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 potencial 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 amd well-defined illness stages of MDD.

Methods

Participants underwent an MRI (3-Tesla):

- 25 first-episode
- 22 remitted-recurrent
- 21 treatment-resistant

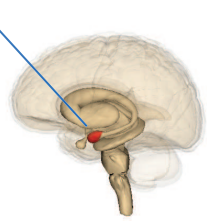
} MDD pacients

- 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.

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**)

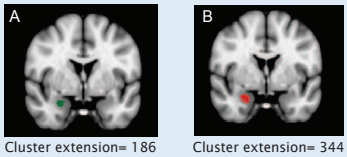
FIRST analyzes indicated *shape* differences in right basolateral amygdala (ventral nucleus and the most connected with the cortex). p<0.05, cluster corrected. (**Figure 1**)

Table 1. Demographics and amygdala volumes (mm^3) of four groups. Means, standard deviations and ratios are provided.

	Healthy Controls	First-Episode	Remittent-recurrent	Treatment -resistant	F/X^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 remited-recurrent patients (A) and to treament-resistant patients (B).



Cluster extension= 186 | Cluster extension= 344

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 hyphotesis of structural volum 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.

Conflicts of interest

V.P. has received educational honoraria from: Sanofi-Aventis,Lundbeck, Pfizer, AstraZeneca and Eli Lilly, and researchfunding from Boehringer-Ingelheim for this work. E.A. hasreceived consulting and educational honoraria from severalpharmaceutical companies including Eli Lilly, Sanofi-Aventis,Lundbeck and Pfizer, and he has participated as main localinvestigator in clinical trials from Eli Lilly, Bristol-Myers Squibband Sanofi-Aventis and also as national coordinator of clinicaltrials from Servier and Lundbeck.

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