

# Amygdala shape differences in patients with Major Depressive Disorder | P.2.b.021

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## Background

Imaging studies of Major Depression Disorder (MDD) have shown **hyperactivation of amygdala** and differences in its reactivity to emotional stimuli.

However, **volumetric findings** are much more **heterogeneous** [1]. Two potential reasons are:

- \* Most of the studies do not discriminate patients with distinct long-term outcomes.
- \* Other structural characteristics apart from volume could exist.

The aim of this study is **to analyze shape and volume** differences of amygdala in patients with different and well-defined illness stages of MDD.

## Results

ANOVA did not show significant differences nor in left ( $F(3,21)=0.78$ ,  $p=0.5$ ) or in right ( $F(3,121)=0.89$ ,  $p=0.45$ ) ICV-normalized amygdala **volumes**. (Table 1)

FIRST analyzes indicated **shape differences in right basolateral amygdala** (ventral nucleus and the most connected with the cortex).  $p<0.05$ , cluster corrected. (Figure 1)

**Table 1.** Demographics and amygdala volumes ( $\text{mm}^3$ ) of four groups. Means, standard deviations and ratios are provided.

	Healthy Controls	First-Episode	Remittent-recurrent	Treatment-resistant	F/ $\chi^2$	p
Age	46.4 (8.6)	42.8 (7.9)	48.2 (8.8)	48.8 (7.7)	2.44	0.07
Gender ♀♂	43/19	18/7	20/2	17/4	4.58	0.21
Right Amygdala	2147 (278)	2070 (232)	2134 (315)	2158 (293)	5.35	0.66
Left Amygdala	1807 (230)	1716 (238)	1866 (289)	1737 (219)	1.97	0.12

**Figure 1.** Coronal views of T1-MPRAGE images showing shape differences in right amygdala (coloured voxels).

Healthy controls showed **shape** differences compared to **remitted-recurrent** patients (A) and to **treatment-resistant** patients (B).



## Methods

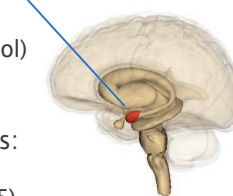
Participants underwent an MRI (3-Tesla):

25 first-episode	} MDD patients
22 remitted-recurrent	
21 treatment-resistant	
62 healthy controls	

**Structural MRI processing:**

**Volume** - Left and right amygdala were segmented (Freesurfer v5), and size normalized to total intracranial volume (ICV).

**Shape** - FIRST (model-based segmentation/registration tool) of FSL was used.



**Statistics** - ANOVA of 4 groups:

**Volume**= SPSS

**Shape**= Vertex analysis (FIRST - FSL5)

Age and gender were introduced as covariates when necessary.

## Conclusions

There are **structural alterations** of the amygdala in advanced stages of MDD.

As these alterations are not present in early stages of the illness, amygdala could be suffering morphological changes as a **result of a long-term dysfunction of the emotional processing circuit** [2].

These findings agree with the seminal hypothesis of structural volume losses of amygdala and hippocampus as a consequence of **glucocorticoid-induced neurotoxicity** [3].

Basolateral amygdala is crucial in the **expression and regulation of emotion**.

A **longitudinal study** would truly respond whether these differences are a **consequence** of the disease.

## References

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## Conflicts of interest

V.P. has received educational honoraria from: Sanofi-Aventis, Lundbeck, Pfizer, AstraZeneca and Eli Lilly, and research funding from Boehringer-Ingelheim for this work. E.A. has received consulting and educational honoraria from several pharmaceutical companies including Eli Lilly, Sanofi-Aventis, Lundbeck and Pfizer, and he has participated as main local investigator in clinical trials from Eli Lilly, Bristol-Myers Squibb and Sanofi-Aventis and also as national coordinator of clinical trials from Servier and Lundbeck.