

Sotirios Polychronis,¹ Gennaro Pagano,¹ Rosa de Micco,¹ Flavia Niccolini,¹ and Marios Politis¹

¹Neurodegeneration Imaging Group, Institute of Psychiatry, Psychology & Neuroscience (IoPPN), King's College London, UK.

OBJECTIVE

To explore the significance of Diabetes Mellitus (DM) on dopaminergic dysfunction and clinical features in early *de novo* (untreated) Parkinson's disease (PD) patients

BACKGROUND

Several experimental and epidemiological studies have investigated the association between PD and DM showing an increased risk of developing PD among people with DM [1]. The coexistence of DM and PD has been associated with worse postural instability [2] and cognitive impairment [3]. However, the influence of DM on dopaminergic dysfunction has not been investigated yet.

Table 1. Demographic characteristics of PD patients with and without DM

	No DM (n=33)	DM (n=33)
Age, mean ± SD	62.39±9.71	65.84±9.18
Gender male, % (n)	75.8% (25)	81.8% (27)
PD duration (months), mean ± SD	8.76±8.72	8.67±9.11
Family history of PD, % (n)	33.3% (11)	27.3% (9)
Year of Education, mean ± SD	15.88±3.18	15.58±2.37

*P values <0.05 (*t*-test and Mann-Whitney U tests, Bonferroni corrected)

METHODS

We performed a case-control study using the Parkinson's Progression Markers Initiative database, where we assessed and compared semi-quantified [¹²³I]FP-CIT SPECT, and motor and non-motor features from two groups of 33 early *de novo* PD patients with and without DM who were matched for age, gender, PD duration, family history of PD and years of education. The presence of DM was based on either the measurement of serum glucose levels (two measures >126ml/dl) or any previous history of diabetes.

Table 2. Clinical features of PD patients with and without DM

	No DM (n=33)	DM (n=33)
Hoehn and Yahr stage (mean ± SD)	1.30 ± 0.47	1.64 ± 0.48*
MDS-UPDRS Part-III (mean ± SD)	16.06 ± 7.97	21.91 ± 7.82*
MDS-UPDRS Total (mean ± SD)	27 ± 12.42	32.12 ± 10.64
Rigidity (mean ± SD)	2.54 ± 2.01	3.73 ± 2.72*
Bradykinesia (mean ± SD)	7.15 ± 5.49	9.94 ± 5.07*
Resting Tremor (mean ± SD)	2.72 ± 2.13	3.30 ± 2.54
Postural instability (mean ± SD)	0.94 ± 0.75	1.76 ± 1.15*
MDS-UPDRS Part-I (mean ± SD)	1.27 ± 1.42	1.03 ± 1.10
MDS-UPDRS Part-I Quest (mean ± SD)	4.82 ± 4.21	4.61 ± 2.94
MDS-UPDRS Part-II Quest (mean ± SD)	4.85 ± 3.19	4.58 ± 3.59
MoCA (mean ± SD)	26.52 ± 2.87	26.58 ± 3.01
SCOPA-AUT (mean ± SD)	3.39 ± 5.61	10.48 ± 7.79
Epworth Sleepiness Scale (mean ± SD)	6.09 ± 4.21	7.06 ± 3.46
UPSIT (mean ± SD)	22.18 ± 8.21	19.61 ± 7.20

*P values <0.05 (*t*-test and Mann-Whitney U tests, Bonferroni corrected).

RESULTS

Compared with PD without DM, PD patients with DM had a greater motor burden, with higher H&Y stage and MDS-UPDRS part-III (Table 2). Rigidity, bradykinesia and postural instability MDS-UPDRS subscores were higher in PD with DM compared to PD without DM (Figure 1). PD with DM had a greater dopaminergic dysfunction, with lower [¹²³I]FP-CIT SPECT binding within Putamen and Caudate (Figure 2 and 3). No differences were found for non-motor symptoms or for CSF biomarkers.

Figure 1. Influence of DM on motor symptoms

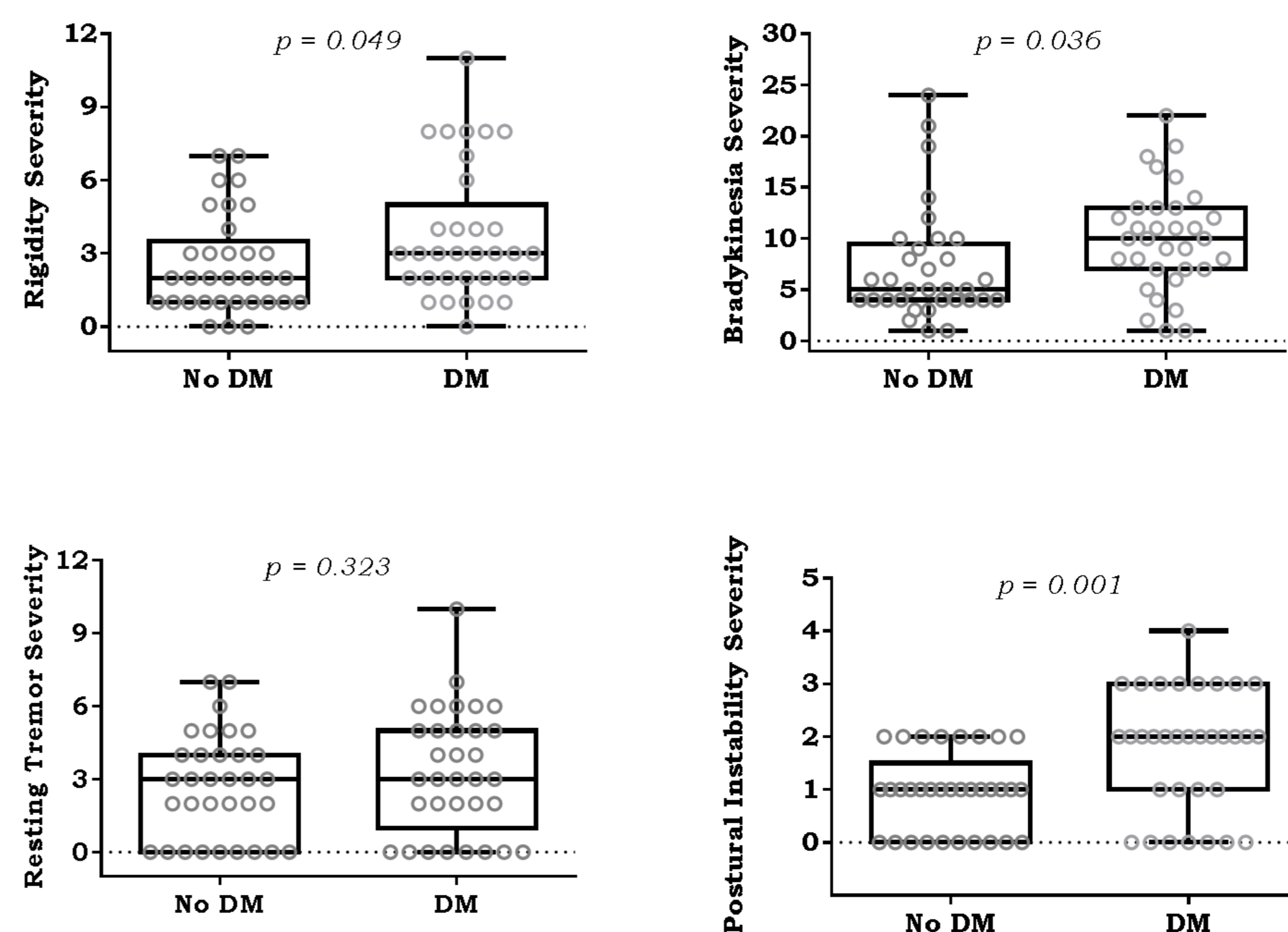


Figure 2. Influence of DM on dopaminergic dysfunction

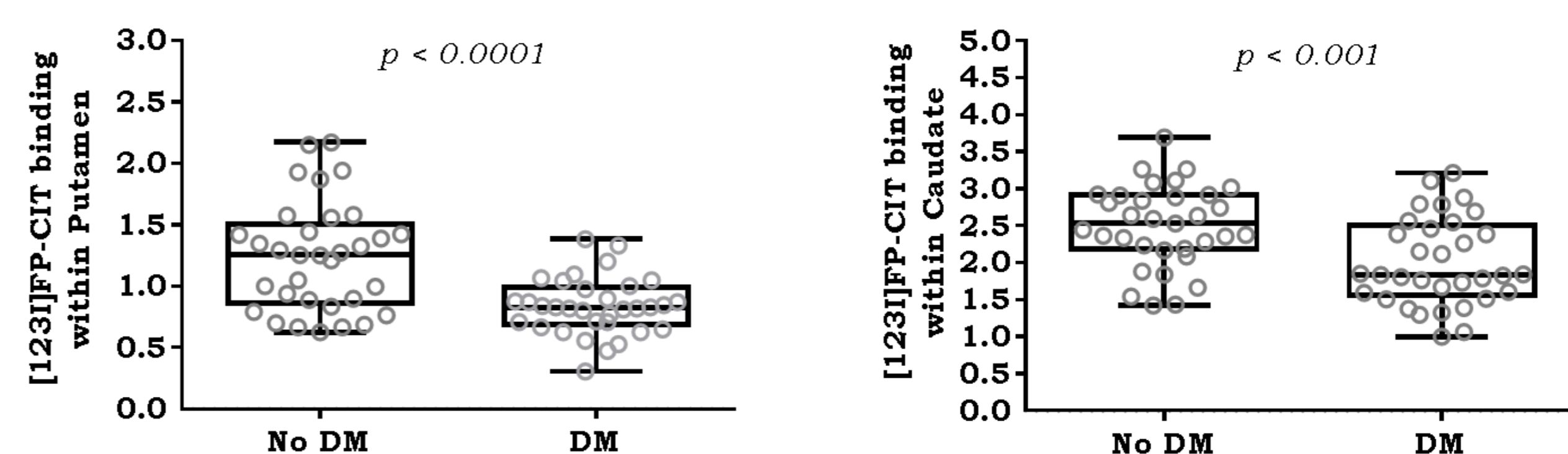
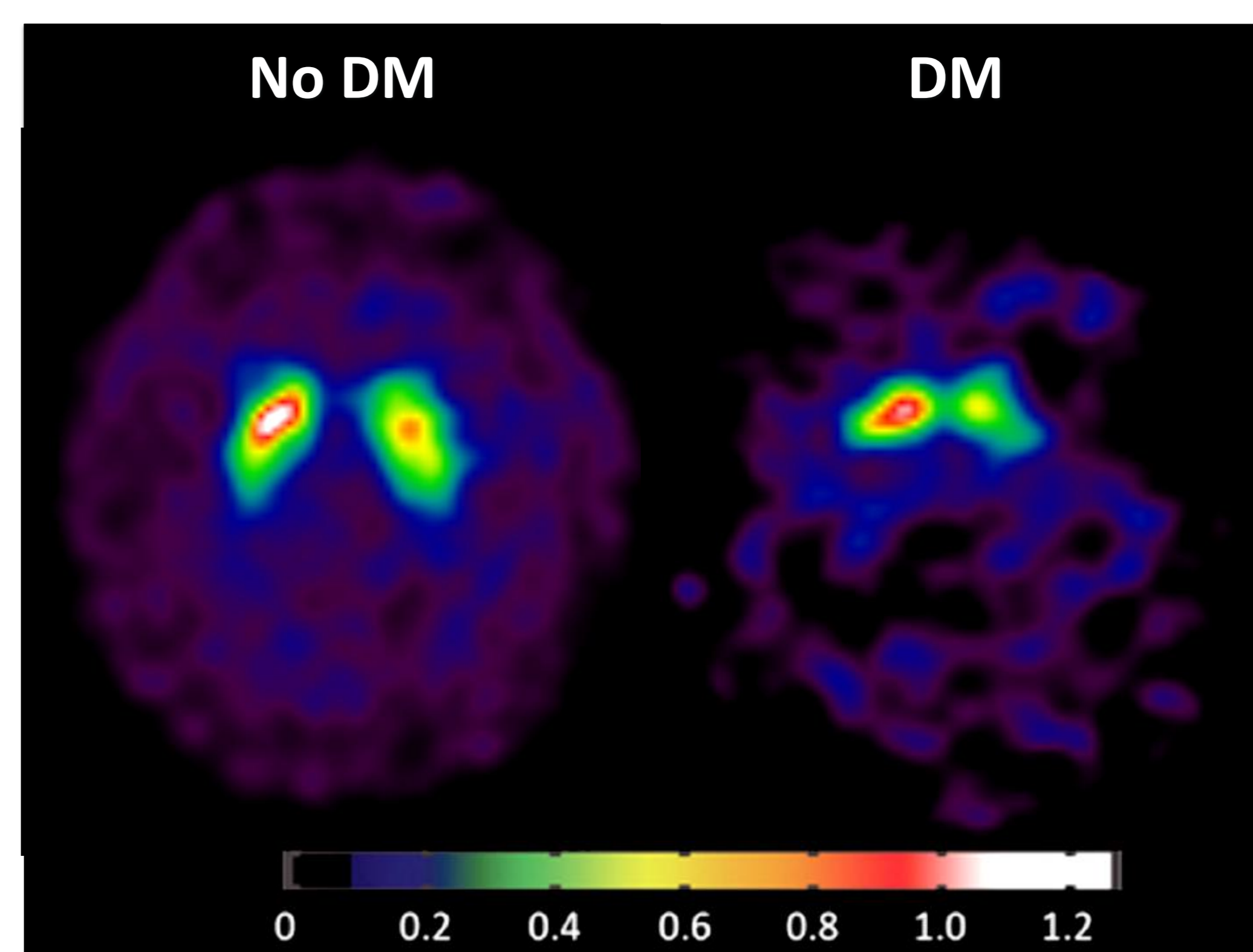


Figure 3. [¹²³I]FP-CIT in PD with DM vs PD without DM



CONCLUSION

Our data suggest that DM is associated with greater dopaminergic dysfunction and worse motor symptoms in early *de novo* PD patients.

REFERENCES

- Cereda E, Barichella M, Pedrolli C, Klersy C, Cassani E, Caccialanza R, Pezzoli G. Diabetes and risk of Parkinson's disease: a systematic review and meta-analysis. *Diabetes Care*. 2011;34(12):2614-23.
- Kotagal V, Albin RL, Müller ML, Koeppe RA, Frey KA, Bohnen NI. Diabetes is associated with postural instability and gait difficulty in Parkinson disease (2013). *Parkinsonism Relat Disord* ;19(5):522e6.
- Cereda E, Barichella M, Pedrolli C, Klersy C, Cassani E, Caccialanza R, Pezzoli G. Diabetes and risk of Parkinson's disease. *Mov Disord*. 2013;28(2):257.