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Impaired pentagon drawing is an early predictor of cognitive decline in Parkinson disease

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The Mini Mental State Exam (MMSE) is used commonly in the assessment of mental status and cognitive decline in Parkinson disease (PD). The pentagon drawing task of the MMSE is more impaired in dementia with Lewy bodies than in Alzheimer disease¹⁻³ and PD without dementia.⁴ Impaired pentagon drawing is also more likely to occur early in the course of dementia with Lewy bodies.⁵ We therefore examined prospectively whether impaired pentagon drawing might be a predictor of cognitive decline in Parkinson patients with MMSE ≥ 26 .

One of us (RJE) examined and diagnosed 729 consecutive patients with PD, according to the UK Parkinson's Disease Society Brain Bank clinical diagnostic criteria.⁶ Our examination included the MMSE, and we routinely used WORLD backwards instead of serial sevens in our assessments.

Of the 729 patients, 224 had an initial MMSE score ≥ 26 and were re-examined three or more times (median 7, range 3-20 visits) over a period of at least 2 years (median 6, range 2-23 years), while retaining the diagnosis of PD. Most were referred to our clinic for tremor or suspected PD; 10% were initially diagnosed elsewhere. Two subgroups of these 224 patients were defined. Pentagon-abnormal patients (40 men and 40 women) drew abnormal intersecting pentagons at the time of their initial examination, and the pentagon-normal patients (83 men and 61 women) drew the pentagons correctly.

We used a linear mixed-effect regression model with random intercepts and slopes to test our primary hypothesis that the MMSE declined more rapidly in the pentagon-abnormal group, compared to pentagon-normal patients.

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The pentagon-normal and abnormal patients did not differ statistically in Hoehn & Yahr and Schwab & England scores, but the pentagon-normal patients were slightly older, were followed for slightly less time, and had a higher mean baseline MMSE scores (Table). The rate of decline for the pentagon-normal patients was -0.29 points/year (95% CI -0.46 to -0.11) and was -0.71 points/year for the pentagon-abnormal patients (95 CI -1.17 to -0.25) ($p = 0.016$). The difference in slopes was statistically significant ($p=0.004$). These slopes did not change (-0.29 and -0.72) when we excluded 49 pentagon-normal patients with baseline MMSE = 30. Pentagon abnormal patients were twice as likely to be placed on a cholinesterase inhibitor and three times as likely to reach an MMSE <26 (Table).

In conclusion, Parkinson patients without dementia (MMSE ≥ 26) exhibited more than twice the rate of decline in MMSE if they drew intersecting pentagons incorrectly at the time of initial examination and were three times as likely to reach a MMSE <26 . These results are comparable to those of Williams-Gray and coworkers⁷ who did not restrict their study to patients with MMSE ≥ 26 . We conclude that early impairment of pentagon drawing is indeed a predictor of faster cognitive decline in patients with Parkinson disease.

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Table

Clinical and demographic data

	Pentagon-normal patients	Pentagon-abnormal patients
Number	144	80
Age (yr)	68.7 (10.1)*	65.7 (11.2)
Mini Mental State Exam	28.7 (1.3)	27.6 (1.1)*
Hoehn & Yahr score	2.3 (0.9)	2.4 (0.7)
Schwab & England score	81.9 (11.9)	79.4 (10.5)
Patients with <12 yr education	8 (5.6%)	4 (5.0%)
Duration of follow-up (yr)	6.3 (3.9)	7.8 (5.1)*
Patients given a cholinesterase inhibitor	45 (31.3%)	42 (52.5%)**
Patients reaching an MMSE <26	22 (15.3%)	35 (43.8%)**

* mean (SD), two-sided t-test, $p < 0.05$

** $p < 0.01$, Fisher's exact test