

Longitudinal structural effects of electroconvulsive therapy (ECT) in major depressive disorder (MDD)

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RATIONALE & OBJECTIVES

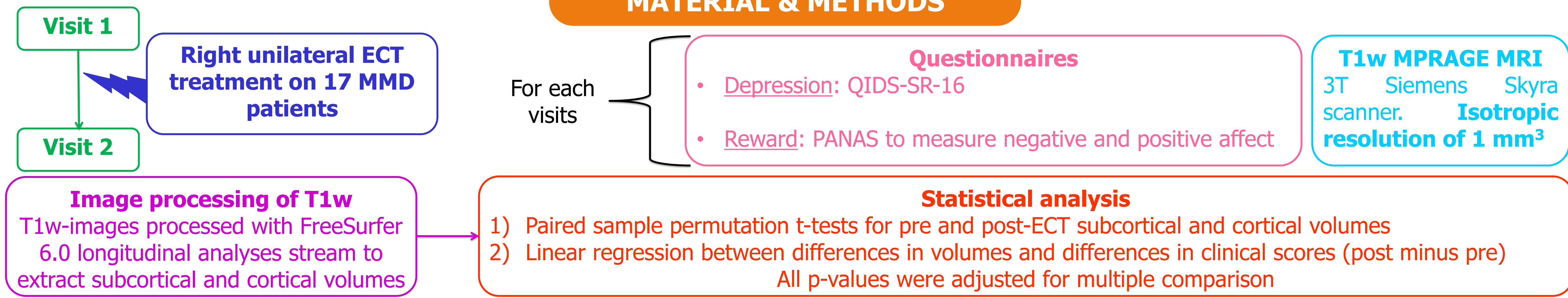
- MDD = clinical syndrome with symptoms of different dimensional nature
- Negative and positive affect are two **distinct constructs** linked to MDD with depressed individuals reporting low positive and/or high negative affect
- ECT is used to treat treatment-resistant MDD patients with notable efficacy on depressive, anhedonia, negative and positive affect symptoms
- Volumetric changes following ECT have been found consistently** in the literature but have not been correlated to changes in clinical symptoms
- **Restricted comprehension of ECT mechanisms of action and its relation to changes in clinical symptoms of different dimensions**

OBJECTIVE 1: To study changes in clinical symptoms of different dimensions (ie. beyond depression severity) following ECT

OBJECTIVE 2: To reveal ECT morphological mechanisms of action by comparing whole-brain volumetric changes before and after ECT

OBJECTIVE 3: To explore the relationships between whole-brain volumetric changes and changes in dimensional measures of positive and negative affect, beyond depression severity

MATERIAL & METHODS

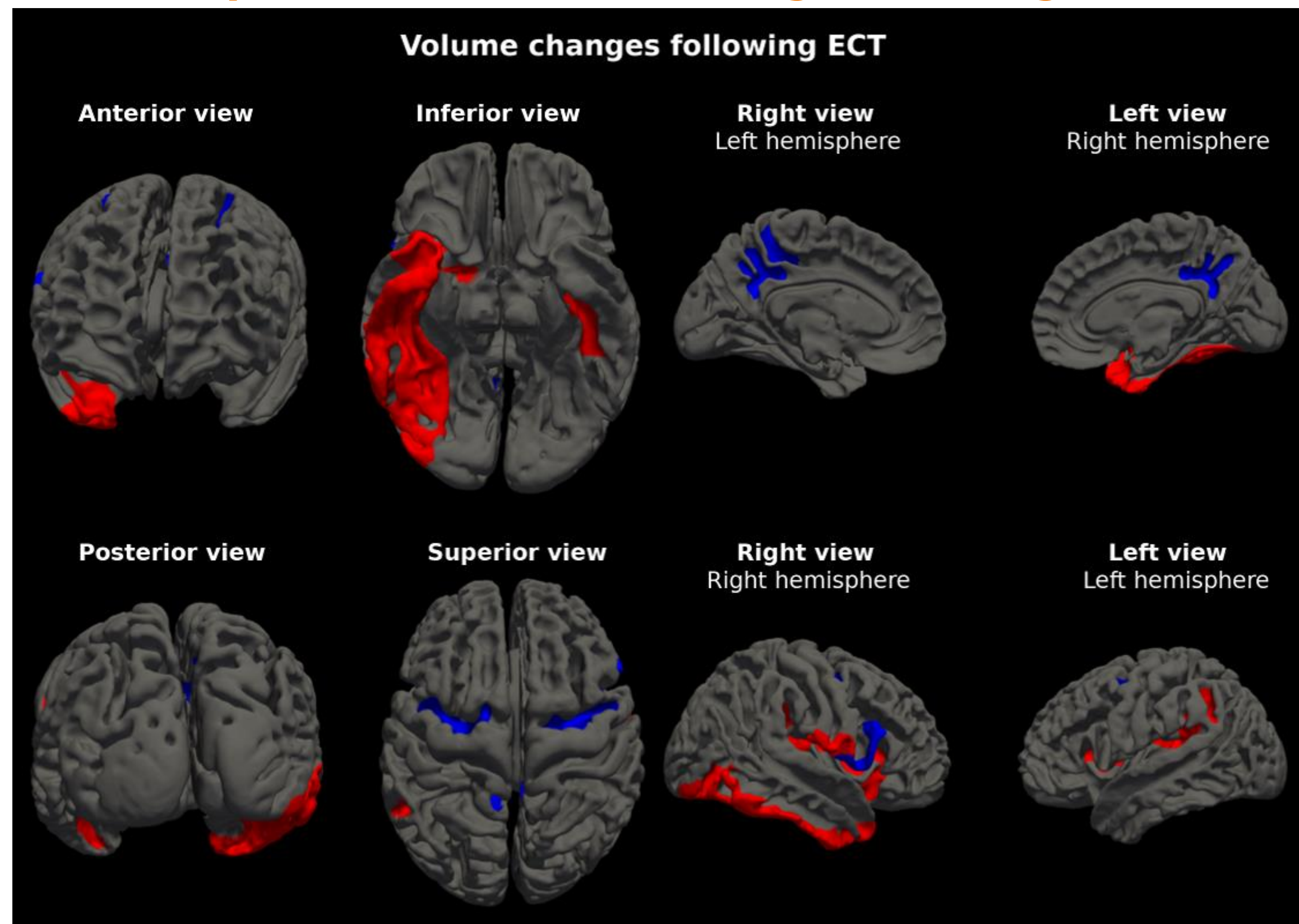


RESULTS

Table 1: Clinical characteristics of the 17 participants (7 male and 10 female) (mean ± standard deviation (range)). We conducted paired-sample *t*-test to compare clinical scores acquired at the post and pre-ECT visits.

	Pre-ECT	Post-ECT	Changes	p-value
QIDS	18.47 ± 3.59 (12 - 25)	12.59 ± 5.57 (4 - 23)	-5.88 ± 6.18	**
PANAS-POS	18.18 ± 5.35 (10 - 28)	22.76 ± 7.89 (11 - 35)	+4.59 ± 4.72	**
PANAS-NEG	33.47 ± 8.33 (20 - 44)	26.82 ± 9.80 (10 - 43)	-6.65 ± 11.15	*

1) Whole-brain volume changes following ECT



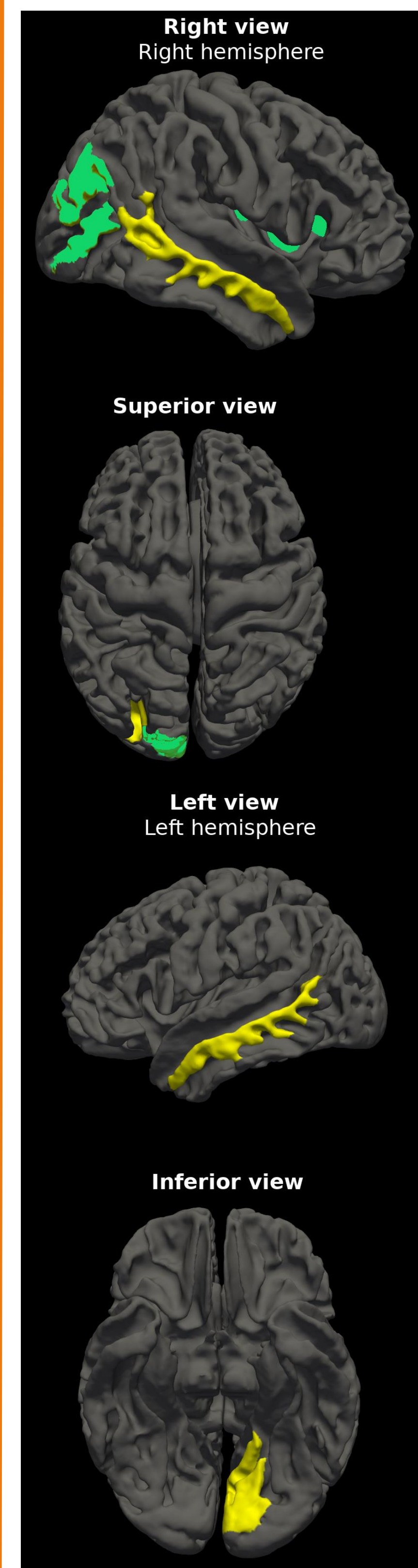
Subcortical volume changes

- Volume increase in all structures
- Volume increase bilateral but more pronounced to the right
- Highest percentage of volume increase: R amygdala > R accumbens > L amygdala > L accumbens > R hippo > L hippo > R putamen > R thalamus > L putamen > L thalamus

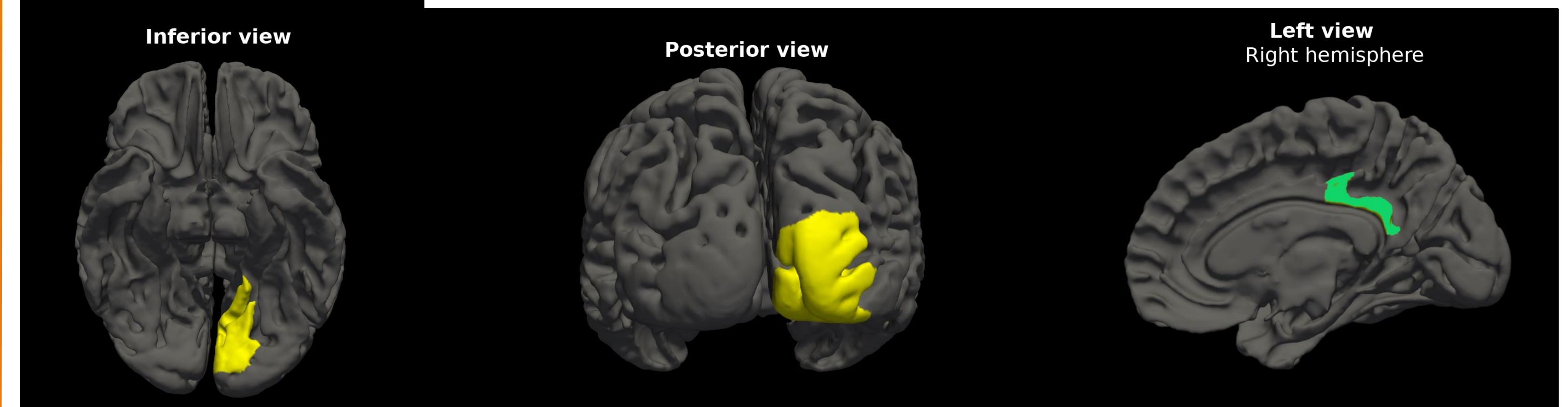
Cortical volume changes

- Volume decrease (in blue) in part of the limbic, parietal, frontal and motor cortices
- Volume increase (in red) in part of the parietal, temporal, occipital and insula cortices
- An important cluster of volumes increase corresponds to a part of the right temporal cortex

2) Linear regression between volumetric changes and changes in clinical scores



Significant region	Regression coefficient		
	QIDS	PANAS-POS	PANAS-NEG
Left superior occipital sulcus			+
Left middle temporal gyrus			-
Right middle temporal gyrus	-		-
Left parahippocampal gyrus			-
Right occipital pole			-
Left superior occipital gyrus		+	
Right middle occipital gyrus		+	
Right posterior cingulate gyrus		+	
Right superior insular circular sulcus		+	
Right putamen	-		



TAKE-HOME MESSAGE

ECT is related with volume increase in subcortical regions, part of the parietal, temporal, occipital and insular cortices, and with volume decrease in the inferior frontal cortex, subparietal cortex and premotor regions.

The correlations between changes in volume and changes in clinical scores indicates specific clinical-anatomical associations specific for syndromal and dimensional constructs. Clarification of these results is required to gain a more granular dimensional understanding of MDD, mechanisms of action of ECT and to use those information towards novel treatment development.