Abnormal conectivity in medial prefrontal cortex in schizophrenia patients and unaffected relatives

D. Guinart[1,2], L. Galindo[1,2,3], F. Pastoriza[1,3], N. Roé[1], D. Bergé[1,2,3,4], A. Mané[1,2,4], M. Picado[1,3], V. Perez[1,2,3,4], O. Vilarroya[1,3]
[1].IMIM Foundation, Barcelona, Spain, [2].Neuropsychiatry and Addictions Institute (INAD) of Parc de Salut Mar, Barcelona, Spain.
[3].Universitat Autònoma de Barcelona, Spain. [4].Cibersam G21

Objectives

The aim of this study is to explore connectivity between Medial Prefrontal Cortex and other areas of the brain, by Functional Magnetic Resonance Imaging during Resting State, in subjects affected by schizophrenia and unaffected relatives.

Methods

We recruited a group of 29 patients diagnosed with schizophrenia, who were treated with atypical antipsychotics, who are and were clinically stable in the last 6 months and had an illness duration range from 5 up to 15 years. Patients who had received either electroconvulsive therapy or clozapine were excluded. We also recruited a group of 23 unaffected relatives, without history of other mental, neurological or somatic disease and a group of 37 healthy volunteers. No subject in any of the three groups met criteria for substance use disorders.

All three groups were clinically evaluated, and a functional magnetic resonance during Resting State was performed.
Functional images were reoriented to the first scan, normalized to the MNI EPI template and smoothed with an 8 mm Gaussian kernel, with SPM. The CONN- FMRI Toolbox v1.2 was used to create individual subject seed-to-voxel connectivity maps, to the corresponding seeds of the default mode network.

Data analysis ⇨ Clinical Data ⇨ ANOVA Chi-square

⇩

fMRI images

ANOVA Model (p< 0.01) Extent P FWE- corrected ⇨ Post hoc analyses (Voxel-vise FDR corrected p<0.05) (p<0.0.1) Extent P FWE- corrected

Results

Table 1. Demographic characteristics in healthy controls, unaffected relatives and patients with schizophrenia

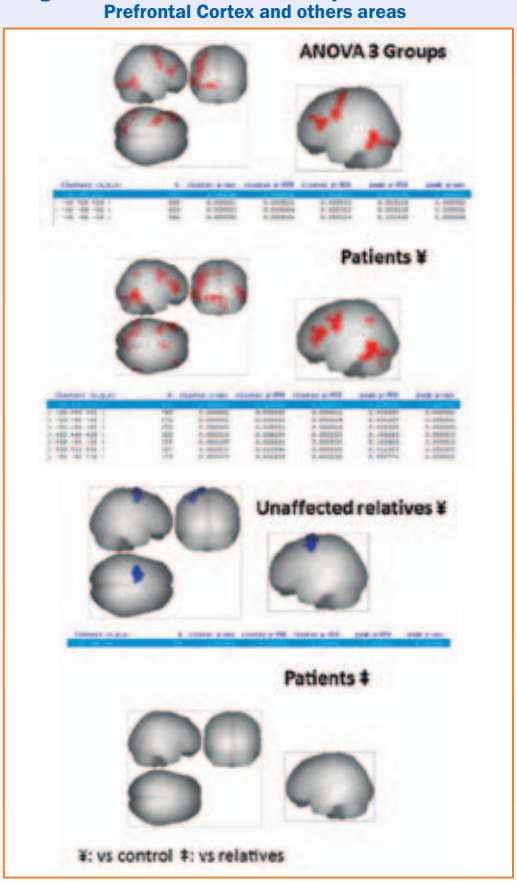
	Healthy Controls n=37	Unaffected Relatives n=24	Patients n=29	p
Mean Age (years) ± SD	36.78 ± 7.61	40.92±10.32	37.97±7.13	0.165
Gender (M/F)	17/20	11/13	16/13	0.713
Mean school Level (years) ± SD	12.89±1.76	11.50±2.65	10.00±2.80	<0.05*

Table 2. Differences of connectivity between Medial Prefrontal Cortex and others areas (Connected Voxels)

Areas	ANOVA 3 Groups	Patients ¥	Unaffected relatives ¥	Patients ‡
Premotor Cortex (L)	437	463	336	-
Dorsolateral Prefrontal Cortex (L)	368	401	-	-
Fusiform Gyrus (L)	211	328	-	-
Dorsal Frontal Cortex (L)	54	84	-	-
Secondary Visual Cortex (L)	38	92	-	-
Associative Visual Cortex (L)	66	113	-	-
Fusiform Gyrus (R)	-	116	-	-
Dorsolateral Prefrontal Cortex (R)	-	158	-	-
Anterior Prefrontal Cortex (R)	-	68	-	-
Somatosensory Association Cortex (L)	-	81	-	-
Inferior Temporal Gyrus (R)	-	59	-	-

¥: vs control ‡: vs relatives (L): Left (R) :Right

Figure 1. Differences of connectivity between Medial Prefrontal Cortex and others areas



Conclusions

- Our results show a significant increase in connectivity between medial prefrontal cortex and left premotor cortex, especially between patients and controls. It is noteworthy to mention that we found a significant decrease in connectivity between medial prefrontal cortex and left premotor cortex between unaffected relatives and controls.
- Our results also show a significant increase in connectivity between medial prefrontal cortex and left dorsolateral prefrontal cortex, left fusiform gyrus, left dorsal frontal cortex and secondary and associative left visual cortex. There are no significant differences between patients and relatives in all those areas.

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Key Words: Brain imaging, Schizophrenia: clinical, Neuroimaging: functional