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INTRODUCTION

Although the majority of patients with psychiatric disorders do not exhibit violence or aggression, a subgroup of psychotic patients are more at risk of exhibiting such behaviors compared to the general population (Szeszko 2014). This implies significant distress for the victims, families of patients, health professionals and leads to higher health care costs and stigmatization (Szeszko 2014). A better understanding of impulsivity, a key factor involved in the genesis of violent behavior in psychotic patients (Witt et al., 2013) will be necessary to develop more efficient early intervention for psychotic patients at risk for aggression. In the current research, we explored the relationship between cortical thickness and impulsivity in early psychosis.

METHOD

- 18 male patients (age 24.5+/-4.8) in the early phase of psychosis were recruited from the Treatment and early intervention in psychosis program (TIPP-Lausanne) (Baumann et al., 2013). This group is a blend of violent and non-violent patients. (See table 1)
- Impulsivity was measured with the Lecrubier's Impulsivity Rating Scale (IRS) (Lecrubier et al., 1995).
- MRI sessions were performed on a 3 Tesla scanner (Magnetom TrioTim, Siemens Medical Solutions) (MPRAGE) T1 weighted sequence.
- Surface-based morphometry (i.e. FreeSurfer) allowed the estimation of cortical thickness from the T1-weighted MR (Fischl and Dale 2000).
- We initially focused on the mean cortical thickness of the 4 lobes. Pearson's partial correlation was used to correlate frontal, temporal, occipital, parietal cortical thickness with IRS impulsivity score while controlling for confounding factors (age, cannabis use, chlorpromazine equivalents, and positive symptoms). p-values were corrected according to the number of comparisons.
- Secondary analyses revealed which frontal regions were most implicated in impulsivity and which IRS items contributed the most to the correlation.

Variable	Violent subjects N=8	Non-violent N=10	P value
Age (years)	26.1±5.4	23.2±4.3	>0.05
Gender (%males)	100%	100%	>0.05
Handedness (R/L/A)	8/0/0	7/2/1	>0.05
Lecrubier score	8.6±2.5	4.9±3.5	0.023*
PANSS 2 items	3.6±1.8	2.5±0.97	0.06
Parent's education (years)	15±5.6	13.2±2.5	>0.05
CPZ equivalents	452.3±235	290.6±255	>0.05

Table 1. Subject characteristics. Given the small sample size, these two groups were combined for analysis.

RESULTS

- The IRS impulsivity scale was significantly higher in violent patients compared to non-violent patients (p=0.023) in accordance with findings in the larger clinical TIPP cohort.
- Among the 4 lobes, only mean frontal cortical thickness correlated significantly with IRS impulsivity mean score (r=0.643, corr p<0.02) (See figure), which remained significant when controlling for confounding factors (r=0.87, corr p<0.02) (See Figure 1)
- The implicated frontal regions were the inferior frontal, middle frontal, superior frontal and orbito-frontal gyrus (See Figure 2)
- IRS impulsivity items 'aggressiveness' (n° 5) and 'lack of control of response' (n° 6) contributed the most to the correlation.

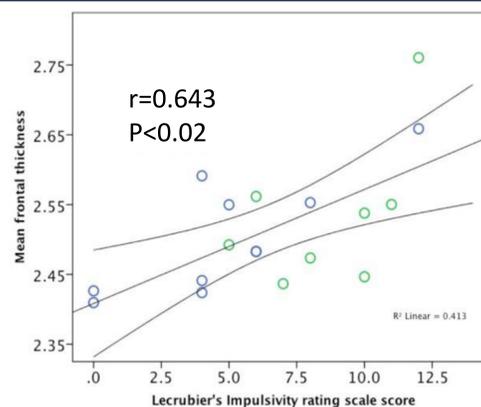


Figure 1. Correlation of mean frontal thickness with Lecrubier Impulsivity score.

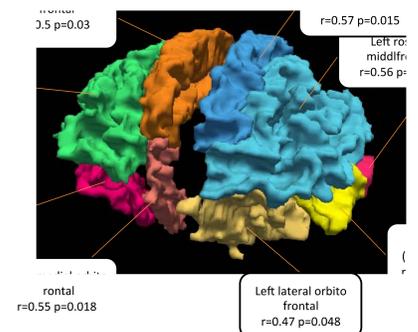


Figure 2. Frontal sub-regions which significantly correlate with Lecrubier Impulsivity score

DISCUSSION & CONCLUSION

- Mean frontal cortical thickness correlates positively with IRS impulsivity score, especially 'aggressiveness' and 'lack of control of response'.
- This correlation suggests that patients showing higher impulsivity have increased frontal cortical thickness.
- Our results are in line with some of the previous findings of larger orbito-frontal volume related to aggression in schizophrenia (Hoptman et al., 2005) and positive correlation between trait impulsiveness and gray matter volume in superior and middle frontal regions (Gardini et al., 2009).
- The normal process of brain development and maturation involves a phase of cortical thinning during adolescence, thought to be important in the refinement of neural circuits (Giedd et al. 1999; Shaw et al. 2008). We can speculate that psychotic subjects exhibiting higher impulsivity may experience a delayed maturational process in frontal areas implicated in the control of emotions and impulsivity.

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