PN 340

STRUCTURAL AND FUNCTIONAL BRAIN NETWORK ALTERATIONS IN PSYCHOGENIC DYSTONIA

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INTRODUCTION

Psychogenic movement disorders are a diagnostic and therapeutic challenge for the clinician. The pathophysiology of psychogenic movement disorders is not well understood but traditional view has suggested the contribution of an underlying psychological or physical stress to the development of abnormal movements.[1] In this study, we explored whether psychogenic dystonia (pDYT) is associated with structural and functional brain abnormalities using advanced neuroimaging techniques.

MATERIALS AND METHODS

This study included a large series of 31 patients fulfilling current criteria[2] for clinically definite pDYT (mean age 46 years; mean disease duration: 5 years; mean Fahn-Marsden rating scale score: 11.6; mean Unified Dystonia Rating Scale score: 11.2; mean Psychogenic Movement Disorder [PMD] scale total score: 18.6) and 36 age- and sex-matched healthy controls (HC) (Table 1).

Table 1. Demographic and clinical findings in healthy controls and pDYT patients.

	HC	pDYT patients	P values
N	36	31	
Age [years]	45.8 ± 12.8 (23 - 61)	46.1 ± 14.2 (17.5 - 61)	0.94
Gender [women]	25 (69%)	24 (77%)	0.58
Education [years]	14.0 ± 2.4 (8 - 18)	11.1 ± 1.5 (8 - 14)	<0.001
Clinical variables			
FMS	-	11.6 ± 8.8 (2 - 34)	-
UDRS	-	11.2 ± 6.7 (1.5 - 30)	-
PMD tot	-	18.6 ± 7.2 (4 - 42)	-
PMD functional	-	7.7 ± 3.6 (0 - 12)	-
PMD phenomenology	-	2.3 ± 0.4 (4 -33)	-

Number denote mean ± standard deviations (range) or frequency (%).
Abbreviations: FMS= Fahn-Marsden Scale; UDRS= Unified Dystonia Rating Scale; PMD= Psychogenic Movement Disorder Scale.

MRI acquisition

1.5 T Philips Intera scanner.

- ✓T2-weighted spin echo and 3D T1-weighted fast field echo sequences.
- ✓Diffusion Tensor (DT) MRI sequence with diffusion gradients applied on 65 noncollinear directions.
- ✓T2*-weighted single-shot echo planar imaging sequence for resting state (RS) fMRI.

MRI analysis

1. A surface based morphometry was used to assess cortical thickness (Freesurfer 5.3).
2. Tract-Based Spatial Statistics (TBSS) in FMRIB software library (FSL) was applied to assess white matter (WM) abnormalities.
3. RS fMRI data analysis of the main locomotor and cognitive brain networks was carried out using MELODIC, as implemented in FSL.

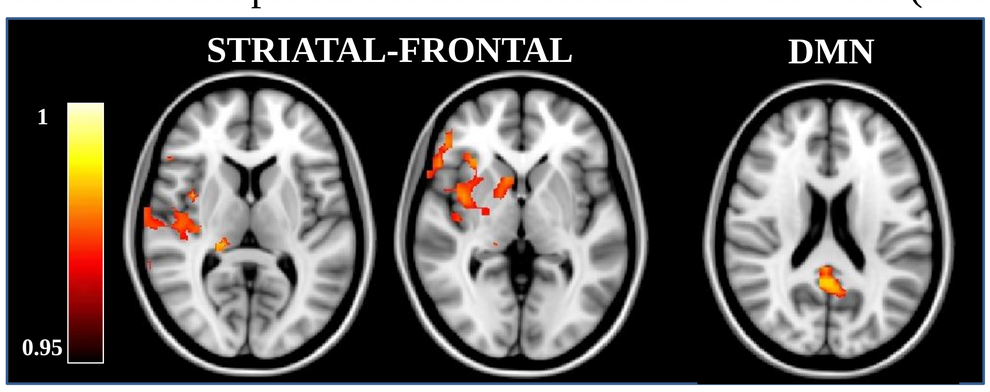
Statistical analysis

- ✓ ANOVA models were used to assess GM, WM and RS fMRI differences between HC and pDYT; $p<0.05$ FWE-corrected.

RESULTS

RS-fMRI: pDYT *vs* HC

In pDYT patients compared to controls, RS fMRI data showed a decreased functional connectivity of the right thalamus, caudate, putamen, insula and dorsolateral prefrontal cortex in the striatal-frontal network and of the precuneus in the default mode network (DMN).



RESULTS

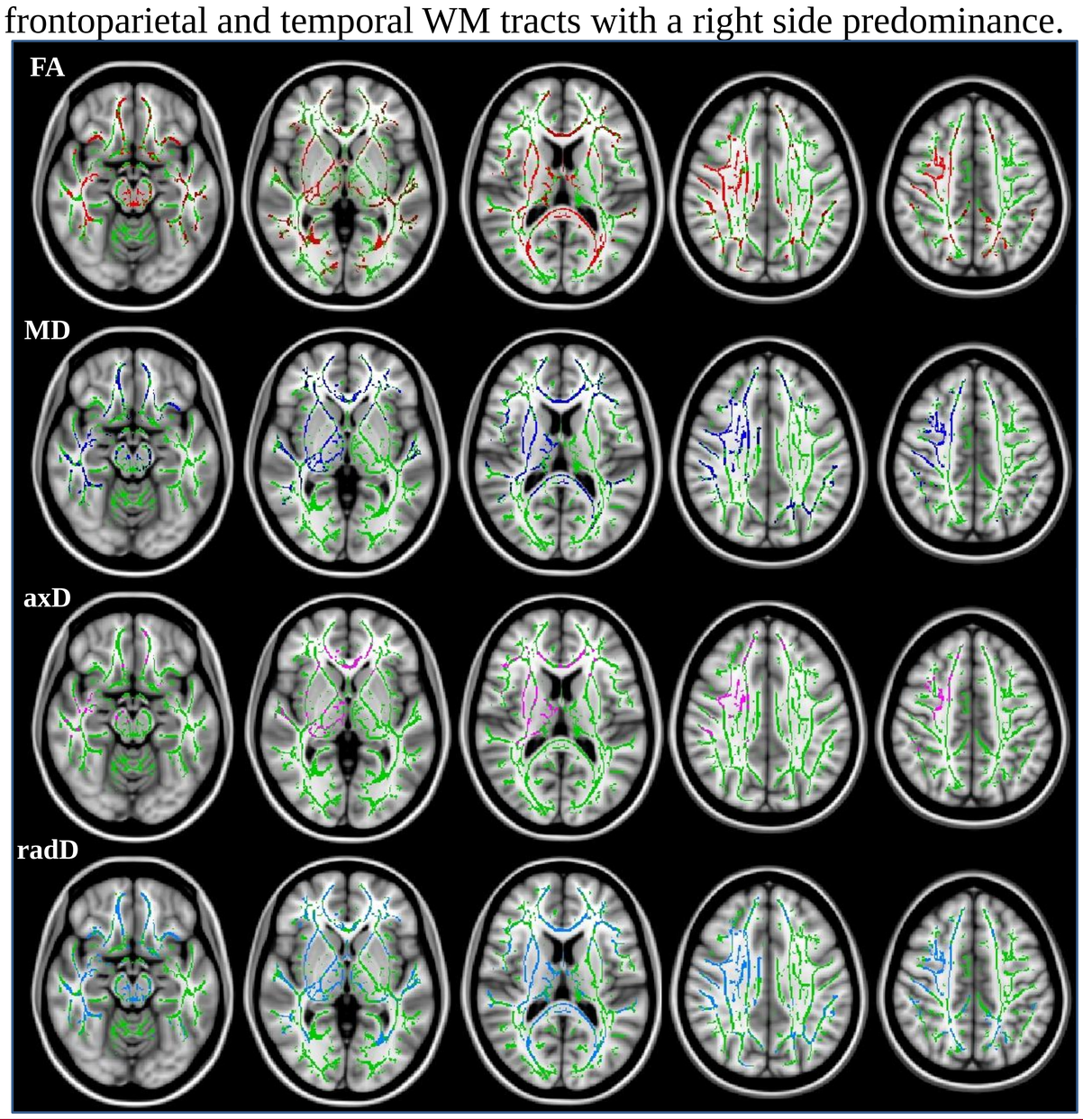
Grey matter atrophy: pDYT *vs* HC

Compared to HC, pDYT patients showed atrophy of the right thalamus and caudate bilaterally, and thinning of the precentral, middle/superior frontal, superior temporal and inferior parietal gyri bilaterally.

REGION	HC	pDYT patients	p
CORTICAL REGIONS (thickness, mm²)			
R superior temporal sulcus	2.49 ± 0.14	2.38 ± 0.12	**0.003**
L superior temporal sulcus	2.43 ± 0.12	2.36 ± 0.13	**0.03**
R inferior parietal gyrus	2.40 ± 0.10	2.34 ± 0.12	**0.04**
L inferior parietal gyrus	2.40 ± 0.10	2.34 ± 0.11	**0.02**
R superior frontal gyrus	2.58 ± 0.09	2.52 ± 0.16	**0.04**
L superior frontal gyrus	2.58 ± 0.10	2.51 ± 0.16	**0.03**
R rostral middle frontal gyrus	2.29 ± 0.10	2.24 ± 0.13	0.13
L rostral middle frontal gyrus	2.29 ± 0.10	2.23 ± 0.13	**0.01**
R caudal middle frontal gyrus	2.46 ± 0.12	2.39 ± 0.15	0.07
L caudal middle frontal gyrus	2.47 ± 0.11	2.37 ± 0.16	**0.003**
R precentral gyrus	2.46 ± 0.11	2.38 ± 0.13	**0.01**
L precentral gyrus	2.47 ± 0.11	2.40 ± 0.15	**0.02**
SUBCORTICAL REGIONS (volume, mm³)			
R caudate nucleus	3834.62 ± 420.69	3618.57 ± 453.09	**0.04**
L caudate nucleus	3723.77 ± 452.78	3441.11 ± 446.52	**0.01**
R thalamus	7259.71 ± 803.15	6824.43 ± 895.63	**0.04**
L thalamus	8099.33 ± 1055.04	7676.85 ± 1084.66	0.12

White matter alterations: pDYT *vs* HC

pDYT patients showed a distributed pattern of decreased fractional anisotropy (FA, red) and increased mean (MD, blue), axial (axD, pink) and radial (radD, light-blue) diffusivity including the brainstem, internal and external capsule, corpus callosum, corona radiate, and frontoparietal and temporal WM tracts with a right side predominance.



CONCLUSIONS

This study shows that pDYT is characterized by a structural and functional breakdown of motor and extramotor brain networks. Neuroimaging may improve our understanding of the functional and anatomical substrates of this condition and may therefore help develop new therapeutic strategies targeting the affected structures. Future studies comparing pDYT patients with those with genetic dystonia may help to elucidate the primary or secondary nature of these abnormalities.

[1]Ganos C. Parkinsonism Relat Disord. 2014; [2]Thenganatt MA. Neurol Clin. 2015.