

Olfactory dysfunction in Parkinson's disease and striatal dopamine transporter scan (DaTscan) uptake

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OBJECTIVE:

We aimed to ascertain the association between the assessment of olfactory dysfunction using the validated non motor symptoms scale (NMSS) as a flagging tool and striatal dopamine transporter scan (DaTscan) uptake ratio.

BACKGROUND:

Olfactory dysfunction is a common non motor symptom (NMS) in Parkinson's disease (PD), with prevalence ranging from 50 to 90% (Haehner et al. 2009). Olfactory dysfunction is part of Braak (2003) stage 1, yet the underlying pathophysiology is largely unknown. However, a dopaminergic basis has been proposed to explain the neuropathophysiology.

METHOD:

As part of this cross-sectional study, using the 'Non motor symptoms International Longitudinal Study' (NILS) database, patients with idiopathic PD underwent motor symptoms and NMS assessments including the PD NMSS, NMS Questionnaire (NMSQuest), Scales for the Outcome in Parkinson's Disease (SCOPA) motor, Hospital Anxiety and Depression Scale (HADS), and Mini-Mental State Examination (MMSE), and a subset underwent DaTscan imaging. We applied the Spearman's rank correlation to assess the association between olfactory dysfunction on NMSS and DaT uptake.

Table 1: Patient demographics

N=86	Mean	SD
Age (yrs)	62.04	11.80
Age of Onset (yrs)	58.86	11.76
Duration of disease (yrs)	3.0	3.22
NMSS total*	50.35	40.62
NMS Quest total	9.65	5.85
*NMS Burden (cohort mean)	Moderate	

NMS Burden grading (based on NMSS): 0 no burden; 1-20 Mild burden; 21-40 Moderate burden, 41-70 Severe burden, >71 Very severe burden (Chaudhuri et al., 2013)

Table 2: Mean DaTscan uptake

	Mean	SD
Right striatum	1.21	0.52
Left striatum	1.26	0.48
Right caudate	1.51	0.60
Left caudate	1.52	0.56
Right putamen	0.90	0.46
Left putamen	0.99	0.42

King's dopamine transporter scan uptake grading system: Normal (>2.0); Mild (1.5 to 2.0); Moderate (1.0 to 1.5); Severe (<1.0)

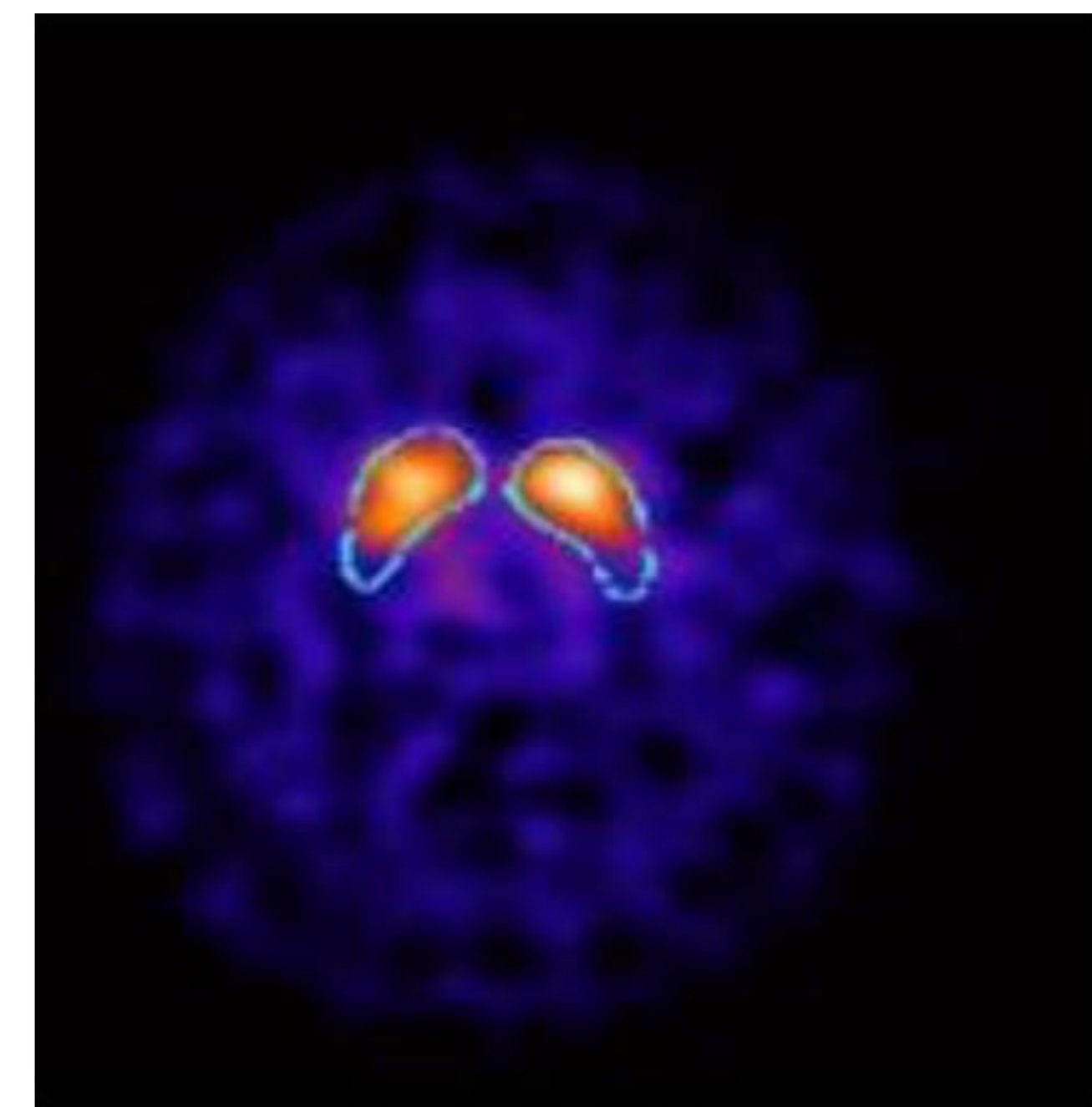


Figure 1: Normal DaTscan

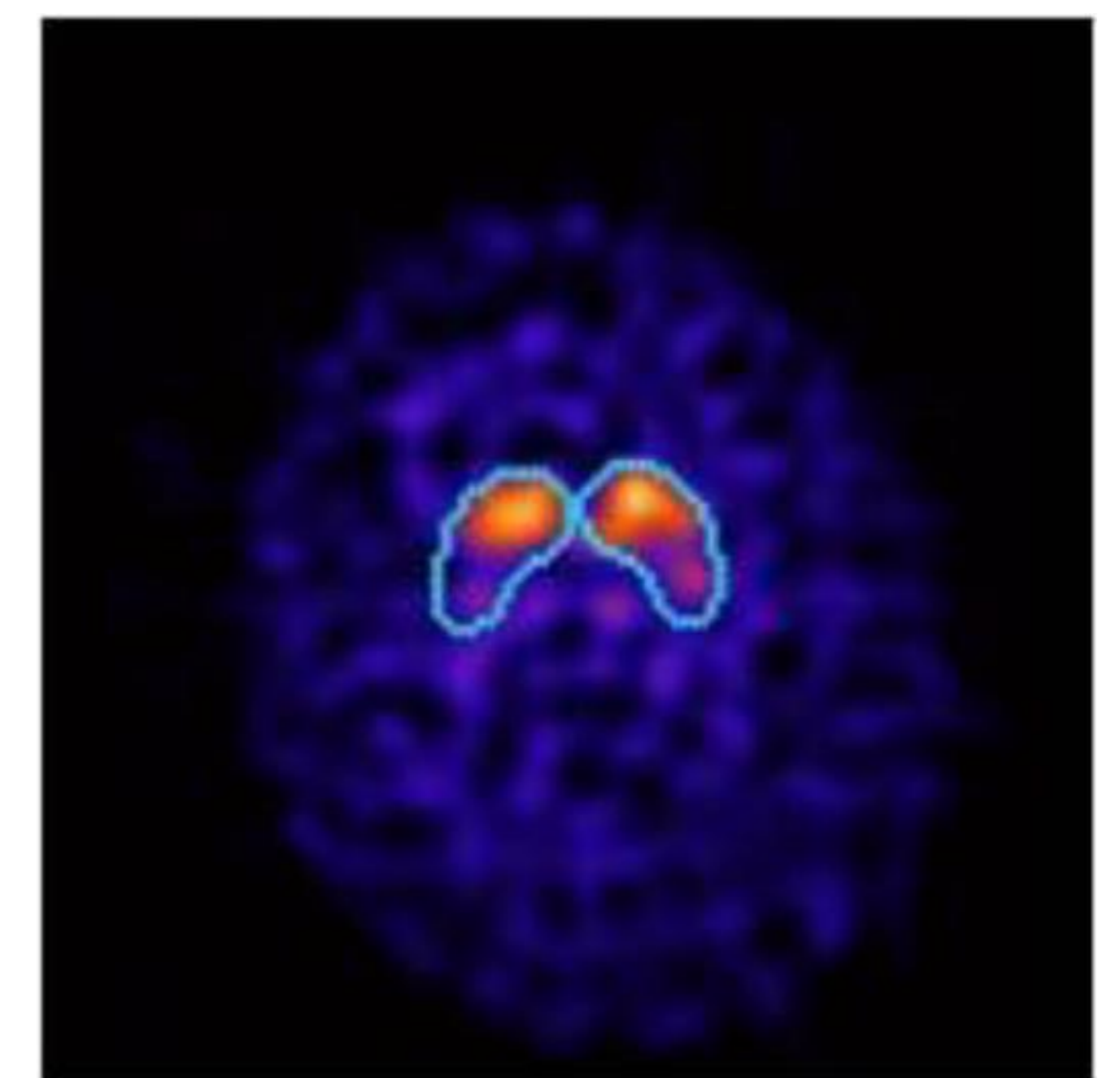


Figure 2: Reduced DaT uptake

Figure 1 shows the characteristic 'comma' shape and circular 'full stop' in a PD patient with normal DaTscan; Figure 2 shows the loss of uptake in the putamen with preserved caudate uptake in PD.

Table 3: Miscellaneous Domain with olfactory dysfunction (DaT uptake)

Spearman's r	RC	LC	RP	LP	RS	LS
Olfactory dysfunction	-0.242	-1.66	-0.358	-0.189	-0.289	-0.171
Domain 9 total*	-0.231	-0.213	-0.272	-0.210	-0.251	-0.209

Spearman's r system: Very weak (0.00-0.19); Weak (0.20-0.39); Moderate (0.40-0.59); Strong (0.60-0.79); Very strong (0.80-1.00); (Yellow highlight denotes statistical significance p>0.05); *Domain 9 is Miscellaneous including Pain, weight changes, sweating and olfactory dysfunction

Table 4: NMSS Miscellaneous Domain

	Mean DaTscan uptake
Olfactory dysfunction	-0.24
Domain 9 total	-0.23

King's dopamine transporter scan uptake grading system: Normal (>2.0); Mild (1.5 to 2.0); Moderate (1.0 to 1.5); Severe (<1.0)

yrs years; N numbers; NMSS non-motor symptoms; NMSS NMS Scale; NMSQuest NMS Questionnaire; SD standard deviation; RC right caudate; LC left caudate; RP right putamen; LP left putamen; RS right striatum; LS Left striatum; DaTscan dopamine transporter scan; PD Parkinson's disease

RESULTS:

Eighty-six patients (70.9% male, mean age 62.04 years \pm standard deviation 11.80 years, mean duration of disease 3.1 \pm 3.2 years, age at PD onset 58.86 \pm 11.76 years) showed the following scores: SCOPA-Motor (mean 16.95 \pm 9.08); HADS score (mean 12.44 \pm 7.90), MMSE (mean 28.26 \pm 3.09), for more see table 1. We found there to be weak association between right sides DaT uptake and olfactory dysfunction on the NMSS Domain 9 Question 28 (table 3).

CONCLUSIONS

Our dataset suggests a reduced right striatal dopaminergic uptake in patients with olfactory dysfunction, suggesting a dopaminergic defect may be at play in the underlying pathophysiology. Further studies are required to assess dopaminergic pathways using other radiotracers.

REFERENCE: Haehner A, Hummel T, Reichmann H. (2009) *Olfactory Dysfunction as a diagnostic marker for Parkinson's disease*. Expert Rev Neurother. Dec; 9(12):1773-9 doi: 10.1586/ern.09.115 (this poster is complementary to the data presented at WPC2016 Poster number 1376 and the current NMDPD2016 Poster number PO01008)

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