

## Parkinson's Disease Current Awareness Bulletin November 2020

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#### Title: Parkinson's Disease: A Clinical Review.

Citation: MEDSURG Nursing; Sep 2020; vol. 29 (no. 5); p. 327-332 Author(s): Vice

**Abstract:** The article discusses a review of epidemiology, pathology, signs and symptoms, diagnosis, treatment, and nursing implications of Parkinson's disease (PD) for application in clinical practice. Highlights include the link of genetics and environmental risk factors to PD, the original genetic discovery associated with PD risk, and the role of neuroinflammation in PD pathology.

#### Title: Giving and receiving a diagnosis of a progressive neurological condition: A scoping review of doctors' and patients' perspectives.

**Citation:** Patient Education & Counseling; Sep 2020; vol. 103 (no. 9); p. 1709-1723 **Author(s):** Anestis ; Eccles, Fiona; Fletcher, Ian; French, Maddy; Simpson, Jane

**Objective:** Delivering a life changing diagnosis can be a distressing experience for patients and a challenging task for professionals. Diagnosis delivery can be especially difficult for individuals with neurodegenerative diseases such as motor neurone disease (MND), multiple sclerosis (MS) and Parkinson's disease (PD). This review aims to scope the literature on doctors' and patients' perspectives on diagnosis delivery for these conditions in order to enhance our understanding in this area and identify potential research gaps.

**Methods:** A scoping review methodology was used, and data were summarised using content analysis.

**Results:** 47 studies fulfilled the inclusion criteria. Studies showed that although patients were generally satisfied with diagnosis delivery, a considerable proportion was still dissatisfied with aspects of the consultation, especially the information and time provided and the doctor's approach. Only six studies addressed doctors' perspectives, which focused more on doctors' practice.

**Conclusion:** There was a significant research gap in professionals' perspectives. The review also found that although basic standards of good practice were being met, a significant proportion of patients were dissatisfied with diagnosis communication.Practice Implications: Professionals delivering such diagnoses need to assess and respond to patients' information needs, provide time for questions and maintain an empathic attitude.

# Title: Evaluation of a psychoeducational intervention compared with education in people with Parkinson's disease and their informal caregivers: a quasi-experimental study

**Citation:** Journal of Advanced Nursing; Oct 2020; vol. 76 (no. 10); p. 2719 **Author(s):** María Victoria Navarta-Sánchez; Ambrosio, Leire; Portillo, Mari Carmen; Ursúa, Maria Eugenia; Senosiain, Juana M; Riverol, Mario

**Aim:** To evaluate the effects of a psychoeducational intervention compared with an education programme to strengthen quality of life, psychosocial adjustment, and coping in people with Parkinson's disease and their informal caregivers.

**Design:** A quasi-experimental study was performed with repeated measures at baseline, after the intervention and 6 months post-intervention.

**Methods:** The study was carried out at seven primary care centres from 2015-2017. A total of 140 people with Parkinson's and 127 informal caregivers were allocated to the experimental and the control groups. The experimental group received a 9-week psychoeducational intervention, whereas the control group received a 5-week education programme. Repeated measures ANOVA were used to test differences in quality of life, psychosocial adjustment, and coping between the experimental and control groups and over time.

**Results:** Patients and informal caregivers in both the experimental and control groups showed significantly better psychosocial adjustment at the post-intervention measurement compared with baseline data. We also found significantly greater quality of life in patients and coping skills in caregivers after the end of the interventions in the experimental and control groups. Nevertheless, no significant differences were identified on the outcomes at the 6-month post-intervention measurement.

**Conclusion:** The effect of the psychoeducational intervention was not different from the effect of the education programme. The strategies applied in both interventions followed a group approach led by a multidisciplinary team covering information about PD, healthy lifestyles, and social resources. They might be easily sustained in Primary Care to improve care for people with Parkinson's and informal caregivers.

### Title: Lipid Peroxidation and Antioxidant Supplementation in Neurodegenerative Diseases: A Review of Human Studies.

**Citation:** Antioxidants (Basel, Switzerland); Nov 2020; vol. 9 (no. 11) **Author(s):** Petrovic, Snjezana; Arsic, Aleksandra; Ristic-Medic, Danijela; Cvetkovic, Zorica; Vucic, Vesna

**Abstract:** Being characterized by progressive and severe damage in neuronal cells, neurodegenerative diseases (NDDs) are the major cause of disability and morbidity in the elderly, imposing a significant economic and social burden. As major components of the central nervous system, lipids play important roles in neural health and pathology. Disturbed lipid metabolism, particularly lipid peroxidation (LPO), is associated with the development of many NDDs, including Alzheimer's disease (AD), Parkinson's disease (PD), and amyotrophic lateral sclerosis (ALS), all of which show elevated levels of LPO products and LPO-modified proteins. Thus, the inhibition of neuronal oxidation might slow the progression and reduce the severity of NDD; natural antioxidants, such as polyphenols and antioxidant vitamins, seem to be the most promising agents. Here, we summarize current literature data that were derived from human studies on the effect of natural polyphenols and vitamins A, C, and E supplementation in patients with AD, PD, and ALS. Although these compounds may reduce the severity and slow the progression of NDD, research gaps remain in antioxidants supplementation in AD, PD, and ALS patients, which indicates that further human studies applying antioxidant supplementation in different forms of NDDs are urgently needed.

### Title: Machine Learning's Application in Deep Brain Stimulation for Parkinson's Disease: A Review.

**Citation:** Brain sciences; Nov 2020; vol. 10 (no. 11) **Author(s):** Watts, Jeremy; Khojandi, Anahita; Shylo, Oleg; Ramdhani, Ritesh A **Abstract**: Deep brain stimulation (DBS) is a surgical treatment for advanced Parkinson's disease (PD) that has undergone technological evolution that parallels an expansion in clinical phenotyping, neurophysiology, and neuroimaging of the disease state. Machine learning (ML) has been successfully used in a wide range of healthcare problems, including DBS. As computational power increases and more data become available, the application of ML in DBS is expected to grow. We review the literature of ML in DBS and discuss future opportunities for such applications. Specifically, we perform a comprehensive review of the literature from PubMed, the Institute for Scientific Information's Web of Science, Cochrane Database of Systematic Reviews, and Institute of Electrical and Electronics Engineers' (IEEE) Xplore Digital Library for ML applications in DBS. These studies are broadly placed in the following categories: (1) DBS candidate selection; (2) programming optimization; (3) surgical targeting; and (4) insights into DBS mechanisms. For each category, we provide and contextualize the current body of research and discuss potential future directions for the application of ML in DBS.

#### Title: Urinary Biomarkers for Neurodegenerative Diseases.

**Citation:** Experimental neurobiology; Oct 2020; vol. 29 (no. 5); p. 325-333 **Author(s):** Seol, Wongi; Kim, Hyejung; Son, Ilhong

**Abstract:** Global incidence of neurodegenerative diseases (NDDs) such as Alzheimer's disease (AD) and Parkinson's disease (PD) is rapidly increasing, but the diagnosis of these diseases at their early stage is challenging. Therefore, the availability of reproducible and reliable biomarkers to diagnose such diseases is more critical than ever. In addition, biomarkers could be used not only to diagnose diseases but also to monitor the development of disease therapeutics. Urine is an excellent biofluid that can be utilized as a source of biomarker to diagnose not only several renal diseases but also other diseases because of its abundance in invasive sampling. However, urine was conventionally regarded as inappropriate as a source of biomarker for neurodegenerative diseases because it is anatomically distant from the central nervous system (CNS), a major pathologic site of NDD, in comparison to other biofluids such as cerebrospinal fluid (CSF) and plasma. However, recent studies have suggested that urine could be utilized as a source of NDD biomarker if an appropriate marker is predetermined by metabolomic and proteomic approaches in urine and other samples. In this review, we summarize such studies related to NDD.

#### Title: Stem Cell-Based Therapies for Parkinson Disease.

**Citation:** International journal of molecular sciences; Oct 2020; vol. 21 (no. 21) **Author(s):** Liu, Zhaohui; Cheung, Hoi-Hung

**Abstract:** Parkinson disease (PD) is a neurological movement disorder resulting primarily from damage to and degeneration of the nigrostriatal dopaminergic pathway. The pathway consists of neural populations in the substantia nigra that project to the striatum of the brain where they release dopamine. Diagnosis of PD is based on the presence of impaired motor features such as asymmetric or unilateral resting tremor, bradykinesia, and rigidity. Nonmotor features including cognitive impairment, sleep disorders, and autonomic dysfunction are also present. No cure for PD has been discovered, and treatment strategies focus on symptomatic management through restoration of dopaminergic activity. However, proposed cell replacement therapies are promising because midbrain dopaminergic neurons have been shown to restore dopaminergic neurotransmission and functionally rescue the

dopamine-depleted striatum. In this review, we summarize our current understanding of the molecular pathogenesis of neurodegeneration in PD and discuss the development of new therapeutic strategies that have led to the initiation of exploratory clinical trials. We focus on the applications of stem cells for the treatment of PD and discuss how stem cell research has contributed to an understanding of PD, predicted the efficacy of novel neuroprotective therapeutics, and highlighted what we believe to be the critical areas for future research.

### Title: Dietary Antioxidants and the Mitochondrial Quality Control: Their Potential Roles in Parkinson's Disease Treatment.

**Citation:** Antioxidants (Basel, Switzerland); Oct 2020; vol. 9 (no. 11) **Author(s):** Lee, Davin; Jo, Min Gu; Kim, Seung Yeon; Chung, Chang Geon; Lee, Sung Bae

Abstract: Advances in medicine and dietary standards over recent decades have remarkably increased human life expectancy. Unfortunately, the chance of developing agerelated diseases, including neurodegenerative diseases (NDDs), increases with increased life expectancy. High metabolic demands of neurons are met by mitochondria, damage of which is thought to contribute to the development of many NDDs including Parkinson's disease (PD). Mitochondrial damage is closely associated with the abnormal production of reactive oxygen species (ROS), which are widely known to be toxic in various cellular environments, including NDD contexts. Thus, ways to prevent or slow mitochondrial dysfunction are needed for the treatment of these NDDs. In this review, we first detail how ROS are associated with mitochondrial dysfunction and review the cellular mechanisms, such as the mitochondrial quality control (MQC) system, by which neurons defend against both abnormal production of ROS and the subsequent accumulation of damaged mitochondria. We next highlight previous studies that link mitochondrial dysfunction with PD and how dietary antioxidants might provide reinforcement of the MQC system. Finally, we discuss how aging plays a role in mitochondrial dysfunction and PD before considering how healthy aging through proper diet and exercise may be salutary.

### Title: Functional Recovery in Parkinson's Disease: Current State and Future Perspective.

**Citation:** Journal of clinical medicine; Oct 2020; vol. 9 (no. 11)

**Author(s):** Bacanoiu, Manuela Violeta; Mititelu, Radu Razvan; Danoiu, Mircea; Olaru, Gabriela; Buga, Ana Maria

**Abstract:** Parkinson's disease (PD) is one of the most frequent neurodegenerative disorders, affecting not only the motor function but also limiting the autonomy of affected people. In the last decade, the physical exercises of different intensities carried out by kinetic therapeutic activities, by robotic technologies or with the participation of sensory cues, have become increasingly appreciated in the management of Parkinson's disease impairments. The aim of this paper was to evaluate the impact of physical exercises with and without physical devices on the motor and cognitive variables of PD patients. In order to achieve our objectives, we performed a systematic review of available original articles based on the impact of kinetic therapeutic activity. Through the search strategy, we selected original papers that were laboriously processed using characteristics related to physical therapy, or the tools used in physiological and psychological rehabilitation strategies for PD patients. In this study, we presented the most current intervention techniques in the rehabilitation

programs of patients with Parkinson's disease, namely the use of assisted devices, virtual imagery or the performing of physical therapies that have the capacity to improve walking deficits, tremor and bradykinesia, to reduce freezing episodes of gait and postural instability, or to improve motor and cognitive functions.

#### Title: The Links between Parkinson's Disease and Cancer.

#### Citation: Biomedicines; Oct 2020; vol. 8 (no. 10)

**Author(s):** Ejma, Maria; Madetko, Natalia; Brzecka, Anna; Guranski, Konstanty; Alster, Piotr; Misiuk-Hojło, Marta; Somasundaram, Siva G; Kirkland, Cecil E; Aliev, Gjumrakch

Abstract: Epidemiologic studies indicate a decreased incidence of most cancer types in Parkinson's disease (PD) patients. However, some neoplasms are associated with a higher risk of occurrence in PD patients. Both pathologies share some common biological pathways. Although the etiologies of PD and cancer are multifactorial, some factors associated with PD, such as α-synuclein aggregation; mutations of PINK1, PARKIN, and DJ-1; mitochondrial dysfunction; and oxidative stress can also be involved in cancer proliferation or cancer suppression. The main protein associated with PD, i.e.,  $\alpha$ -synuclein, can be involved in some types of neoplastic formations. On the other hand, however, its downregulation has been found in the other cancers. PINK1 can act as oncogenic or a tumor suppressor. PARKIN dysfunction may lead to some cancers' growth, and its expression may be associated with some tumors' suppression. DJ-1 mutation is involved in PD pathogenesis, but its increased expression was found in some neoplasms, such as melanoma or breast, lung, colorectal, uterine, hepatocellular, and nasopharyngeal cancers. Both mitochondrial dysfunction and oxidative stress are involved in PD and cancer development. The aim of this review is to summarize the possible associations between PD and carcinogenesis.

# Title: Application of deep learning in detecting neurological disorders from magnetic resonance images: a survey on the detection of Alzheimer's disease, Parkinson's disease and schizophrenia.

**Citation:** Brain informatics; Oct 2020; vol. 7 (no. 1); p. 11 **Author(s):** Noor, Manan Binth Taj; Zenia, Nusrat Zerin; Kaiser, M Shamim; Mamun, Shamim Al; Mahmud, Mufti

**Abstract**: Neuroimaging, in particular magnetic resonance imaging (MRI), has been playing an important role in understanding brain functionalities and its disorders during the last couple of decades. These cutting-edge MRI scans, supported by high-performance computational tools and novel ML techniques, have opened up possibilities to unprecedentedly identify neurological disorders. However, similarities in disease phenotypes make it very difficult to detect such disorders accurately from the acquired neuroimaging data. This article critically examines and compares performances of the existing deep learning (DL)-based methods to detect neurological disorders-focusing on Alzheimer's disease, Parkinson's disease and schizophrenia-from MRI data acquired using different modalities including functional and structural MRI. The comparative performance analysis of various DL architectures across different disorders and imaging modalities suggests that the Convolutional Neural Network outperforms other methods in detecting neurological disorders. Towards the end, a number of current research challenges are indicated and some possible future research directions are provided.

#### Title: Assessment of sexuality among men with idiopathic Parkinson's disease

**Citation:** NPG Neurologie - Psychiatrie - Geriatrie; 2020 **Author(s):** Boulma R.; Khouni H.; Saidani B.; Chouchen A.; Abdelkefi I.

**Introduction:** Parkinson's disease is a common neurodegenerative disorder. However, sexual dysfunction in this disease has not been widely studied.

**Objective(s):** The aim of this study was the evaluation of sexuality among men with Parkinson's disease.

**Method(s):** This was a prospective, single-centre, descriptive study evaluating sexuality among men suffering from Parkinson's disease, running from January 2014 to February 2017. Patients with idiopathic Parkinson's disease and in a steady sexual relationship were included in the study. The evaluation of sexuality was performed using the International Index of Erectile Function in French language (15 questions).

**Result(s):** Twenty-five men treated for idiopathic Parkinson's disease were evaluated for their sexuality. The patients' average age was 65 years. The median duration of the disease was 7.6 years. Despite relatively well preserved sexual desire (average score 6.56 + - 3.1), the patients exhibited disturbances in all the different domains of sexuality. Indeed, we noted low scores for erectile function (8.12 + - 4.9), orgasmic function (4.8 + - 3.2), intercourse satisfaction (6.56 + - 3.1) and global satisfaction (5.12 + - 2.7). No hypersexuality was recorded. Patient age, the duration of the illness, advanced stages the disease and voiding disorders had a statistically significant impact on patients' sexuality.

**Conclusion(s):** Despite relatively well-preserved sexual desire, the domains of sexuality as a whole were disturbed among men with Parkinson disease. It is important to identify and manage these disturbances in good time, because of their possible deleterious impact on quality of life. Copyright © 2020 Elsevier Masson SAS

### Title: The effects of choral singing on communication impairments in acquired brain injury: A systematic review

**Citation:** International Journal of Language and Communication Disorders; 2020 **Author(s):** Monroe P.; Ballard K.J.; Halaki M.; Kumfor F.

**Background:** Acquired brain injury (ABI), such as Parkinson's disease, dementia or stroke, can result in communication difficulties that lead to an impoverished ability to connect meaningfully with others. Choral singing is a complex task that uses multiple brain regions which are also responsible for language and communication skills. The potential therapeutic effects of group singing on communication-related outcomes across ABI aetiologies have not been systematically reviewed. Aim(s): To examine whether participation in group singing over multiple sessions improves speech, voice, language and/or communication skills in individuals with ABI-related communication disorders.

**Methods & Procedures:** A database search was undertaken according to the PRISMA guidelines. Search terms included: stroke OR Parkinson\* OR dementia OR 'acquired brain injury' AND choir OR choral OR singing OR sing OR 'choral sing\*' OR group adj3 singing OR community adj3 singing AND speech OR language OR communication.

**Main Contribution:** A total of 11 studies were included. Nine were quantitative, including one randomized and one non-randomized control trial, and two were mixed method. Nine studies were scored as level IV (uncontrolled) on the American Academy of Neurology (AAN) Classification of Evidence Matrix and two as level III (e.g., lack of blinded assessors).

Eight examined speech and voice skills in Parkinson's disease, two functional communication skills in post-stroke aphasia and one communication between individuals with dementia and a significant other. One level III control trials provided evidence for a therapeutic effect of group singing on communication in individuals with Parkinson's disease.

**Conclusions & Implications:** Currently, there is only one study providing support for using group singing to improve speech and voice skills in people with Parkinson's disease, and no studies of adequate quality indicating positive effects on language and functional communication abilities in ABI. Further research using more rigorous experimental designs is required to determine whether group singing can influence communication skills in ABI.

What this paper adds/ What is already known on the subject: Music activates widespread, bilateral cortical and subcortical brain regions. Group singing is increasingly understood to have positive benefits on quality of life and health-related well-being in both healthy and clinical populations. Given the crossover in neural networks between singing. speech and language, singing activities are also thought to have positive effect of communication impairments secondary to ABI. However, to date, the research evidence supporting the application of group singing for communication impairments in ABI has not been summarized. What this paper adds to existing knowledge A total of 11 studies have looked at communication outcomes after group singing in ABI. For most of these, the guality of evidence was low (AAN level IV). It also highlights that there is a bias in the literature towards the studying individuals with Parkinson's disease (i.e., nine of the 11 studies). What are the potential or actual clinical implications of this work? This review concludes that, currently, there is emerging evidence to support positive effects of a group singing for speech and voice symptoms in individuals with Parkinson's disease, when provided using the Tamplin protocol. However, there is not yet any evidence for communication benefits for individuals with aphasia or dementia. Copyright © 2020 Royal College of Speech and Language Therapists

### Title: A 12-month, dose-level blinded safety and efficacy study of levodopa inhalation powder (CVT-301, Inbrija) in patients with Parkinson's disease

**Citation:** Parkinsonism and Related Disorders; Dec 2020; vol. 81 ; p. 144-150 **Author(s):** Farbman E.S.; Waters C.H.; LeWitt P.A.; Rudzinska M.; Klingler M.; Lee A.; Qian J.; Oh C.; Hauser R.A.

**Introduction:** CVT-301 (InbrijaTM) is a levodopa inhalation powder for on-demand treatment of OFF episodes in Parkinson's disease patients treated with carbidopa/levodopa. Safety and efficacy results of a 12-month, dose-level blinded extension study of a phase 3 trial (SPAN-PD) of CVT-301 are presented.

**Method(s):** Patients were receiving oral carbidopa/levodopa and adjunctive CVT-301 treatment, blinded to dose (60 mg or 84 mg, N = 325). Study visits occurred every 3 months. Pulmonary function was assessed by spirometry. Other safety assessments included dyskinesia and adverse events (AEs). Secondary objectives of the study included maintenance of improvement assessments for occurrence of an ON state during the 60-min post-dose period, change in total daily OFF time, and Patient Global Impression of Change (PGIC).

**Result(s):** Most frequent AEs (>=5%) were cough (15.4%), fall (13.1%), upper respiratory tract infection (7.1%), and dyskinesia (5.1%). Severe AEs (>1 event) were cough (1.9%) and dyskinesia (0.6%). Twelve-month mean changes from baseline for FEV1, FVC, and DLCO were -0.092 L, -0.097 L, and -0.922 mL/min/mmHg, respectively. At 12 months, 73.0% of patients on 84 mg achieved an ON state within 60 min. Total daily OFF time was reduced by

0.55 h (month 1) and 0.88 h (month 12) for the 84 mg dose. Percentage of patients self-reported as improved by PGIC was 65.5-91.9% over 12 months.

**Conclusion(s):** CVT-301 was generally well-tolerated. Twelve-month decline in pulmonary function was consistent with a prior PD control group. Exploratory efficacy results showed CVT-301 maintained improvement at achieving ON states in patients experiencing OFF episodes, decreasing daily OFF time, and maintaining improvement in PGIC. Copyright © 2020

#### Title: White matter hyperintensities and the progression from mild parkinsonian signs to parkinsonism and Parkinson's disease

**Citation:** Neurobiology of Aging; Dec 2020; vol. 96 ; p. 267-276 **Author(s):** Huo Y.; Peng Z.; Tao Y.; Li L.; Yang H.; Hong W.; Huang J.; Wang C.; Ma J.; Chen L.; Liu D.; Dong S.; Zhou H.; Liu L.

**Abstract:** This study investigated the impact of white matter hyperintensities (WMHs) on the progression from mild parkinsonian signs (MPS) to parkinsonism and Parkinson's disease (PD). Participants with MPS completed 5 years of follow-up. WMHs were divided into periventricular WMHs and deep WMHs according to magnetic resonance imaging scans. The diagnosis of MPS, parkinsonism, and PD was based on the motor portion of the Unified Parkinson's Disease Rating Scale. Cox proportional hazard models were used to identify the association between WMHs and MPS progression. Of the 636 participants, 166 (26.1%) with MPS developed parkinsonism and PD after follow-up. After adjusting for potential factors, severe WMHs were associated with an increased risk of MPS progression, moderate and severe periventricular WMHs and severe deep WMHs were associated with the risk of MPS progression, and severe WMHs were associated with the progression of gait/balance impairment, bradykinesia, and rigidity. Additionally, participants treated for vascular risk factors such as hypertension, diabetes mellitus, and hypercholesterolemia had a lower risk of MPS progression. Copyright © 2020 Elsevier Inc.

#### Title: Cardiovascular Risk Among Patients >=65 Years of Age with Parkinson's Disease (From the National Inpatient Sample)

**Citation:** American Journal of Cardiology; Dec 2020; vol. 136 ; p. 56-61 **Author(s):** Abugroun A.; Taha A.; Abdel-Rahman M.; Patel P.; Ali I.; Klein L.W.

**Abstract:** In this study, we aimed to investigate the relationship between Parkinson's disease (PD) and vascular disease and risk factors using a nationally representative sample. The National Inpatient Sample was queried for all patients aged >=65 who were diagnosed with PD during the year 2016. Patients were identified using the International Classification of Diseases-Tenth Revision (ICD-10) diagnosis code: "G20." Each patient diagnosed with PD was frequency-matched to controls at a 1:4 ratio by age and gender. Study outcomes were hypertension, hyperlipidemia, diabetes mellitus, coronary artery disease, and stroke. Outcomes were modeled using logistic regression analysis and further validation was obtained using a propensity score-matched analysis. A total of 57,914 patients (weighted: 289,570) with PD were included. Most patients were of Caucasian race (80.8%). Females were 42.4% and the mean age was 79 years, standard error of the mean (0.03). PD correlated with lower odds for hyperlipidemia adjusted odd ratio (a-OR): 0.77 (95% confidence interval [CI]: 0.75 to 0.79) p <0.001, diabetes mellitus a-OR 0.73 (95% CI 0.71 to

0.75) p <0.001, hypertension a-OR 0.68 (95% CI: 0.67 to 0.70) p <0.001, coronary artery disease a-OR 0.64 (95% CI: 0.63 to 0.66) p <0.001 and higher odds for stroke a-OR: 1.27 (95% CI: 1.24 to 1.31) p <0.001. Following propensity score matching, identical findings were found. In conclusion, patients with PD have a distinct cardiovascular profile with higher rates of stroke and lower rates of coronary artery disease and vascular disease risk factors. Copyright © 2020 Elsevier Inc.

#### Title: Constipation and sleep behaviour disorder associate with processing speed and attention in males with Parkinson's disease over five years follow-up

**Citation:** Scientific Reports; Dec 2020; vol. 10 (no. 1) **Author(s):** Kong W.L.; Huang Y.; Qian E.; Morris M.J.

Abstract: Constipation and REM sleep behaviour disorder (RBD) are the earliest non-motor manifestations of Parkinson's disease (PD). Among non-motor symptoms of PD, it is unclear whether constipation and RBD at early stages of PD are related to cognitive outcomes at later stages. Herein, this study aims to investigate whether the presence of constipation and RBD have an impact on future cognitive outcomes in PD.Access to Parkinson's Progression Markers Initiative (PPMI) database of 360 PD patients with longitudinal observation was requested. Constipation, probable RBD (pRBD) and neuropsychological task scores of PD patients were assessed at baseline and after 5 years. Linear mixed-effects modelling, controlling for gender, age, years of education and LEDD was used to evaluate the association between baseline constipation, pRBD and cognitive performance on follow-up. Gender differences in neuropsychological test performances were found, with men having worse global cognition, speed-attention processing, verbal learning and memory than women at early stages of the disease. We found constipation and pRBD are strongly associated with future decline in some cognitive measures among PD patients, more prominently in men. Our data suggest that early assessment of pRBD and constipation may allow better understanding of the progression of cognitive changes in later phases of PD. Copyright © 2020, The Author(s).

#### Title: Turning and sit-to-walk measures from the instrumented Timed Up and Go test return valid and responsive measures of dynamic balance in Parkinson's disease

Citation: Clinical Biomechanics; Dec 2020; vol. 80

**Author(s):** Picardi M.; Redaelli V.; Antoniotti P.; Pintavalle G.; Aristidou E.; Sterpi I.; Corbo M.; Meloni M.; Caronni A.

**Background:** Balance impairment is a hallmark of Parkinson's disease with dramatic effects for patients (e.g. falls). Its assessment is thus of paramount importance. The aim of this work is to assess which measures from the instrumented Timed Up and Go test (recorded with inertial sensors) are valid balance measures in Parkinson's disease and evaluate their responsiveness to rehabilitation.

**Method(s):** The Mini-BESTest (a criterion-standard balance measure) and the instrumented Timed Up and Go test (with inertial sensors secured to the trunk) were administered to 20 Parkinson's disease patients before and after inpatient rehabilitation (median [IQR]; 76.5 [8.25] years; 5 females; Hoehn and Yahr stage: 2.5 [0.5]). 81 parameters from the instrumented Timed Up and Go test were evaluated. Multiple factor analysis (a variant of principal component analysis for repeated measurements) and effect sizes were used to assess validity and responsiveness, respectively.

**Finding(s):** Only the first component of the multiple factor analysis correlated with the Mini-BESTest, and 21 measures from the instrumented Timed Up and Go test had large loadings on this component. However, only three of these 21 measures also directly correlated with the Mini-BESTest (trunk angular velocities from sit-to-walk and turning; r = 0.46 to 0.50, P = 0.021 to 0.038). Sit-to-walk angular velocity showed greater responsiveness than the Mini-BESTest, while turning showed slightly less. Interpretation(s): Angular velocities from the turning and sit-to-walk phases of the Timed Up and Go test are valid balance measures in Parkinson's disease and are also responsive to rehabilitation. Copyright © 2020 Elsevier Ltd

#### Title: Speaking dyspnea in Parkinson's disease: Preliminary findings

**Citation:** Journal of Communication Disorders; Nov 2020; vol. 88 **Author(s):** Hoit J.D.; Brown V.P.; Nitido H.; Lansing R.W.

**Purpose:** To determine if people with Parkinson's disease (PD) experience dyspnea (breathing discomfort) during speaking.

**Method(s):** The participants were 11 adults with PD and 22 healthy adults (11 young, 11 old). Participants were asked to recall experiences of breathing discomfort across different speaking contexts and provide ratings of those experiences (Retrospective ratings); then they rated the breathing discomfort experienced while performing speaking tasks that were designed to differ in respiratory demands (immediate Post-Speaking ratings).

**Result(s):** Participants with PD reported experiencing breathing discomfort during speaking significantly more frequently (approximately 60 % of the time) than did healthy participants (less than 20 % of the time). Retrospective ratings did not differ significantly from Post-Speaking ratings. Breathing discomfort was experienced by the fewest number of participants with PD for Conversation (two) and Extemporaneous Speaking (three) and by the greatest number for Extended Reading (ten) and Long Counting (nine), although the magnitude of the ratings generally reflected only "Slight" discomfort. Breathing discomfort was most frequently described as air hunger and breathing work, less frequently as mental effort, and very rarely as lung tightness. A few participants with PD reported experiencing emotions associated with their breathing discomfort and most reported using strategies to avoid breathing discomfort in their daily lives.

**Conclusion(s):** Individuals with PD are more apt to experience speaking dyspnea than healthy individuals, especially when speaking for extended periods or when using long breath groups. Such dyspnea may contribute to a tendency to avoid speaking situations and thereby impair quality of life. Copyright © 2020 Elsevier Inc.

### Title: Evaluation of train and test performance of machine learning algorithms and Parkinson diagnosis with statistical measurements

**Citation:** Medical and Biological Engineering and Computing; Nov 2020; vol. 58 (no. 11); p. 2775-2788

Author(s): Avuclu E.; Elen A.

**Abstract:** Parkinson's disease is a neurological disorder that causes partial or complete loss of motor reflexes and speech and affects thinking, behavior, and other vital functions

affecting the nervous system. Parkinson's disease causes impaired speech and motor abilities (writing, balance, etc.) in about 90% of patients and is often seen in older people. Some signs (deterioration of vocal cords) in medical voice recordings from Parkinson's patients are used to diagnose this disease. The database used in this study contains biomedical speech voice from 31 people of different age and sex related to this disease. The performance comparison of the machine learning algorithms k-Nearest Neighborhood (k-NN), Random Forest, Naive Bayes, and Support Vector Machine classifiers was performed with the used database. Moreover, the best classifier was determined for the diagnosis of Parkinson's disease. Eleven different training and test data (45 x 55, 50 x 50, 55 x 45, 60 x 40, 65 x 35, 70 x 30, 75 x 25, 80 x 20, 85 x 15, 90 x 10, 95 x 5) were processed separately. The data obtained from these training and tests were compared with statistical measurements. The training results of the k-NN classification algorithm were generally 100% successful. The best test result was obtained from Random Forest classifier with 85.81%. All statistical results and measured values are given in detail in the experimental studies section. Copyright © 2020, International Federation for Medical and Biological Engineering.

### Title: Estimation of Parkinson's disease severity using speech features and extreme gradient boosting

**Citation:** Medical and Biological Engineering and Computing; Nov 2020; vol. 58 (no. 11); p. 2757-2773

**Author(s):** Tunc H.C.; Sakar C.O.; Apaydin H.; Gunduz A.; Tutuncu M.; Serbes G.; Gurgen F.

**Abstract:** In recent years, there is an increasing interest in building e-health systems. The systems built to deliver the health services with the use of internet and communication technologies aim to reduce the costs arising from outpatient visits of patients. Some of the related recent studies propose machine learning-based telediagnosis and telemonitoring systems for Parkinson's disease (PD). Motivated from the studies showing the potential of speech disorders in PD telemonitoring systems, in this study, we aim to estimate the severity of PD from voice recordings of the patients using motor Unified Parkinson's Disease Rating Scale (UPDRS) as the evaluation metric. For this purpose, we apply various speech processing algorithms to the voice signals of the patients and then use these features as input to a two-stage estimation model. The first step is to apply a wrapper-based feature selection algorithm, called Boruta, and select the most informative speech features. The second step is to feed the selected set of features to a decision tree-based boosting algorithm, extreme gradient boosting, which has been recently applied successfully in many machine learning tasks due to its generalization ability and speed. The feature selection analysis showed that the vibration pattern of the vocal fold is an important indicator of PD severity. Besides, we also investigate the effectiveness of using age and years passed since diagnosis as covariates together with speech features. The lowest mean absolute error with 3.87 was obtained by combining these covariates and speech features with prediction level fusion. [Figure not available: see fulltext.]Copyright © 2020, International Federation for Medical and Biological Engineering.

#### Title: Action observation improves sit-to-walk in patients with Parkinson's disease and freezing of gait. Biomechanical analysis of performance

Citation: Parkinsonism and Related Disorders; Nov 2020; vol. 80 ; p. 133-137

**Author(s):** Mezzarobba S.; Grassi M.; Bernardis P.; Pellegrini L.; Catalan M.; Stragapede L.; Manganotti P.; Kruger B.

**Introduction:** Freezing of gait (FoG) is one of the most disabling gait disorders in Parkinson's disease (PD), reflecting motor and cognitive impairments, mainly related to dopamine deficiency. Recent studies investigating kinematic and kinetic factors affecting gait in these patients showed a postural instability characterized by disturbed weight-shifting, inappropriate anticipatory postural adjustment, worse reactive postural control, and a difficulty executing complex motor tasks (i.e. sit-to-walk). These symptoms are difficult to alleviate and not very responsive to Levodopa. For this reason, additional therapeutic actions based on specific therapeutic protocols may help patients with their daily lives. We conducted a randomized control trial aimed to test if two clinical protocols for PD patients with FoG were effective to improve postural control.

**Method(s):** Rehabilitation protocols, conceived to improve gait, were based on learning motor exercises with the Action Observation plus Sonification (AOS) technique, or by the use of external sensory cues. We collected biomechanical data (Center of Mass COM, Center of Pressure COP, and moving timings), using the sit-to-walk task as a measure of motor and gait performance.

**Result(s):** Kinetic and kinematic data showed that when treatment effects consolidate, patients treated with AOS protocol are more efficient in merging subsequent motor tasks (sit-to-stand and gait initiation), and diminished the total moving time and the area of the COP positions.

**Conclusion(s):** We demonstrated for the first time that PD patients with FoG treated with an AOS protocol aimed at relearning appropriate gait patterns increased balance control and reacquired more efficient postural control. Copyright © 2020 Elsevier Ltd

### Title: Anxiety in Parkinson's disease is associated with changes in the brain fear circuit

Citation: Parkinsonism and Related Disorders; Nov 2020; vol. 80 ; p. 89-97

**Author(s):** Carey G.; Lopes R.; Viard R.; Betrouni N.; Kuchcinski G.; Devignes Q.; Defebvre L.; Dujardin K.; Leentjens A.F.G.

**Background:** Anxiety is frequent in Parkinson's disease (PD) and has a negative impact on disease symptoms and quality of life. The underlying mechanisms remain largely unknown. The aim of this study was to identify anatomical and functional changes associated to PD-related anxiety by comparing the volume, shape and texture of the amygdala, the cortical thickness as well as the functional connectivity (FC) of the fear circuit in patients with and without clinically relevant anxiety.

**Method(s):** Non-demented PD patients were recruited, and anxiety was quantified using the Parkinson Anxiety Scale. Structural MRI was used to compare cortical thickness and amygdala structure and resting-state functional MRI to compare FC patterns of the amygdala and resting-state functional networks in both groups.

**Result(s):** We included 118 patients: 34 with (A+) and 84 without (A-) clinically relevant anxiety. Clusters of cortical thinning were identified in the bilateral fronto-cingulate and left parietal cortices of the A+ group. The texture and the shape of the left amygdala was different in the A+ group but the overall volume did not differ between groups. FC between the amygdala and the whole brain regions did not differ between groups. The internetwork resting-state FC was higher between the "fear circuit" and salience network in the A+ group.

**Conclusion(s):** Anxiety in PD induces structural modifications of the left amygdala, atrophy of the bilateral fronto-cingulate and the left parietal cortices, and a higher internetwork resting-state FC between the fear circuit and the salience network.Copyright © 2020 Elsevier Ltd

#### Title: A rapid and low-cost test for screening the most common Parkinson's diseaserelated GBA variants

Citation: Parkinsonism and Related Disorders; Nov 2020; vol. 80 ; p. 138-141

Author(s): Straniero L.; Rimoldi V.; Melistaccio G.; Duga S.; Asselta R.; Di Fonzo A.; Pezzoli G.

**Introduction:** Deleterious variants in the GBA gene confer a 2- to 20-fold increased risk of Parkinson's disease (PD) and are associated with a more severe disease course. The presence of a highly-similar pseudogene complicates genetic screening, both by Sanger and next-generation sequencing (NGS). Among PD-associated GBA variants, four missense substitutions (p.L444P, p.N370S, p.T369M, p.E326K) account for the majority of cases. Here, we aimed at developing an allele-specific PCR (AS-PCR) able to concomitantly detect the most common PD-related GBA variants.

**Method(s):** A multiplex PCR assay was designed using allele-specific oligonucleotides that distinguish the gene from the pseudogene and can exclusively amplify the variant alleles. Primer sequences and molarity, and thermal profiles were empirically optimized. The assay was validated on 4016 DNAs extracted by standard salting-out and previously analyzed by whole-exome sequencing (WES) followed by Sanger validation.

**Result(s):** AS-PCRs performed on 4016 DNAs detected 103 variants; among them, 97 were true positives and 6 false positives. When comparing the results with the original WES data, for the "difficult" p.L444P, the number of false positives was 2/9 and 18/24 for multiplex-AS-PCR and WES, respectively. As we could have missed some p.L444P alleles by NGS, we verified the test performance on 50 DNAs from Sanger-validated p.L444P heterozygotes. All samples tested correctly.

**Conclusion(s):** We set up and validated a rapid and inexpensive test for screening large cohorts of individuals for variants conferring a significant PD risk. This screening method is particularly interesting to identify patients who could benefit most from early access to personalized therapies. Copyright © 2020 The Authors

#### Title: Cognitive impairment in Parkinson's disease: Associations between subjective and objective cognitive decline in a large longitudinal study

**Citation:** Parkinsonism and Related Disorders; Nov 2020; vol. 80 ; p. 127-132 **Author(s):** Mills K.A.; Schneider R.B.; Oakes D.; Eberly S.; Saint-Hilaire M.; Ross G.W.; Hauser R.A.; Lang A.E.; Marras C.; Halverson M.J.; Litvan I.; Blindauer K.; Aquino C.; Simuni T.

**Background:** Cognitive decline creates substantial morbidity and cost in Parkinson's disease (PD) and clinicians have limited tools for counseling patients on prognosis. We aimed to use data from a randomized, controlled trial of isradipine in Parkinson's disease (STEADY-PD III) to determine which objective cognitive domain deficits drive patient complaints of cognitive symptoms.

**Method(s):** Neuro-Quality of Life (Neuro-QoL) Cognition: General Concerns (GC), and Cognition: Executive Function (EF) (subjective measures), were administered at baseline, 1, 2, and 3 years in 324 people with PD. Baseline Montreal Cognitive Assessment (MoCA) was divided into 4 domains: visuospatial/executive, memory, attention, and language (objective measures). Spearman rank correlations and multiple regression models adjusted for other clinical variables evaluated associations between baseline Neuro-QoL domains and individual MoCA domains. Multiple regression models evaluated the association between baseline MoCA domain performance and Neuro-QoL change over three years. Cox proportional hazards predicted development of PD-MCI based on baseline and time-varying Neuro-QoL reporting.

**Result(s):** Higher MoCA memory performance was associated with better Neuro-QoL-GC (beta = 0.75, SE = 0.391, p = 0.05) and Neuro-QoL-EF (beta = 0.81, SE = 0.36, p = 0.02) at baseline. There was a trend for baseline MoCA memory to predict the degree of subjective cognitive decline on the Neuro-QoL-EF (beta = 0.70, SE = 0.42, p = 0.09). Baseline depression and anticholinergic use were associated with worsened Neuro-QoL-EF and Neuro-QoL-GC. Increasing subjective cognitive complaints in Neuro-QoL-EF were associated with development of PD-MCI over 3 years of follow-up (HR = 0.95, CI = 0.90-1.0, p = 0.039).

**Conclusion(s):** Objective memory impairment may be a stronger predictor than executive or visuospatial dysfunction for the presence of subjective cognitive complaints in early PD. Copyright © 2020 Elsevier Ltd

### Title: REM sleep behavior disorder in early Parkinson's disease predicts the rapid dopaminergic denervation

**Citation:** Parkinsonism and Related Disorders; Nov 2020; vol. 80 ; p. 120-126 **Author(s):** Kim Y.E.; Ma H.-I.; Kim Y.J.; Hwang H.S.

**Objective:** To test the hypothesis that REM sleep behavior disorder (RBD) in early Parkinson's disease (PD) predicts rapid progression of dopaminergic denervation.

**Method(s):** 123I-FP-CIT single photon emission computed tomography (SPECT) scans were performed sequentially at baseline, 1 year, 2 years, and 4 years in 416 de novo patients with PD. RBD screening questionnaire scores >5 at baseline placed the participant in the likely-RBD group. Temporal changes in the specific binding ratio (SBR; caudate, putamen. sum of both, striatum) were compared between the likely-RBD and the non-likely-RBD groups for more or less affected striatum with a repeated measure ANOVA.

**Result(s):** Likely-RBD was reported in 37.7% of the drug-naive PD patients at baseline. The likely-RBD and non-likely-RBD groups did not have significant differences in the baseline clinical features including gender, age, disease duration, UPDRS motor score, and striatal SBR. Striatal SBR decreased significantly over four years in both groups (P < .001). In the analysis of a more affected striatum, striatal SBR decreased significantly faster in the likely-RBD group than in the non-likely-RBD group (P < .05 for all), whereas it was not statistically significant for the less affected striatum. The mean striatal SBR value (mean value of both striata), especially the caudate SBR, indicated greater acceleration of denervation in the likely-RBD group than in the non-likely-RBD group over time (P < .05).

**Conclusion(s):** Likely-RBD in PD predicts accelerating dopaminergic denervation, thereby implicating it as a marker for a poor prognosis or distinctive subtype in PD. Copyright © 2020 Elsevier Ltd

Title: The changes of exercise pattern and clinical symptoms in patients with Parkinson's disease in the era of COVID-19 pandemic

**Citation:** Parkinsonism and Related Disorders; Nov 2020; vol. 80 ; p. 148-151 **Author(s):** Song J.; Ahn J.H.; Choi I.; Mun J.K.; Cho J.W.; Youn J.

**Introduction:** The coronavirus disease 2019 (COVID-19) pandemic has disrupted everyday life of Parkinson's disease (PD) patients, but its clinical impact has not been illustrated. In this study, we investigated the change in physical activity and subsequently clinical symptoms of PD during the COVID-19 pandemic.

**Method(s):** We enrolled PD patients who were able to ambulate independently and had visited our clinic at Samsung Medical Centre from December 2019 to January 2020 (baseline) and in May 2020 (follow-up during the COVID-19 crisis), and divided them into either 'the sustained exercise group' or 'the reduced exercise group'. Then, we assessed the change in the exercise and clinical features between these two groups over the study period.

**Result(s):** A total of 100 subjects were recruited. During the COVID-19 pandemic, the amount, duration and frequency of exercise were reduced. There was decrease in number of patients who do indoor-solo exercise and increase in that of patients who do not exercise. One third reported subjective worsening of both motor and non-motor features, although Unified PD Rating Scale (UPDRS) part 3 score was similar. Additionally, the reduced exercise group reported more motor and non-motor aggravation than the sustained exercise group, despite lack of significant difference in the UPDRS part 3 score.

**Conclusion(s):** The COVID-19 pandemic had a clear impact on exercise and subjective symptoms in PD patients, with reduced exercise being related to a subjective increase in both motor and non-motor symptoms of PD. Maintaining exercise should therefore be emphasized even in situations like the COVID-19 pandemic. Copyright © 2020 Elsevier Ltd

#### Title: Coronavirus Disease 2019 and Management of Advanced Therapies in Parkinson's Disease; Peculiar Needs for Deep Brain Stimulation Patients?

**Citation:** Movement Disorders Clinical Practice; Oct 2020; vol. 7 (no. 7); p. 875-876 **Author(s):** Cerroni R.; Scalise S.; Stefani A.

### Title: Physical Activity Changes and Correlate Effects in Patients with Parkinson's Disease during COVID-19 Lockdown

**Citation:** Movement Disorders Clinical Practice; Oct 2020; vol. 7 (no. 7); p. 797-802 **Author(s):** Schirinzi T.; Di Lazzaro G.; Salimei C.; Cerroni R.; Liguori C.; Scalise S.; Alwardat M.; Mercuri N.B.; Pierantozzi M.; Stefani A.; Pisani A.

**Background:** COVID-19 outbreak profoundly affected health systems and people's daily life worldwide. Parkinson's disease (PD) patients lost their normal routine and interrupted regular physical activity, either as physiotherapy or sport, with inevitable consequence on their daily-life and well-being.

**Objective(s):** To evaluate the changes in physical activity due to COVID-19 emergency, including self-management strategies or technology-assisted activities, and the subsequent clinical implications in PD patients.

**Method(s):** Seventy-four patients from an Italian center have been remotely examined during the lockdown (April-May 2020) by an e-mail structured survey, including self-administered scales. We collected and analyzed data on changes, modalities and amount of physical active practice, on the use of technology-based tools, and on self-perceived clinical condition.

**Result(s):** Sixty percent of patients reported a significant worsening of their general conditions during the lockdown, the reduction of physical activity being the main risk factor for such change. However, patients found ways to practice physical activity, using satisfactorily technology assistance in 50% of cases (mostly women).

**Conclusion(s):** The COVID-19 emergency has been an ordeal for PD patients. Nevertheless, patients adapted their habits to continue practicing physical activity that resulted a main determinant of their well-being; as well, they successfully approached technology-based assistance. Education, communication, and networking emerge as critical for a constructive reaction to the emergency's challenges. Copyright © 2020 International Parkinson and Movement Disorder Society

### Title: Risk of Mortality Associated With Atypical Antipsychotic use: A National Cohort Study of Older Adults With Depression and Parkinson's Disease

**Citation:** American Journal of Geriatric Psychiatry; Oct 2020; vol. 28 (no. 10); p. 1079-1088 **Author(s):** Chekani F.; Johnson M.L.; Chen H.; Sherer J.T.; Aparasu R.R.; Holmes H.M.

Objectives: This study examined the risk of all-cause-mortality in patients with Parkinson's Disease (PD) and comorbid depression using inappropriate atypical antipsychotics (AAPs), based on the 2015 American Geriatrics Society Beers criteria.

**Method(s):** A retrospective analysis of 2007-2010 Minimum Data Set linked Medicare data was conducted using a propensity-matched approach. The cohort included PD patients aged 65 years or older without schizophrenia or bipolar disorder who started AAPs. All patients had a diagnosis of comorbid depression. Risk of 6-month all-cause-mortality was compared across appropriate AAPs (aripiprazole, clozapine, or quetiapine) and inappropriate AAPs (olanzapine, asenapine, brexpiprazole, iloperidone, lurasidone, paliperidone, risperidone, or ziprasidone) using robust Cox regression models involving the matched cohort.

**Result(s):** All-cause mortality rate was 15.65% in appropriate AAP group (n = 6,038) and 16.91% in inappropriate AAP group (n = 6,038) over 6-month follow-up in the matched cohort. The robust Cox proportional hazards models revealed increased risk of all-cause mortality (hazard ratio [HR] 1.13 [95% confidence interval {CI}: 1.01-1.28)] for patients who used inappropriate compared to appropriate AAPs. Risk of death was also higher for risperidone compared to quetiapine (HR: 1.20 [95% CI: 1.03-1.40]) in sensitivity analysis. However, there was a significant relationship between pneumonia and death in all analyses. The impact of inappropriate AAP use on mortality was not significant when pneumonia was modeled as a mediator.

**Conclusion(s):** Inappropriate AAP use is associated with a higher risk of all-cause-mortality in older patients with PD which is mainly mediated by pneumonia. Therefore, inappropriate AAP use should be avoided to improve quality of care in PD.Copyright © 2020 American Association for Geriatric Psychiatry

### Title: Linear predictive coding distinguishes spectral EEG features of Parkinson's disease

**Citation:** Parkinsonism and Related Disorders; Oct 2020; vol. 79 ; p. 79-85 **Author(s):** Anjum M.F.; Dasgupta S.; Mudumbai R.; Singh A.; Cavanagh J.F.; Narayanan N.S.

**Objective:** We have developed and validated a novel EEG-based signal processing approach to distinguish PD and control patients: Linear-predictive-coding EEG Algorithm for PD (LEAPD). This method efficiently encodes EEG time series into features that can detect PD in a computationally fast manner amenable to real time applications.

**Method(s):** We included a total of 41 PD patients and 41 demographically-matched controls from New Mexico and Iowa. Data for all participants from New Mexico (27 PD patients and 27 controls) were used to evaluate in-sample LEAPD performance, with extensive cross-validation. Participants from Iowa (14 PD patients and 14 controls) were used for out-of-sample tests. Our method utilized data from six EEG leads which were as little as 2 min long.

**Result(s):** For the in-sample dataset, LEAPD differentiated PD patients from controls with 85.3 +/- 0.1% diagnostic accuracy, 93.3 +/- 0.5% area under the receiver operating characteristics curve (AUC), 87.9 +/- 0.9% sensitivity, and 82.7 +/- 1.1% specificity, with multiple cross-validations. After head-to-head comparison with state-of-the-art methods using our dataset, LEAPD showed a 13% increase in accuracy and a 15.5% increase in AUC. When the trained classifier was applied to a distinct out-of-sample dataset, LEAPD showed reliable performance with 85.7% diagnostic accuracy, 85.2% AUC, 85.7% sensitivity, and 85.7% specificity. No statistically significant effect of levodopa-ON and levodopa-OFF sessions were found.

**Conclusion(s):** We describe LEAPD, an efficient algorithm that is suitable for real time application and captures spectral EEG features using few parameters and reliably differentiates PD patients from demographically-matched controls. Copyright © 2020 Elsevier Ltd

#### Sources Used:

The following databases are searched on a regular basis in the development of this bulletin: EMCARE, British Nursing Index, Cinahl, Medline

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