statistically significant (HC 1.00 ± 0.20, PD 0.92 ± 0.16, SWEDDs 0.82 ± 0.33). An increase in average anterior trunk tilt and elbow flexion were present in the PD group ($p < .05$, relative to HC) but not present in the SWEDDs group. Normalized arm swing, summarized as shoulder flexion/extension motion divided by hip flexion/extension motion, was lower in both PD (0.29 ± 0.11) and SWEDDs (0.32 ± 0.11) than in HC (0.48 ± 0.15) on the side of smallest arm swing (p <. 05).

CONCLUSIONS: Our preliminary results indicate SWEDDs patients tend to exhibit arm swing dysfunction but not the flexed posture of Parkinsonian gait.

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Ambulatory monitoring of freezing of gait in Parkinson's disease and normal pressure hydrocephalus

Steven Moore[1], Hamish MacDougall[2], Bandar Hakim[1], Catherine Cho[1], David Solomon[3], William Ondo[4]

[1]Mt Sinai School of Medicine, New York, United States, [2]University of Sydney, Sydney, Australia, [3]Johns Hopkins Hospital, Baltimore, United States, [4]Baylor School of Medicine, Houston, United States

INTRODUCTION: Freezing of gait (FOG) is common in advanced Parkinson's disease (PD), is resistant to treatment and negatively impacts quality of life. We have developed and validated an ankle-mounted gait monitor [1,2] for detection of FOG events in PD [3], utilizing the frequency characteristics of vertical acceleration of the shank. The aim of this study was to determine whether FOG events in NPH patients exhibit similar movement characteristics as observed in PD patients.

METHODS: Vertical linear acceleration of the left shank during ambulation was sampled at 100 Hz using an ankle-mounted sensor array that stored data on a SD card. Simultaneous video records were obtained throughout testing and FOG events identified by a movement disorders specialist.

RESULTS: Acceleration data from 51 FOG events were obtained from 11 PD patients and 2 NPH patients. Frequency analysis showed high-frequency components of leg movement during FOG in the 3-8 Hz band (Fig. 1B,C) that were not apparent during volitional standing (Fig. 1A). A freeze index (FI) was defined as the power in the 'freeze' band divided by the power in the 'locomotor' band (0.5 – 3 Hz), and a threshold chosen such that FI values above this limit were designated as FOG. Individual calibration of the freeze threshold correctly identified 90% of FOG events in PD patients, with 10% false positives [3]. Preliminary data from NPH patients (Fig. 1C) demonstrated similar frequency characteristics of vertical leg motion during FOG.

CONCLUSIONS: FOG is currently resistant to treatment and there is no means to identify FOG events. Ambulatory monitoring may significantly improve clinical management of FOG in PD and NPH by providing an objective assessment of treatment efficacy.

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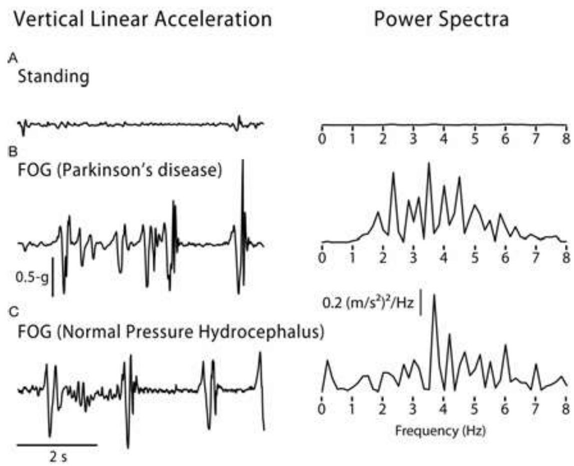

Fig.1 Vertical linear acceleration of the left shank (left column) and power spectra (right column) ***A*** when quietly standing, ***B*** FOG during gait initiation in a patient with PD, and ***C*** FOG during gait initiation in a patient with NPH.

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Feasibility of using the Lokomat robotic system for patients with Parkinson disease

Aleksandr Telenkov, Ksenia Ustinova, Marina Kurganskaya, Lyudmila Chernikova

Research Central of Neurology of RAMS, Moscow, Russian Federation

INTRODUCTION: Gait disturbance in patients with Parkinson disease (PD) is the major factor affecting quality of their life. Although addressed by conventional rehabilitation, gait training might benefit from the use of innovative robot-assisted device Lokomat. To test this hypothesis fesibility of the using the Lokomat robotic system in patients with PD was analyzed.

METHODS: Ten patients (4 women, 6 men) with akineticorigid and rigid-tremor form of PD, age 35-65 years, Hoehn and Yahr stage 3-4 practiced walking with the robot-assisted Lokomat system. Vertical body weight unloading 35.6±3.7 % and unexpected changes of treadmill speed (from 1.2 to 1.9 km/h) were applied during training sessions lasting from 15-21 to 40-45 min. The values of vertical and horizontal (up to 5% - 0%) weight unloading had been gradually decreased over time. The training course included 10-15 sessions. Clinical evaluation of patients was done using the 42 items UPDRS scale before and after practice with specific attention to the items 22 (stiffness), 29 (gait), 31 (body bradikinesia/hypokinesia), test of 20-m walking. Gait kinematic was assessed using magnetic system for motion analysis "Flock of birds".

RESULTS: After course of Lokomat therapy significant improvement of most measured variables was observed including bradykinesia decrease of 41.0%, stiffness – of 22.9%, walking speed increase of 30.6%. Therefore, upon completion the Lokomat therapy, participants demonstrated increased step length and reduced time to make a 180º turn.

CONCLUSIONS: the results showed that robot-assisted gait therapy with the Lokomat system can be used in rehabilitation of patients with PD. Further studies are needed to assess the effect of Lokomat therapy on the gait of patients with PD.

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Long term follow up of advanced Parkinson's disease following STN deep brain stimulation: impact on gait, balance and functional activity

Lynn Rochester[1,3], Katherine Baker[2], Diana Jones[2], Jon Godwin[3,4], David Burn[1]

[1]Newcastle University, Newcastle upon Tyne, United Kingdom, [2]Northumbria University, Newcastle upon Tyne, United Kingdom, [3]Glasgow Caledonian University, Glasgow, United Kingdom, [4]Oxford University, Oxford, United Kingdom

INTRODUCTION: A recent randomised long-term assessment of surgery for Parkinson's disease (PD) (PD SURG) evaluated the efficacy of deep brain stimulation of the sub-thalamic nucleus (DBS-STN), compared to medical therapy in patients with advanced PD and demonstrated significant improvements in quality of life. This study aimed to quantify changes in severity of motor symptoms associated with gait after DBS-STN compared to objective measures of gait performance and function. We carried out a long term evaluation of gait, balance and functional activity following DBS-STN.

METHODS: 18 people with PD were recruited. Activity was measured 6 months (P3) and 6 weeks before surgery (P4) and at four time points after surgery (6 weeks (T1), 3 months (T2), 6 months (T3) and 12 months (T4)). Outcome measures of motor severity (Hoehn and Yahr score), gait (freezing of gait questionnaire) gait speed, step length and cadence), balance (timed single and tandem stance) and function (Falls Efficacy Scale, Nottingham Extended Activities of Daily Living) were made. Assessments were carried out in the home with individuals on medication. Regressions of measures of each outcome against time (P3-T4) provided variance ratios and associated p values for the null hypothesis. A *P* value of 0.05 was considered significant.

RESULTS: Significant improvements in motor symptoms following DBS-STN were found which were immediate and sustained showing reduced motor severity (Hoehn & Yahr scores) (P=.005), incidence and severity of freezing (Freezing of Gait Questionnaire) (P=.0004), and improved activities of daily living (Nottingham Extended Activities of Daily Living) (P=.01). However, there was no significant improvement in walking speed, step length, cadence, timed balance tests or reduced fear of falling.

CONCLUSIONS: Improvements in the distressing motor symptoms of PD do not translate to improved gait and balance outcomes underscoring the dopa-resistant nature of these clinical characteristics. These results highlight the need for specific rehabilitation aimed at gait and mobility in order to optimise the benefits of surgery and underscore the importance of a multidisciplinary approach to patient management.

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The effects of stroke involving the basal ganglia on control of axial segment reorientation during turning

Kristen Hollands[1], Paulette Van Vliet[2], Alan Wing[1], Doerte Zietz[1], Mark Hollands[1]

[1]University of Birmingham, Birmingham, United Kingdom, [2]University of Nottingham, Nottingham, United Kingdom

INTRODUCTION: Individuals with Parkinson's disease (PD) show altered coordination during turning characterized by simultaneous rotation of the head and trunk and delayed onset of reorientation in all axial segments [1,2]. This indicates that the BG may play an important role in the control of axial segment reorientation during turning. We sought to explore the contributions of the BG to the control of turning by examining biomechanical deficits in turning in patients with stroke lesion involving the BG.

METHODS: Six participants (> 6months post-stroke) with MRI-confirmed lesions involving the BG (SBG), with lesions not involving the BG (SNoBG) and age-match controls (CBG, CNoBG) were asked to change walking direction by 45°, either left or right,