

Amygdala nuclei segmentation in behavioural variant of Frontotemporal Dementia

Irene Mattioli, Konstantinos Paulakis, Dyvia Brundavanam, J-Sebastian Muehlboeck, Elisabet Englund, Eric Westman, Alexander F Santillo, Olof Lindberg

State of the art The amygdala is a cluster of nuclei located within the temporal lobes, affected by neurodegeneration in behavioral variant Frontotemporal Dementia (bvFTD). Past *in vivo* MRI studies mostly considered the total volume of the amygdala, but the availability of automated segmentation tools has risen a new interest in the role of its nuclei.

Methodology Using the automated segmentation tool for T1-weighted MRI available in Freesurfer (version 6), we extracted 9 amygdala nuclei volumes in a cohort of 49 bvFTD patients (age: mean = 66.9 years, standard deviation = 8.33) and 39 age-matched healthy controls (HC). The 9 amygdala nuclei were grouped into a 3-part, 5-part, and 9-part amygdala subdivisions, and included into elastic net regression models to determine disease prediction. A potential correlation was investigated between nuclei volumes and symptoms recorded in the Neuropsychiatric Inventory (NPI).

Results The model with the best accuracy was the 3-part parcellation (Cohen's kappa 0.5591). A 10 mm³ increase of the right CentroMedial group increased the odds of belonging the HC by 13%, while a similar increase of the left and right BasoLateral group by 4.0% and 1.0% respectively. We found a weak (ρ 0.38, $p=0.04$ uncorrected) correlation between the CentroMedial group and the NPI Depression item bilaterally.

Conclusion The right CentroMedial group seems involved in bvFTD, suggesting its potential role as imaging biomarker of bvFTD. The CentroMedial group may further play a role in experience and expression of negative affect in bvFTD. The BasoLateral group involvement is weaker and not lateralized.

Conflicts of interest

none