

Gastrointestinal symptoms in Parkinson's disease and striatal dopamine transporter (DaTscan) uptake

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OBJECTIVE:

We investigated a possible association between the upper and lower gastrointestinal tract (GIT) symptoms in Parkinson's disease (PD) using the non motor symptoms (NMS) scale (NMSS). In this study we focused on the GIT domain of the NMSS looking at correlation with striatal presynaptic dopaminergic transporter (DaTscan) uptake.

BACKGROUND

GIT dysfunction ranges from constipation to dysphagia, with 'dribbling of saliva' being a common complaint. There may be a multi-peptide dysfunction related to the pathophysiology, however the link between a dopaminergic dysfunction still remains uncertain.

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
SCOPA-motor total	17.13	9.36
NMSS total	50.35	40.62
*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)

METHOD:

- We used the Non-motor symptoms International Longitudinal Study (NILS) dataset of patients diagnosed with idiopathic PD.
- These patients completed a battery of motor and non motor assessments including the NMSS and the NMS Questionnaire (NMSQuest). The NMSS domain 6 explores GIT symptoms including 'dribbling of saliva'.
- A subset of patients from the NILS database, underwent a DaTscan with patients in their optimal 'ON' state.
- We then applied Spearman's rank correlation to examine significant associations.

Table 4: NMSS Gastrointestinal tract Domain

	Mean DaTscan uptake
Dribbling of saliva	-0.283
Difficulty swallowing	-0.128
Constipation	-0.142
Domain 6 total	-0.246

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;
NMS 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

Table 3: NMSS Gastrointestinal tract Domain (DaT uptake values)

Spearman's r	RC	LC	RP	LP	RS	LS
Dribbling of saliva	-0.286	-0.317	-0.266	-0.260	-0.281	-0.288
Difficulty swallowing	-0.116	-0.118	-0.123	-0.171	-0.109	-0.128
Constipation	-0.045	-0.143	-0.154	-0.219	-0.102	-0.191
Domain 6 total*	-0.175	-0.281	-0.220	-0.308	-0.202	-0.293

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 6 is Miscellaneous including Pain, weight changes, sweating and olfactory dysfunction

RESULTS:

- Eighty-six patients were included in the final analysis as assessed using the NMSS. There was a weak but consistent and moderately significant association of 'dribbling of saliva' with bilateral dopamine transporter deficiency: right ($p=0.009$) and left ($p=0.007$) striatal DaT uptake ratios.
- While no association was observed for dysphagia as well as constipation, apart from a weak association with left putamen uptake.

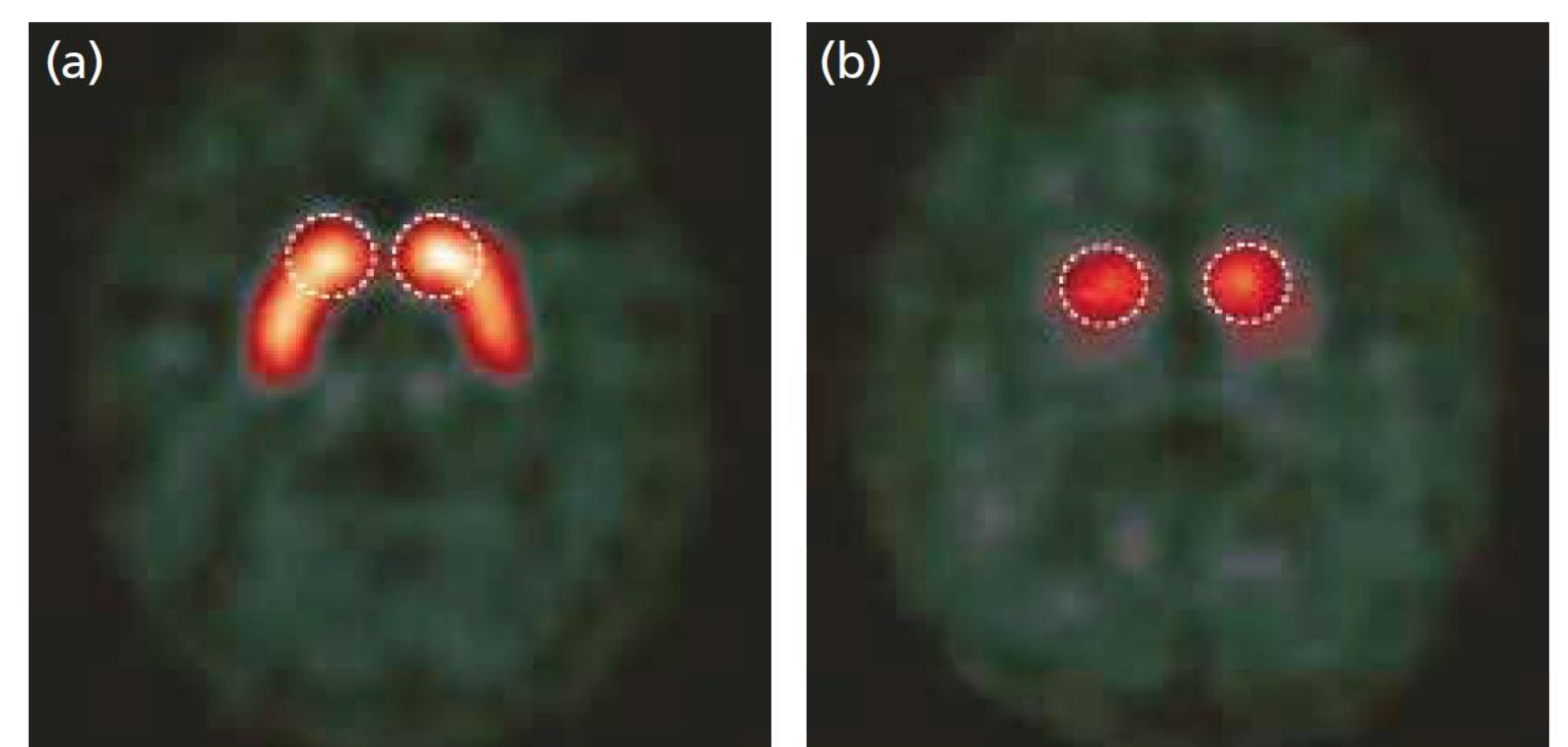


Figure 1: DaTscan uptake

(a) Normal DaTscan uptake whereby the classic 'commar' and 'full dtop' is outlined in a normal scan
(b) Loss of the 'commar' representing reduced uptake in the putamen
Images from FastFact Parkinson's Disease V3

CONCLUSIONS

- Dopaminergic uptake appears to have heterogeneous association with gastrointestinal tract symptoms, as measured by NMSS.**
- Interestingly, 'dribbling of saliva' appears to have stronger association with low bilateral striatal presynaptic DaT uptake, while similar relationship with dysphagia or constipation is unclear.**

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