

# A functional magnetic resonance imaging study of schizoaffective patients versus healthy controls: preliminary data

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## Introduction:

Brain functional activity has been only studied marginally in schizoaffective disorder (SAD). Both schizophrenia and major affective disorder are known to be associated with reduced dorsolateral prefrontal cortex activation. Recent studies have also highlighted alterations in default mode network function in both these disorders. The default mode network consists of a connected series of brain regions, including particularly two midline cortical regions, the medial frontal cortex and the posterior cingulate cortex/precuneus, that have high metabolic activity at rest, but which de-activate when the subject has to perform attention demanding cognitive tasks (1).

## Methods:

The patient sample consisted of 13 patients meeting both DSM-IV and RDC criteria for schizoaffective disorder, currently in a schizomaniac episode (Young > 18), and 26 sex- and age-matched healthy controls (Table 1). Subjects underwent functional magnetic resonance imaging (fMRI) while performing baseline, 1-back and 2-back versions of the n-back task. Linear models were used to obtain maps of activations and deactivations in the two groups.

## Results:

In the 2-back vs baseline contrast, the controls showed a cluster of task-related activation in cluster including the bilateral dorsolateral prefrontal cortex among other regions. They also showed de-activation in the medial and orbitofrontal cortex and the posterior cingulate gyrus/precuneus, the two midline nodes of the default mode network.

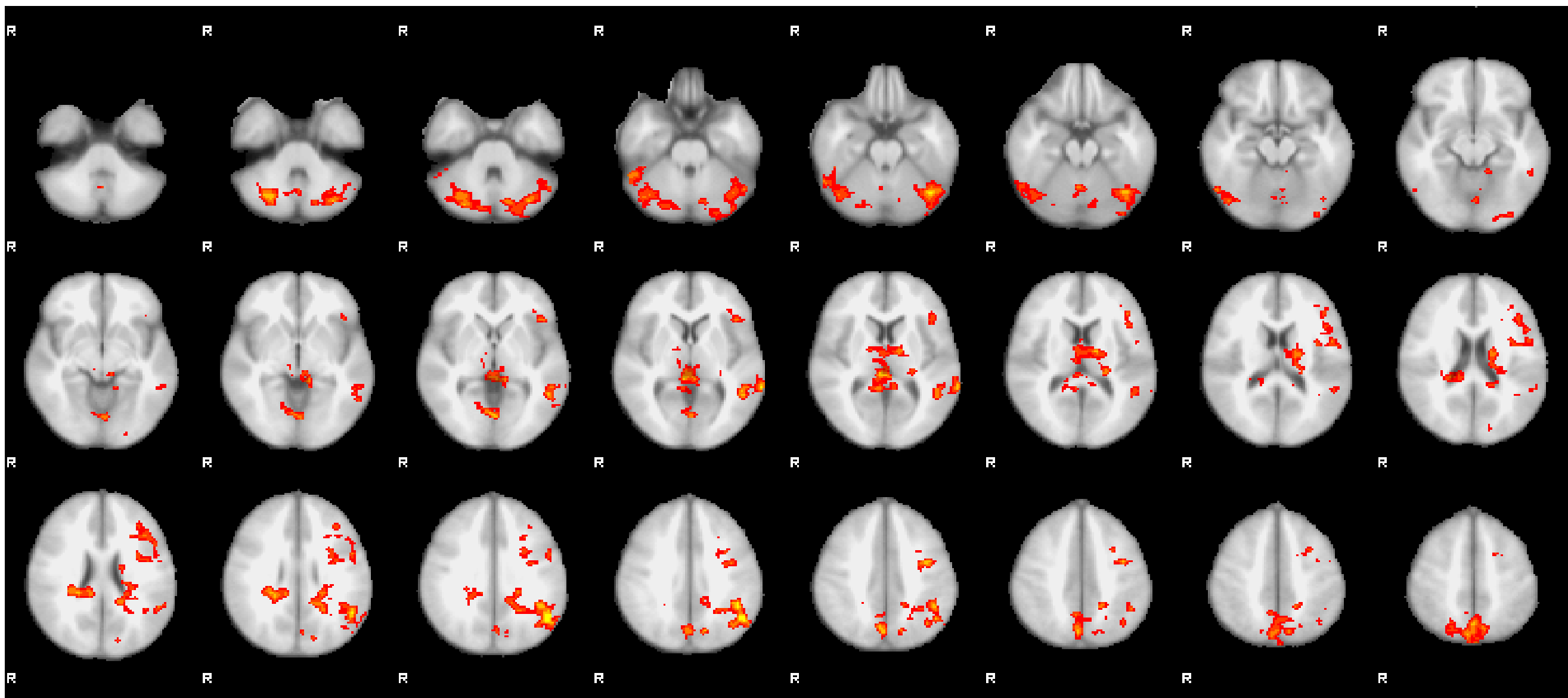
The SAD patients showed significantly less activation in the prefrontal cortex and a network of other areas than the controls (Figure 1 and Graph 1). They also showed a marked failure to de-activate in medial frontal cortex (Figure 2 and Graph 2).

When each subject's d' score (task performance) was entered as a covariate in the comparison, only the failure of de-activation in the medial frontal cortex remained significant.

Table 1: Sample characteristics:

	Patients (n=13)	Controls (n=26)	p
Age (years)	42.24± 8.74	41.84± 13.10	0.93
Sex (male/female)	9/4	18/8	
TAP (pre-morbid IQ)	24.15± 4.10	23.81± 4.83	0.81
Current IQ (WAIS-III)	96.38±11.67	107.65± 13.39	0.014
BADS	13.08±3.52	17.54± 2.87	<0.001
Illness duration (years)	18.55± 9.89		
Young	23,92 ± 4,46		
PANSS total score	63,92 ± 14,44		

Figure 1: Controls>Schizomanics (2-back versus baseline)



Graph 1: Boxplot of averaged activations in the SAD patients and controls

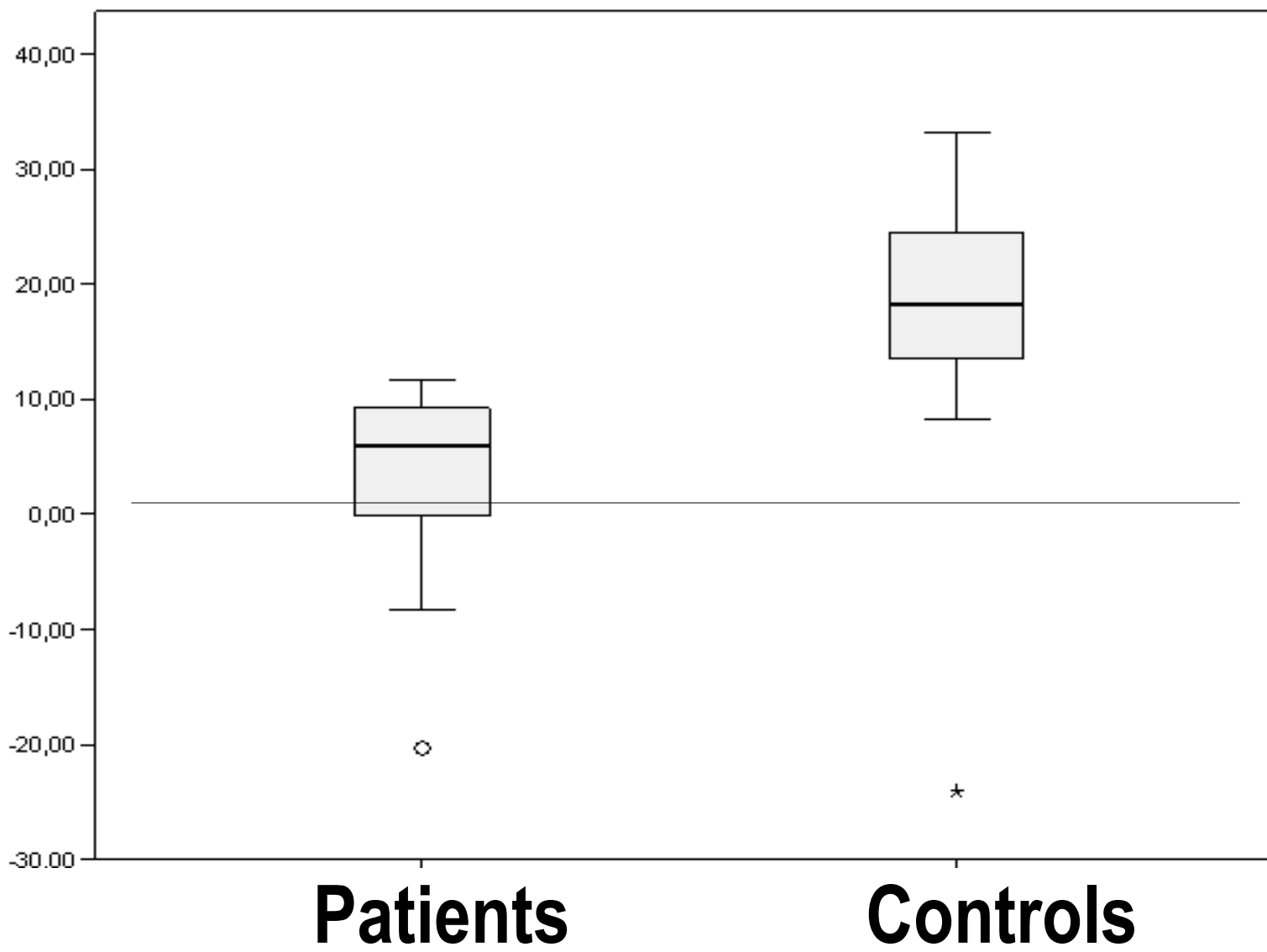
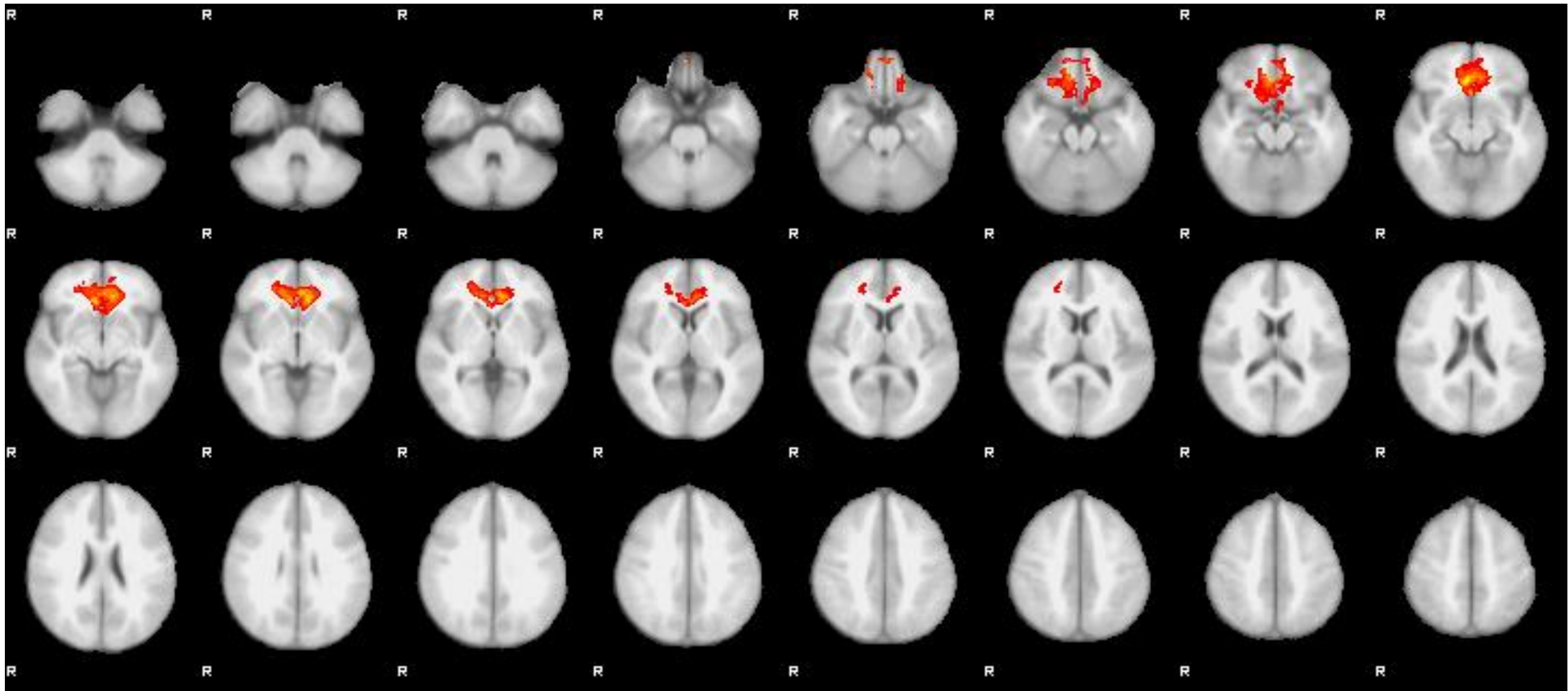
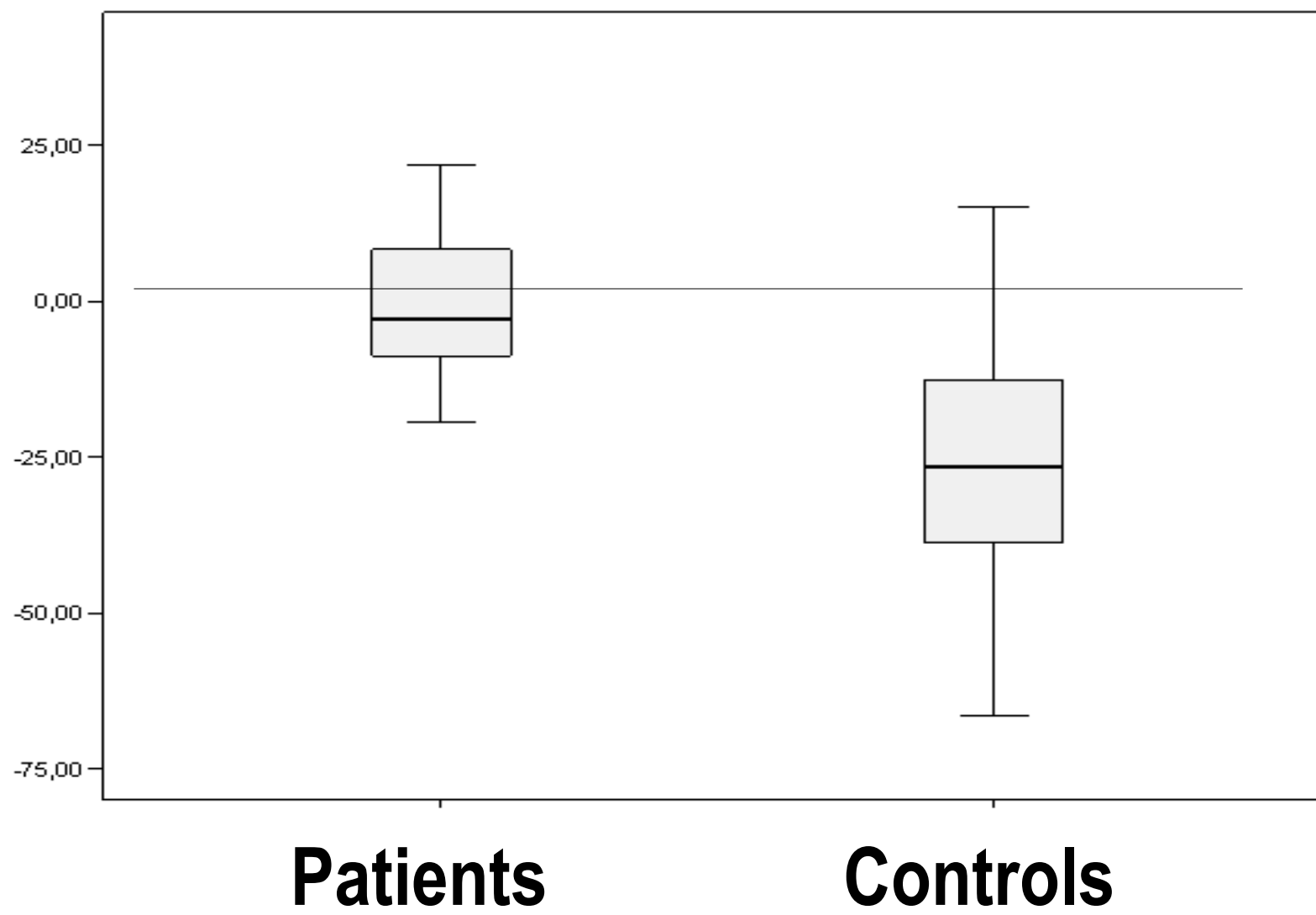


Figure 2: Schizomanics > Controls (2-back versus baseline)



Graph 2: Boxplot of averaged de-activations in the SAD patients and controls



## Conclusions:

We document that SAD (schizomaniac) patients show reduced activation in prefrontal and other cortical regions during working memory task performance, and also a failure to de-activate the medial prefrontal cortex, in an area overlapping with the anterior midline node of the default mode network. This pattern of abnormality is similar to that found by our group to characterise schizophrenia (failure to activate and failure to de-activate) (2).

The failure to activate was a function of the patients' impaired performance on the n-back task, whereas the failure to deactivate was less performance dependent..

## References:

1. Broyd, S. J., C. Demanuele, et al. (2009). "Default-mode brain dysfunction in mental disorders: a systematic review." *Neurosci Biobehav Rev* 33(3): 279-96.
2. Pomarol-Clotet, E., R. Salvador, et al. (2008). "Failure to deactivate in the prefrontal cortex in schizophrenia: dysfunction of the default mode network?" *Psychol Med* 38(8): 1185-93.

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