTIVES: The mechanisms underlying tremor generation in Parkinson disease (PD) remain unclear. Previously, we demonstrated a connection between rest tremor amplitude and higher dopamine transporter (DAT) binding in the ipsilateral striatum among the Parkinson Progression Markers Initiative cohort. Here, we investigated the association of parkinsonian motor symptoms with striatal DAT binding in a sizable and clinically representative sample of patients with parkinsonian signs to validate the previously observed ipsilateral relationship in PD. **METHODS:** This observational cross-sectional study included right-handed patients referred for [¹²³I]FP-CIT SPECT because of clinically uncertain parkinsonism or tremor at Turku University Hospital and the Helsinki and Uusimaa Hospital

District, Finland. Each patient underwent a comprehensive clinical evaluation and follow-up (median 3.0 years [interquartile range (IQR) 2.5]). Associations between striatal tracer binding and symptoms were investigated using voxel-wise linear models, adjusting for age, sex, motor symptom severity, and medication. The primary outcome measure was the association between rest tremor amplitude and striatal DAT binding. RESULTS: At the end of the follow-up period, of the 414 patients included (median age 68 years [IQR 14], 49.4% female), 148 were evaluated to have PD and 79 other forms of parkinsonism with striatal DAT deficit. In total, 187 patients had normal binding. Among the patients with PD, left and right rest tremor amplitudes were positively associated with ipsilateral striatal DAT binding (beta = +0.12 [95% CI +0.05, +0.19] and +0.10 [+0.05, +0.15] specific binding ratio [SBR] per point; pFWE + Bonf. pFWE + Bonf. pFWE + Bonf. DISCUSSION: These findings confirm the positive association between rest tremor amplitude and ipsilateral striatal DAT binding in a clinical sample of PD patients. However, the non-PD groups were diagnostically heterogeneous, limiting conclusions about disease specificity. Access or request item here:

13. Hallucinations and cognitive impairment are associated with blood pressure fluctuations in Parkinson's disease.

Authors: Nomoto, Shohei;Oeda, Tomoko;Tomii, Yasuhiro;Kasahara, Nina;Uchizumi, Hiroshi;Ishihara, Toshiya;Kohsaka, Masayuki;Toda, Shintaro;Umemura, Atsushi;Park, Kwiyoung;Tomita, Satoshi;Tahara, Masayuki;Yamamoto, Kenji;Yamamoto, Yasumasa and Sawada, Hideyuki

Publication Date: 2026

Journal: BMJ Neurology Open 8(1), pp. e001497

Abstract:

Background: Patients with Parkinson's disease (PD) frequently develop cardiovascular autonomic dysfunctions, including blood pressure (BP) fluctuations and orthostatic hypotension (OH) in the early stage, and hallucinations or cognitive impairment in the middle stage to late stage. The current study aimed to determine whether OH, BP fluctuations and cerebral white matter hyperintensities (WMHs) on MRI are associated with the development of hallucinations and cognitive impairment. Methods: In this joint cross-sectional case-control study conducted across two institutions, we analysed the systolic BP coefficient of variation (SBP-CV) and nocturnal BP dipping using ambulatory BP monitoring and OH prevalence in 121 patients with PD and 21 hospital controls. The association between these factors and hallucinations/psychosis or cognitive impairment was analysed using multivariable logistic regression models. Then, we conducted mediation analyses of the relationship between abnormal BP fluctuations and cognitive impairment in PD, with WMHs evaluated using the Fazekas scale as the intermediate factor. Results: Patients with PD were characterised by large SBP-CV without pulse rate-CV elevation, neurogenic OH and riser pattern of nocturnal BP dipping. Neurogenic OH was significantly associated with hallucinations/psychosis (adjusted OR: 6.22; 95% CI 2.47 to 15.64; p: Patients with PD were characterised by large SBP-CV without pulse rate-CV elevation, neurogenic OH and riser pattern of nocturnal BP dipping. Neurogenic OH was significantly associated with hallucinations/psychosis (adjusted OR: 6.22; 95% CI 2.47 to 15.64; p: Conclusions: Large BP fluctuations in PD were associated with hallucinations and cognitive impairment, but WMHs did not mediate this relationship. Copyright © Author(s) (or their employer(s)) 2026. Re-use permitted under CC BY-NC. No

commercial re-use. See rights and permissions. Published by BMJ Group. Access or request item here:

14. At the extreme limits of L-DOPA therapy: probable dopamine dysregulation and psychiatric complications in Parkinson's disease.

Authors: Oikarinen, Niko;Ottela, Emma;Ronka, Jaana;Haanpaa, Maria;Niemela, Solja;Lees, Andrew John and Kaasinen, Valtteri

Publication Date: 2026

Journal: BMJ Neurology Open 8(1), pp. e001498

Abstract:

Background: Dopamine dysregulation syndrome (DDS) is an uncommon but debilitating complication of Parkinson's disease (PD), characterised by a compulsive overuse of dopaminergic therapy. Most reported cases are male and involve daily oral levodopa (L-DOPA) intake between 2000 and 4000 mg. Methods: We describe a female with young-onset PD who progressively escalated oral L-DOPA intake to a peak of 10 000 mg/day prior to subthalamic nucleus deep brain stimulation (DBS). A structured psychiatric assessment was performed after DBS. Whole-exome sequencing was conducted to evaluate possible genetic susceptibility. Results: The patient developed compulsive medication use, impulse control disorders and gingival black pigmentation with near-total tooth loss. Classical hedonistic DDS features were absent. Following DBS, the L-DOPA dose stabilised at 1800 mg/day, but psychosis emerged, requiring hospitalisation. Genetic testing did not identify a pathogenic cause for early-onset PD; a rare missense variant of uncertain significance was detected without established clinical relevance. Discussion: This case represents the highest sustained oral L-DOPA dose reported in PD. Despite lacking several core DDS features, the pattern of compulsive use suggests dopaminergic dysregulation. This case highlights limitations in current DDS criteria and suggests that contextual features, such as motor disability, psychological reinforcement and individual vulnerability, should be integrated into future refinements. Copyright © Author(s) (or their employer(s)) 2026. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ Group. Access or request item here:

15. Evaluation of Orthostatic Hypotension in Patients With Idiopathic Parkinson's Disease Utilizing the Head-Up Tilt Test.

Authors: Ramanan, B. B. V.;Thirunavukarasu, Suresh C.;Varadharaj, Devi;Arumugam, Durai;Poyyadhappan, Jayasri;Natarajan, Nivethini and Vijaykumar, Sigilipalli

Publication Date: Feb ,2026

Journal: Cureus 18(2), pp. e104363

Abstract:

INTRODUCTION: Parkinson's disease (PD) is a neurodegenerative disorder, affecting individuals aged 60 and older, with rapidly increasing prevalence in aging populations, particularly in India. Apart from classical motor symptoms, nonmotor symptoms, particularly

orthostatic hypotension (OH), significantly affect the quality of life, increasing the fall risk that contributes to increasing morbidity and mortality. This single-center, prospective, cross-sectional observational study evaluates OH, a key cardiovascular autonomic dysfunction, in idiopathic PD patients using the head-up tilt test (HUTT) to assess its prevalence and correlation with disease duration and severity. Conducted from July 2023 to June 2024 at the Department of Neurology, Indira Gandhi Government General Hospital and Post Graduate Institute, Puducherry, India, the study enrolled 114 patients diagnosed according to UK Brain Bank criteria, excluding confounders such as diabetic neuropathy or cardiovascular comorbidities. METHODS: Patients underwent detailed clinical evaluation, demographics, PD duration, autonomic symptom history, and Modified Hoehn and Yahr staging, and the HUTT was commenced at 60degree after 30 minutes of supine rest. Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure, and heart rate were obtained every five minutes before tilt; one, three, and five minutes during tilt; and one minute after tilt, as indicated for patient safety. OH was defined as a drop in SBP ≥ 20 mmHg and/or DBP ≥ 10 mmHg within three to five minutes. Data analysis used Statistical Package for the Social Sciences version 20 (IBM Corp., Armonk, NY) with chi-square test, analysis of variance, t tests, and Pearson correlation (p : Patients underwent detailed clinical evaluation, demographics, PD duration, autonomic symptom history, and Modified Hoehn and Yahr staging, and the HUTT was commenced at 60degree after 30 minutes of supine rest. Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure, and heart rate were obtained every five minutes before tilt; one, three, and five minutes during tilt; and one minute after tilt, as indicated for patient safety. OH was defined as a drop in SBP ≥ 20 mmHg and/or DBP ≥ 10 mmHg within three to five minutes. Data analysis used Statistical Package for the Social Sciences version 20 (IBM Corp., Armonk, NY) with chi-square test, analysis of variance, t tests, and Pearson correlation (p RESULTS: The mean age was 65 +/-11.19 years, 62.28% were male, and the mean disease duration was 2.75 +/-1.93 years. OH prevalence was 28% (32/114 patients). No gender association was observed (p = 0.180), but strong links with duration (p : The mean age was 65 +/-11.19 years, 62.28% were male, and the mean disease duration was 2.75 +/-1.93 years. OH prevalence was 28% (32/114 patients). No gender association was observed (p = 0.180), but strong links with duration (p : The mean age was 65 +/-11.19 years, 62.28% were male, and the mean disease duration was 2.75 +/-1.93 years. OH prevalence was 28% (32/114 patients). No gender association was observed (p = 0.180), but strong links with duration (p DISCUSSION: OH increases progressively with PD duration and motor severity, reflecting autonomic neurodegeneration independent of dopaminergic loss, consistent with prior studies. The HUTT's sensitivity detected asymptomatic cases, which are vital for fall mitigation. HUTT proved superior to static measures for early detection. Limitations of the study include a single-center design and the absence of a control group. Routine screening via HUTT is recommended for advanced PD to prevent falls/syncope via interventions (e.g., hydration and midodrine). CONCLUSION: OH affects 28% of idiopathic PD patients, strongly tied to duration and H&Y stage; HUTT enables proactive management to enhance the quality of life. Copyright © 2026, Ramanan et al. Access or request item here:

16. YouTube videos for describing Deep Brain Stimulation: a comprehensive and quantitative review

Authors: Richardson, Daniel;Smith, Bran G.;Fang, Stephanie W. Y.;Scott, Teresa R.;Alamri, Alexander;Hart, Michael G. and Pereira, Erlick A. C.

Publication Date: Apr ,2026

Journal: British Journal of Neurosurgery 40(2), pp. 321–330

Abstract:

INTRODUCTION: Patients use online videos to learn about their condition and potential treatments. Operative techniques in Deep Brain Stimulation (DBS) vary significantly between institutions. This poses challenges to ensuring patients are adequately and accurately informed. We performed a comprehensive review of YouTube videos describing Deep Brain Stimulation. **METHODS:** Text searches for DBS-related search strings were performed on YouTube. The top 25 de-duplicated videos per search were included. Each video was assessed for differences in procedural technique, educational quality using the JAMA benchmark and DISCERN tools, and audio-visual or editing quality. **RESULTS:** We identified 91 DBS-related YouTube videos with 44% of videos uploaded by academic institutions and 15% by hospitals. Parkinson's disease was the most frequently described condition in 65% of videos. Variations in procedure impacting patient experience and expectations, were discussed in varying proportions: head shaving in 14.3% of videos, potential complications in 23.1%, number of stages in 33.0%, and awake vs asleep surgery in 46.2%. The JAMA benchmark criteria was fulfilled in 12% of videos and the median total DISCERN score was 46, an 'average' quality rating. High-quality images (N = 69, 75.8%), audio/music (N = 73, 80.2%), accessible language (N = 84, 92.3%), and professional production quality (N = 72, 79.1%) were present in most videos. **DISCUSSION AND CONCLUSION:** YouTube videos describing DBS are visually appealing but lack scientific quality and present potentially misleading content for future DBS recipients and caregivers. They should be viewed with caution as a source of medical communication or information for patients. Access or request item here:

17. Patient and Physician Perspectives on Pharmacotherapy in Parkinson's Disease Psychosis: A Mixed-Methods Exploratory Study.

Authors: Rose O.;Hinteregger T.;Trinka E.;Iglseider B.;Pachmayr J. and Clemens, S.

Publication Date: 2026

Journal: Pharmacy 14(1) (pagination), pp. Article Number: 8. Date of Publication: 01 Feb 2026

Abstract:

Psychosis is a frequent and disabling non-motor complication of Parkinson's disease (PD). Clozapine and quetiapine are widely used in the treatment of Parkinson's disease psychosis (PDP). We conducted an exploratory study to compare patient experiences with physician prescribing practices. Patients with PDP hospitalized at a university center completed semi-structured interviews on perceived efficacy, adverse effects, and daily functioning. Neurologists and geriatricians attending training sessions completed a structured questionnaire on prescribing patterns, attitudes toward clozapine, and perceived treatment burden. Data were analyzed thematically and triangulated across cohorts. Eleven patients (mean age 81 years; nine treated with quetiapine, two with clozapine) were included. Most quetiapine-treated patients reported persistent hallucinations, sedation, dizziness, and reduced autonomy. Fourteen physicians completed the survey and most preferred quetiapine, citing monitoring logistics and agranulocytosis risk as barriers to clozapine. Overall, patient priorities centered on symptom control and independence, whereas physician decisions emphasized

feasibility and safety. Facilitating clozapine monitoring and incorporating patient-reported outcomes into routine care may improve patient-centered PDP management. Copyright © 2026 by the authors. Access or request item here:

18. Synuclein Disorder-Related Genetic Determinants of Mild Behavioural Impairment in a Pre-Clinical Community Cohort.

Authors: Sander-Long, Millie; Creese, Byron; Corbett, Anne; Rosenzweig, Ivana; Cummings, Jeffrey and Ballard, Clive

Publication Date: Mar ,2026

Journal: International Journal of Geriatric Psychiatry 41(3), pp. e70189

Abstract:

BACKGROUND: The GBA variant confers increased risk of synuclein disorders but it is unclear what impact it has in pre-clinical groups. This study aimed to identify early psychiatric and cognitive manifestations amongst pre-clinical GBA carriers in a community cohort.

METHOD: This study used data from the PROTECT-UK cohort to compare 388 GBA carriers (N370S, E326K and T369M) without Parkinson's disease to age-matched controls.

Neuropsychiatric symptoms (NPS) were measured with the Mild Behaviour Impairment Checklist, and cognition was measured using computerised neuropsychology.

RESULTS: Results: GBA carriers over 70 had significantly increased NPS compared with controls ($z = 2.13$, $p = 0.03$).

There was no difference between carriers and non-carriers in younger individuals but a sub-group comparison in the overall cohort showed that NPS were more severe in quartile four (Q4) of carriers compared to Q4 of controls ($z = 2.39$, $p = 0.017$), indicating an increase in NPS in this sub-group across a broader age range.

No differences in cognition were seen. **DISCUSSION:** These findings suggest that NPS may be an early clinical manifestation of emerging synucleinopathy amongst individuals prior to diagnosis.

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19. Outcome of People with Parkinson's Disease Treated with Levodopa-Entacapone-Carbidopa Intestinal Gel Who Failed Previous Subcutaneous Foslevodopa/Foscarbidopa.

Authors: Santos Garcia, Diego; Legarda, Ines; Gonzalez Fernandez, Tamara M.; Rodriguez Sanz, Ana; Morales-Casado, Maria Isabel; Peral, Alejandro; Caballol, Nuria; Alvarez Sauco, Maria; Campos Rodriguez, Iria; Alonso Modino, Deborah; Lopez Manzanares, Lydia; Olivares Romero, Jesus and Blanco Ollero, Alberto

Publication Date: Mar 22 ,2026

Journal: Brain Sciences 16(3)

Abstract:

Introduction: The clinical outcome of switching to levodopa-entacapone-carbidopa intestinal gel (LECIG) after failure of subcutaneous foslevodopa/foscarbidopa (fLD/fCD) is unknown. We analyze it in people with Parkinson's disease (PwP) treated in Spain. **Methods:** Retrospective

analysis of PwP who had previously received fLD/fCD but dropped out for different reasons and started before this LECIG in Spain up to 30 November 2025. Non-parametric tests were applied to evaluate the changes between the pre-(Vpre) and post-treatment (Vpost) (LECIG) periods. Results: Data about 14 patients (57.1% males; 66.6 +/-8.6 years old) from 12 hospitals out of a total of 15 who were treated with LECIG were included. The mean time with fLD/fCD was 98.6 +/-92.3 days, with 92.9% and 57.1% experiencing side effects and lack of response, respectively. Specifically, significant subcutaneous nodules were reported in up to 64.3% of the patients. LECIG was a direct switch from fLD/fCD in 35.7% of the patients. LECIG was well tolerated, with only one dropout due to complications related to dementia. Adverse events were reported in 28.6% and 35.7% of the patients in the optimization and final follow-up evaluation (mean follow-up of 233.7 +/-157.4 days) phases, respectively. From Vpre to Vpost, "Off" time was reduced in 2.9 +/-1.9 h (p = 0.002) and motor symptoms burden improved significantly (p = 0.013), whereas a trend of significance was found for non-motor symptoms burden (p = 0.050) and quality of life (p = 0.126). Conclusions: LECIG could be an alternative therapeutic option in PwP who failed fLD/fCD. Access or request item here:

20. Moving beyond the hospital: in-depth characterization of daily-life mobility in patients with atypical Parkinsonian disorders.

Authors: Sidoroff V.;Moradi H.;Prigent G.;Jagusch F.;Teckenburg I.;Asalian M.;HergenroederLenzner N.;Giraitis M.;SchoenfeldtReichmann E.T.;Ndayisaba J.P.;Goebel G.;Seppi K.;Ionescu A.;Krismer F.;Benninger D.;Winkler J.;Eskofier B.M.;Klucken J.;Aminian K.;Wenning G., et al

Publication Date: 2026

Journal: Npj Parkinson's Disease 12(1) (pagination), pp. Article Number: 34. Date of Publication: 01 Dec 2026

Abstract:

This study evaluates mobility in patients with multiple system atrophy (MSA), progressive supranuclear palsy (PSP), and Parkinson's disease (PD) by integrating clinical assessments, instrumented gait analysis (IGA) in the hospital, and 1 week of physical activity monitoring (PAM) at home, using wearable sensors. Clinical scores provide a broad measure of disease severity but lack precision in quantifying gait impairments. IGA offers objective gait metrics under standardized conditions, identifying deficits in stride dynamics and postural control. However, these controlled assessments do not reflect real-world mobility. PAM addresses this gap by continuously tracking movement patterns and physical activity during daily-life, offering insights into how patients walk beyond clinical settings. The combination of IGA and PAM provides a more comprehensive understanding of mobility limitations, particularly in MSA and PSP, where gait and balance impairments differ from PD. This dual approach enhances patient assessment, supports personalized disease management, and improves clinical decision-making. Trial registration: ClinicalTrials.gov, NCT04608604, date of registration: 19/10/2020, first patient enrollment: 01/02/2021. Copyright © The Author(s) 2026. Access or request item here:

21. Structural and functional magnetic resonance imaging abnormalities and plasma GLP-1 levels in Parkinson's disease with cognitive impairment.

Authors: Sun, Yunfei;Zhang, Mengyan;Shi, Xiaoxue;Wu, Longyu;Wang, Li;Zheng, Jinhua;Ma, Jianjun;She, Zonghan;Qi, Xuelin;Wang, Yingyun;Xu, Qing;Gu, Qi;Chen, Siyuan and Li, Xue

Publication Date: Jun ,2026

Journal: IBRO Neuroscience Reports 20, pp. 457–464

Abstract:

Objective: To investigate alterations in plasma glucagon-like peptide 1 (GLP-1) levels and structural and functional magnetic resonance imaging (MRI) in patients with Parkinson's disease-related cognitive impairment. Methods: A total of 34 PD patients with cognitive impairment and 37 PD patients without cognitive impairment were prospectively recruited at our hospital from September 2022 to July 2024. Data on the cognitive function, demographics and plasma GLP-1 levels of the participants were collected. PD patients underwent 3.0T MRI, and plasma GLP-1 concentrations were measured using an enzyme-linked immunosorbent assay (ELISA). Voxel-based morphometry (VBM) results were used to examine structural alterations. Resting-state functional MRI results were used to reveal the extent of changes in brain connectivity. Results: Compared with those in healthy individuals, plasma GLP-1 levels were lower in PD patients and were positively correlated with Montreal Cognitive Assessment (MoCA) scores. We observed volume reductions in the superior temporal gyrus, amygdala, and left frontal operculum in patients with Parkinson's disease-related cognitive impairment (PD-CI). Moreover, these changes were significantly positively correlated with MoCA scores and GLP-1 levels. We observed decreased functional activity in the right cuneal cortex, left occipital lobe and lateral occipital cortex in PD-CI patients. Conclusions: Our findings reveal that more severe Parkinson's disease-related cognitive impairment is associated with abnormalities in the superior temporal gyrus, left frontal operculum and the visual network. These structural and functional abnormalities are associated with plasma GLP-1 levels. Our results may help clarify the pathophysiology of cognitive impairment and suggest potential therapeutic targets. Copyright © 2026 The Authors. Access or request item here:

22. Longitudinal changes in effective connectivity associated with worsening freezing of gait in Parkinson's disease: a resting-state functional MRI study.

Authors: Taniguchi S.;D'Cruz N.;Kimura Y.;Kakuda K.;Ogawa K.;Kochiyama T.;Kajiyama Y.;Shirahata E.;Ge L.;Asai K.;Nieuwboer A.;Gilat M.;Ikenaka K. and Mochizuki, H.

Publication Date: 2026

Journal: Journal of Neurology 273(3) (pagination), pp. Article Number: 176. Date of Publication: 01 Mar 2026

Abstract:

Background: Freezing of gait (FOG) is a key contributor to gait impairment in people with Parkinson's disease (PD). Previously, we found freezing-specific increased effective connectivity from the dorsolateral prefrontal cortex (DLPFC) to the mesencephalic locomotor region (MLR), but it is yet unknown whether effective connectivity changes with FOG progression. Objective(s): The primary objective of this study was to evaluate effective

connectivity changes in freezers over time and their association with gray matter structural alterations. Method(s): In this longitudinal study, spanning 2 years, we analyzed 51 patients (27 freezers and 24 non-freezers) for the main effective connectivity, and 88 patients (44 freezers and 44 non-freezers) and 37 age-matched healthy controls for structural volume analysis. Spectral dynamic causal modeling (DCM) with hierarchical empirical Bayes approaches was performed. Result(s): Freezers reported a significant worsening of FOG over time. Longitudinally, abnormally increased functional connectivity was observed between the bilateral cerebellar lobule VIIb and the MLR. Spectral DCM revealed that the previously identified increase in DLPFC-to-MLR effective connectivity was lost at follow-up. In contrast, an increased inhibitory effective connectivity from the left cerebellar lobule VIIb to the right MLR emerged (posterior probability > 0.99). This was associated with slower FOG progression, but not with structural volume changes. Conclusion(s): We found that the pattern of FOG-related effective connectivity changed over time, characterized by increasing inhibitory connectivity from the cerebellum to MLR, while frontal compensatory influences were no longer apparent. Future study needs to focus on how compensatory cortical mechanisms could be optimized to counteract FOG progression. Clinical trial registration: This study was registered in the University Hospital Medical Information Network Clinical Trial Registry (UMIN-CTR 000036570) on 22 April 2019. Copyright © The Author(s) 2026. Access or request item here:

23. Effects of Music Therapy Combined with Hospital-Community Integrated Care on the Psychological Status of Patients with Parkinson's Disease Treated with Pramipexole and Levodopa.

Authors: Xu, Gang and Tian, Ran

Publication Date: 2026

Journal: Noise and Health 28(130), pp. 94–102

Abstract:

OBJECTIVE: To evaluate the effects of five-element music therapy combined with hospital-community integrated care on the psychological status and cognitive function of patients with Parkinson's disease (PD). **METHODS:** The clinical data of 130 patients with PD treated with pramipexole and levodopa at The First Affiliated Hospital of Chengdu Medical College from July 2022 to March 2024 were retrospectively analysed. Participants were divided into three groups based on care protocols as follows: a routine care group (n = 40, routine care), community care group (n = 50, routine care + hospital-community integrated care) and comprehensive care group (n = 40, routine care + hospital-community integrated care + five-element music therapy). Comparisons were made amongst the three groups regarding psychological status (Self-Rating Depression Scale [SDS], Self-Rating Anxiety Scale [SAS]), clinical symptoms (subscores of the Unified Parkinson's Disease Rating Scale Part I [UPDRS-I]), social adaptability (Social Adaptability Function Evaluation [SAFE]), cognitive function (Montreal Cognitive Assessment [MoCA]) and nursing satisfaction. Homogeneity of variance was verified by using Levene's test. For comparisons between groups meeting normality and homogeneity of variance, one-way analysis of variance was used. Intragroup comparisons before and after care were performed by employing paired-sample t-tests. **RESULTS:** After 3 months of care, the SDS and SAS scores in the comprehensive care group were lower than those in the community and routine care groups (P :

scores in the comprehensive care group were lower than those in the community and routine care groups (P : After 3 months of care, the SDS and SAS scores in the comprehensive care group were lower than those in the community and routine care groups (P : After 3 months of care, the SDS and SAS scores in the comprehensive care group were lower than those in the community and routine care groups (P : After 3 months of care, the SDS and SAS scores in the comprehensive care group were lower than those in the community and routine care groups (P : After 3 months of care, the SDS and SAS scores in the comprehensive care group were lower than those in the community and routine care groups (P CONCLUSION: Five-element music therapy combined with hospital-community integrated care improves psychological status, alleviates clinical symptoms, enhances social adaptability and cognitive function and increases nursing satisfaction in patients with PD. Copyright © 2026 The Author(s). Access or request item here:

24. Does the Minimal Detectable Change in the 10-Meter Walk Test and Timed Up and Go Test Differ by Parkinson's Disease Severity?.

Authors: Yamasaki R. and Inoue, Y.

Publication Date: 2026

Journal: Archives of Physical Medicine and Rehabilitation (pagination), pp. Date of Publication: 2026

Abstract:

Objective: To determine the minimal detectable change (MDC) of the 10-meter walk test (10MWT) and Timed Up and Go test (TUG) across different stages of Parkinson's disease (PD) severity as classified by the Hoehn & Yahr scale (H&Y). Design(s): Cross-sectional observational study with a repeated-measures design. Subjects completed 2 trials of each test in a single session to assess reliability and MDC95. Setting(s): Inpatient neuromodulation center at a general hospital. Participant(s): A total of 80 patients with PD admitted to the Center for Neuromodulation, Kurashiki Heisei Hospital, were categorized into H&Y stage II (n=25), III (n=31), and IV (n=24). Intervention(s): Not applicable. Main Outcome Measure(s): The 10MWT and TUG were conducted twice in the "On" medication state. Intraclass correlation coefficients (ICC) and Bland-Altman analyses were used to assess reliability and systematic bias, and MDC95 values were calculated. Result(s): Both tests demonstrated high reliability (ICC_{1,1} > 0.92). MDC95 values for the 10MWT were 0.7 seconds (stage II), 0.9 seconds (stage III), and 1.4 seconds (stage IV). MDC95 values for the TUG were 0.9 seconds (stage II), 1.3 seconds (stage III), and 2.7 seconds (stage IV), indicating greater variability in advanced stages. Conclusion(s): The MDC95 values of 10MWT and TUG increase with PD severity, highlighting the need for stage-specific criteria in clinical assessments. Using severity-specific MDC values may improve the accuracy of treatment evaluations and clinical decision-making in patients with PD. Copyright © 2026 American Congress of Rehabilitation Medicine Access or request item here:

25. Symptom-based indicators of autonomic dysfunction and their bidirectional associations with Parkinson's disease incidence and adverse outcomes.

Authors: Yang, Tianmi;Wei, Qianqian;Pang, Dejiang;Cheng, Yangfan;Huang, Jingxuan;Lin, Junyu;Xiao, Yi;Jiang, Qirui;Wang, Shichan;Liu, Jiyong;Zhang, Sirui;Ma, Yuanzheng;Li, Chunyu and Shang, Huifang

Publication Date: Mar 10 ,2026

Journal: Journals of Gerontology Series A-Biological Sciences & Medical Sciences 81(4)

Abstract:

BACKGROUND: Symptom-based indicators suggestive of autonomic dysfunction are common but underrecognized in Parkinson's disease (PD), with potential implications as a biomarker of aging for early detection and prognosis. We aimed to examine the associations between autonomic dysfunction and PD in a large, population-based cohort. **METHODS:** We analyzed 374 657 UK Biobank participants who were free of PD at baseline. Autonomic symptoms-including orthostatic hypotension, constipation, urinary and sexual dysfunction, hyperhidrosis, and other autonomic disorders-were identified via hospital records. Incident PD and subsequent outcomes, including dementia and all-cause mortality, were tracked through June 2023. Cox models estimated hazard ratios for PD and adverse outcomes, and conditional logistic regression assessed the temporal trajectory of autonomic dysfunction relative to PD diagnosis. **RESULTS:** Over a median 14.1-year follow-up, 2568 participants developed PD. Orthostatic hypotension (HR: 2.91; 95% CI: 1.39-6.13), constipation (HR: 1.63; 95% CI: 1.19-2.24), urinary dysfunction (HR: 1.45; 95% CI: 1.04-2.02), and sexual dysfunction (HR: 3.56; 95% CI: 1.60-7.95) independently predicted PD risk. Prediagnostic and postdiagnostic autonomic dysfunction was associated with a higher risk of PD dementia and mortality. Autonomic dysfunction was detectable over 10 years before PD diagnosis (OR: 4.46; 95% CI: 3.76-5.29), with the strongest association observed within 5 years after PD onset (OR: 8.59; 95% CI: 7.58-9.74). **CONCLUSIONS:** Symptom-based indicators suggestive of autonomic dysfunction serve as early clinical signals and robust prognostic markers in PD, highlighting their potential utility for early risk stratification and long-term patient management in large population-based settings. Copyright © The Author(s) 2026. Published by Oxford University Press on behalf of the Gerontological Society of America. All rights reserved. For commercial re-use, please contact reprints@oup.com for reprints and translation rights for reprints. All other permissions can be obtained through our RightsLink service via the Permissions link on the article page on our site-for further information please contact journals.permissions@oup.com. Access or request item here:

26. Leveraging the Potential of Digital Technology for Better Individualized Treatment of Parkinson's Disease.

Authors: Frohlich H.;Bontridder N.;PetrovskaDelacreta D.;Glaab E.;Kluge F.;El Yacoubi M.;Valero M.M.;Corvol J.C.;Eskofier B.;Van Gyseghem J.M.;Lehericy S.;Winkler J. and Klucken, J.

Publication Date: 2022

Journal: Frontiers in Neurology 13(pagination), pp. Article Number: 788427. Date of Publication: 2022

Abstract:

Recent years have witnessed a strongly increasing interest in digital technology within medicine (sensor devices, specific smartphone apps) and specifically also neurology. Quantitative measures derived from digital technology could provide Digital Biomarkers (DMs) enabling a quantitative and continuous monitoring of disease symptoms, also outside clinics. This includes the possibility to continuously and sensitively monitor the response to treatment, hence opening the opportunity to adapt medication pathways quickly. In addition, DMs may in the future allow early diagnosis, stratification of patient subgroups and prediction of clinical outcomes. Thus, DMs could complement or in certain cases even replace classical examiner-based outcome measures and molecular biomarkers measured in cerebral spinal fluid, blood, urine, saliva, or other body liquids. Altogether, DMs could play a prominent role in the emerging field of precision medicine. However, realizing this vision requires dedicated research. First, advanced data analytical methods need to be developed and applied, which extract candidate DMs from raw signals. Second, these candidate DMs need to be validated by (a) showing their correlation to established clinical outcome measures, and (b) demonstrating their diagnostic and/or prognostic value compared to established biomarkers. These points again require the use of advanced data analytical methods, including machine learning. In addition, the arising ethical, legal and social questions associated with the collection and processing of sensitive patient data and the use of machine learning methods to analyze these data for better individualized treatment of the disease, must be considered thoroughly. Using Parkinson's Disease (PD) as a prime example of a complex multifactorial disorder, the purpose of this article is to critically review the current state of research regarding the use of DMs, discuss open challenges and highlight emerging new directions. Copyright © 2022 Frohlich, Bontridder, Petrovska-Delacreta, Glaab, Kluge, Yacoubi, Marin Valero, Corvol, Eskofier, Van Gyseghem, Lehericy, Winkler and Klucken.

Sources:

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