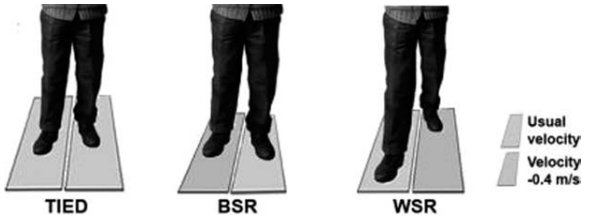

FIG. 1 (524).

sponding to the fastest leg run 0.4 m/s slower. The bilateral coordination of gait was assessed by the Phase Coordination Index (PCI).

Results: During tied condition, the step lengths of the slowest and fastest leg were respectively 26.5±3.0 and 34.9±3.9 cm (p=ns) with a fastest/slowest ratio of 1.3±0.5. During the BSR condition these values resulted respectively 31.1±4.9 cm, 29.9±4.0 cm (p=ns) and 1.1±0.8 (p=0.03 vs. *tied*), thus revealing a more symmetric gait as compared to the tied condition. During WSR, these values were respectively 22.5±2.5 cm, 41.0±2.8 cm (p=0.0003) e 1.8±0.2 (P=0.002 vs *tied*), thus revealing a more asymmetric gait. However, when examining the bilateral coordination of the lower limbs, gait was significantly more coordinated during WSR than during tied (p=0.05) or BSR (p=0.02): the PCI values were 39.8±10.3, 47.3±10.7, and 52.3±11.5, respectively. As a consequence the global performance of gait resulted improved during the WSR as compared to the tied condition: stride length increased from 61.0±5.0 to 64.1±5.9 cm (p=0.05) whereas cadence decreased from 147±17 to 118±9 steps/min (p=0.04).

Conclusions: Our findings reveal that during normal gait (tied) the locomotor system reduces the step length of the less affected side in order to preserve the symmetry between legs. In fact, during the WSR condition, in spite of the increased asymmetry, gait improves in terms of stride length and coordination.

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Gait analysis using a wearable accelerometer system: Comparison between control subjects and patients with Parkinson's disease

D. Maquet, J.-L. Croisier, F. Robert, S. LeScanf, C. Rodriguez de la Cruz, T. Bury, G. Garraux (Liege, Belgium)

Objective: To examine specific gait parameters using a wearable accelerometer system in PD patients as compared with normal individuals.

Background: Walking is one of the most universal human activities and disorders of gait are one of the most cumbersome symptoms in Parkinson's disease (PD). Quantitative gait analysis using external devices is particularly relevant to detect and characterize walking disorders, particularly in patients with neurological diseases.

Methods: Ten PD patients (mean age: 63±9 years and body mass index: 23±3 kg/m^2) and 10 control subjects (mean age: 64±9 years and body mass index: 24±2 kg/m^2) were included in the study. PD patients were studied on medication. Mean disease duration was 8 years and mean score on Hoehn & Yahr scale was 2 Participants were asked to walk at their comfortable speed under standardized experimental conditions in a 40 m-long hospital corridor. The gait analysis system used in this study (Locometrix^{TM}) included an acceleration sensor, a recording device and a software for signal processing. The sensor was composed of two accelerometers placed perpendicularly and was incorporated into a semi-elastic belt placed over the L3-L4 intervertebral space. We extracted the following gait parameters during a 20-second period of stabilized walking: stride frequency, stride length, stride regularity (similarity of cranio-caudal movements over successive strides) and step symmetry (similarity of left and right cranio-caudal movements). Walking speed was also measured.

TABLE 1 (525).

Gait parameters	Controls	PD	p value
Walking speed (m/s)	1.39 ± 0.19	1.16 ± 0.3	0.05
Stride frequency (Hz)	0.92 ± 0.04	0.92 ± 0.1	NS
Stride length (m)	1.51 ± 0.18	1.26 ± 0.26	0.02
Stride regularity (au)	270 ± 47	239 ± 67	NS
Step symmetry (au)	214 ± 52	185 ± 79	NS

m=meters; s=seconds; au =arbitrary unit; NS=not significant.

Results: Walking speed and stride length were significantly lower in PD patients in comparison with healthy controls (Table 1). Stride regularity and step symmetry were also altered in the PD group but this difference did not reach statistical significance.

Conclusions: Although this study is limited by a small sample size, our preliminary results showed that quantitative gait parameters can be easily studied in PD patients using a wearable accelerometer system. This approach still needs to be validated in PD but opens interesting perspectives to track modifications of quantitative gait parameters associated with disease progression and to evaluate more accurately the effects of specific therapeutic interventions.

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Ambulatory monitoring of energy expenditure and physical activity levels using the SenseWear Armband^{TM} system in Parkinson's disease

C. Rodriguez de la Cruz, T. Bury, S. Le Scanff, F. Robert, D. Maquet, J.-L. Croisier, G. Garraux (Liege, Belgium)

Objective: To monitor physical activity levels and energy expenditure in daily life using the ambulatory SenseWear Armband^{TM} system in Parkinson's disease (PD) patients and control subjects.

Background: One goal of therapeutic interventions in PD is to improve the level of mobility and physical activity during daily life but these important outcomes remain difficult to quantify with a high accuracy.

Methods: We recruited 11 PD patients (mean age: 63.33±7.81 years and B.M.I.: 25.1±3.24 kg/m2) and 11 control subjects (mean

TABLE 1 (526). *Parameters derived from 24h ambulatory SenseWear Armband^{TM} recordings*

	Controls	PD	P value
TEE	2286 ± 563	2336±584	NS
0-1 MET			
EE (cal)	687±166	894±224	NS
Time (min)	658±163	768±179	NS
1-2 MET			
EE (cal)	392±119	560±176	NS
Time (min)	408±163	424±211	NS
2-3 MET			
EE (cal)	562±155	361±121	0.002
Time (min)	222±74	147±55	0.01
3-6 MET			
EE (cal)	628±557	506±442	NS
Time (min)	150±103	100±80	NS
>6MET			
EE (cal)	17±20	12±4	NS
Time (min)	2.2±2.4	6±7	NS
Number of steps	7563±3194	5279±1820	0.045

TEE=total energy expenditure (EE); cal=calories; min=minutes.

age: 63.34±2.6 years and B.M.I.: 22.54±2.77 kg/m2). PD patients were studied on medication. Mean disease duration was 9.2 years and mean score on Hoehn & Yahr scale was 1.9. The SenseWear Armband™ system was placed on the right upper arm during 24 hours on a week-end day. The system includes a two-axis accelerometer, a galvanic skin response sensor, a heat flux sensor, a skin temperature sensor and at least a near-body ambient temperature sensor. We recorded the total energy expenditure (T.E.E.), and both energy expenditure (E.E.) and time (T.) at 0-1, 1-2, 2-3, 3-6 & >6 metabolic equivalents (MET=3.5 mlO2.Kg-1.min-1) as well as the total number of steps. On a separate day, PD patients also performed a triangular aerobic test at 10 watts/min on a cyclo-ergometer to estimate their VO2max and maximal heart rate (MHR).

Results: Despite PD patients were on medication, E.E. & T. at 2-3 METs and steps number were significantly lower than in healthy controls (Table 1).

Mean group VO2max and MHR were 25 ml/kg/min and 125/min, respectively. There was no significant linear correlation between VO2max and T.E.E. or between VO2max and steps number in the PD group.

Conclusions: Although this study is limited by a small sample size, our results showed that energy expenditure and physical activity levels can be easily monitored during everyday life using the ambulatory SenseWear Armband™ system. This device still needs to be fully validated in PD but it opens interesting perspectives to monitor sustained motor effects after therapeutic interventions including a physical reconditioning program. In this case, the aerobic triangular test may also be indicated for longitudinal follow up.

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Nine-hundred patients with Parkinson's disease: A twenty-year experience in a public hospital

N.S. Garretto, T. Arakaki, J.A. Bueri, V.E. Diaz Aragunde, V.A. Pujol Lereis, N.E. Campora, M.R. Arce (Caba, Buenos Aires, Argentina)

Objective: To analyze the clinical features and treatment trends of PD patients treated in our Movement Disorder Clinic in the last twenty years.

Background: There are guidelines for the treatment of the early stages of PD. However, for many patients levodopa is still a choice as an initial treatment.

Methods: We performed a retrospective study of 3,590 medical records from the period 1988-2008. We selected 900 patients with idiopathic PD (25%). We analyzed age, gender, family history, stage of the disease, features of the progression of the disease, and treatments.

Results: *Demographic data*: Age at onset: 57.9±10.6 years (51.8% men). Family History of PD:10%. *Clinical features at first visit*: duration of disease: 48 months[1-360], previous diagnosis of PD: 88,3% (in 70% of patients, diagnosis was made immediately when symptoms began); motor fluctuations: 39.9%, dyskinesia: 29.2%, Hoehn&Yahr stage I: 24.1%, II: 63.3%, III: 11.4%, IV: 0.9%, V:0.3%. *Progression during follow-up* (FU): dyskinesia: 42.1% (FU: 72 months [4-252]), motor fluctuations: 54.3 % (FU: 60 months [2-252]), cognitive impairment:13.1% (FU: 108 months [24-336]), hallucinations: 16% (FU: 120 months [24-336]), depression: 31.4% (FU: 54 months [1-360]). *Initial treatment with levodopa* 1988-1997: 85%; 1998-2008: 79%; in patients aged<65 years: 83.7% and 75.8%, respectively.

Conclusions: The demographic and clinical features in our patient population are coincident with those in the literature. The large number of patients with a prior diagnosis of PD is accounted for by the fact that ours is a referral center. Levodopa remained the first choice for initial therapy in most patients, in spite of the availability of more optional drugs in the last decade and the recommendations for early disease treatment. We suspect that economical factors are an important determinant in the choice of the initial therapy, although limited knowledge of other alternatives by non-experts could be the cause in some cases.

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Dyskinesia-hyperpyrexia syndrome: Another Parkinson's disease emergency

S. Gil, A. Contreras, R. Fernandez, F. Grandas (Madrid, Spain)

Objective: To present a case of dyskinesia-hyperpyrexia in a patient with Parkinson's disease (PD), a new PD emergency different from the parkinsonism-hyperpyrexia syndrome (PHS).

Background: PHS is a rare though life-threatening PD complication. It is characterized by hyperthermia, autonomic dysfunction, consciousness disturbances, rigidity and elevated serum creatinekinase (CK). No PD patients with a dyskinetic status- instead of severe rigidity- associated with hyperthermia, rhabdomyolisis and a confusional state have been previously described.

Methods: A 68-year-old female, with a twelve-year history of PD complicated with motor fluctuations and dyskinesias, was treated with levodopa/carbidopa/entacapone, pramipexole and amantadine. She experienced transient visual hallucinations that became more frequent over the last six months. Two days before her admission severe continuous generalized dyskinesias appeared followed by confusion, drowsiness and fever. There has been no change in her usual antiparkinsonian treatment. On examination she was conscious but disoriented and with prominent visual hallucinations. Temperature was 41.2 °C. No meningeal signs were found. Severe generalized choreatic dyskinetic movements were observed, more intense in the lower limbs. Only a mild bilateral akinetic-rigid syndrome was detected. The remainder of neurological and general examination was normal. High plasma CK was found (up to 1455 IU/L). Blood, urine and cerebrospinal fluid cultures, a cranial computerized tomography, and a chest radiography showed no abnormalities.

Results: Treatment was started with intravenous fluids, antipyretic measures and pramipexol was tapered and withdrawn within five days. A small dose of quetiapine (25 mg/day) was added. Patient's clinical status progressively improved. Temperature and CK levels normalized in few days and the severity of dyskinesias was greatly reduced. Hallucinations remitted almost completely. Two months later her neurological state remained unchanged.

Conclusions: We describe a patient with dyskinesia-hyperyrexia syndrome, a severe complication of PD which, although shares some of the features of the PHS, has some clinical differences (severe dyskinesias instead of rigidity) and a different therapeutic approach.

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Risk factors for freezing of gait in Parkinson's disease

A. Contreras, F. Grandas (Madrid, Spain)

Objective: To determine possible risk factors for Freezing Of Gait (FOG) in Parkinson's disease.

Background: FOG is a major source of morbidity and poor quality of life in patients with Parkinson's disease (PD). Although a common motor complication of PD, the risk factors for FOG are not well understood.

Methods: Cross-sectional study involving 160 consecutive PD patients. We screened patients for the presence of FOG and assessed 19 variables regarding clinical, neuroimaging and therapeutics aspects, as well as gait and balance functional scales and timed tests. A comparison between PD patients with and without FOG was performed using statistical univariant analysis, followed by multivariant logistic regression, Kaplan-Meier and ROC curves, and Cox models.

Results: 43,8% experienced FOG. Age of PD onset, disease duration, MMSE score, motor fluctuations, dyskinesias, UPDRS, Hoehn-Yahr stating, Schawb-England score, balance and gait Tinetti Score, falls and number and length of steps were significantly different between patients with and without FOG. There were no differences in antiparkisonian treatments and cerebrovascular disease. Hoehn-