VOLUMETRIC TRAJECTORIES OF AMYGDALA SUBNUCLEI IN FRONTOTEMPORAL DEMENTIA

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FORE FRONT

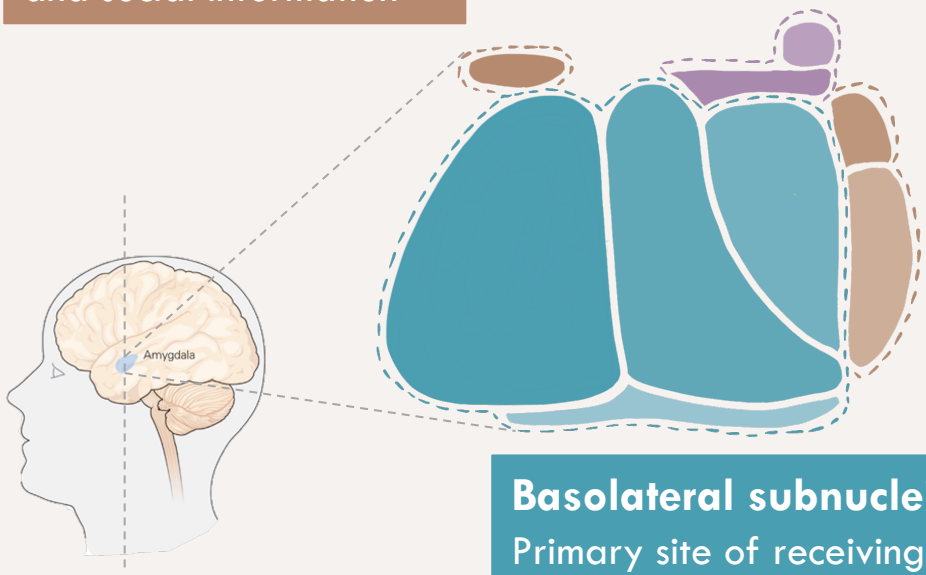
FRONTIER
Frontotemporal Dementia Research Group

BACKGROUND

- Amygdala atrophy has been implicated in frontotemporal dementia (FTD), yet the extent to which it is affected in each clinical phenotype remains unclear
- Rather than being a unitary structure, the amygdala is comprised of multiple nuclei, grouped into **3 anatomico-functional clusters**
- To date, no study has explored the longitudinal changes of amygdala subnuclei in FTD

Centromedial subnuclei
The main output region, mediates innate emotional responses

Superficial subnuclei
Processing of olfactory and social information



Basolateral subnuclei
Primary site of receiving various sensory inputs

This study aims to examine volumetric alterations in amygdala subnuclei in FTD with disease progression

METHODS

PARTICIPANTS

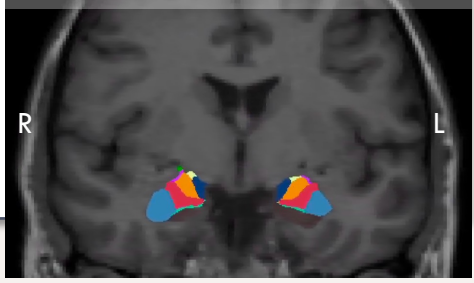
- 60 Patients clinically diagnosed with FTD:
  - behavioural variant FTD (bvFTD)
  - Semantic dementia (SD)
  - Primary non-fluent aphasia (PNFA)
- 20 patients with Alzheimer's disease (AD)
- 20 matched healthy controls

All groups are matched on age, sex, education, disease duration, number of MRI scans

NEUROIMAGING PROCESSING

- T1-weighted images were processed using FreeSurfer longitudinal pipeline
- The amygdala was automatically segmented into 9 individual nuclei
- Nuclei volumes were summed together to create the groups

Figure 1. Visualisation of amygdala nuclei segmentation



STATISTICAL ANALYSES

- ANOVA was used for baseline comparisons
- Linear mixed effects models were used to analyse volume changes over time

BASELINE RESULTS

1. Within FTD, bvFTD and SD displayed significant atrophy in all 3 subnuclei
2. SD showed the most severe and asymmetrical (L > R) amygdala atrophy

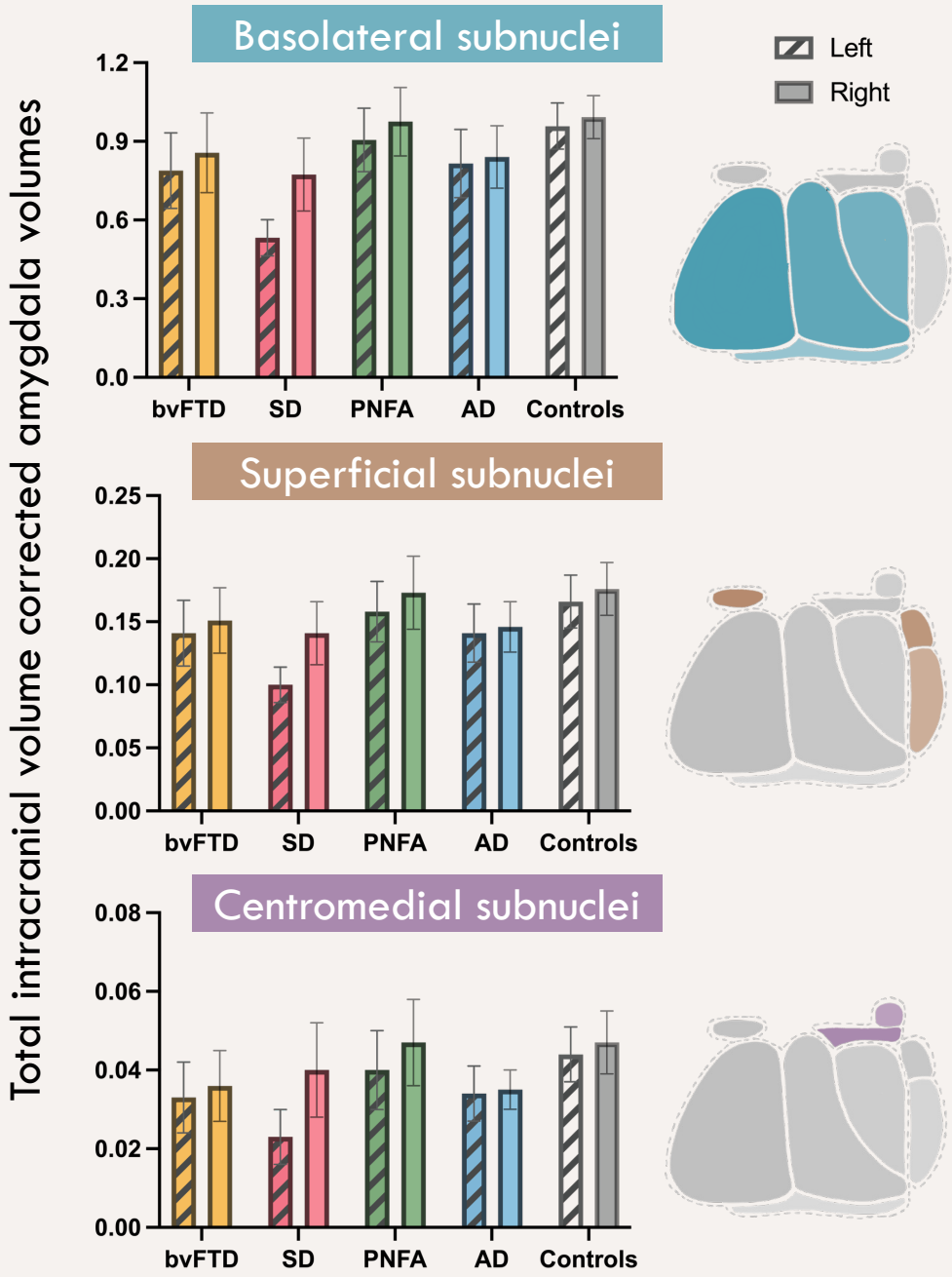


Figure 2. Baseline comparisons of amygdala subnuclei volumes.

LONGITUDINAL RESULTS

1. **bvFTD:** rates of decline did not differ significantly from controls
2. **SD:** disproportionately faster decline in the right amygdala
3. **PNFA:** faster decline relative to controls in all 3 subnuclei

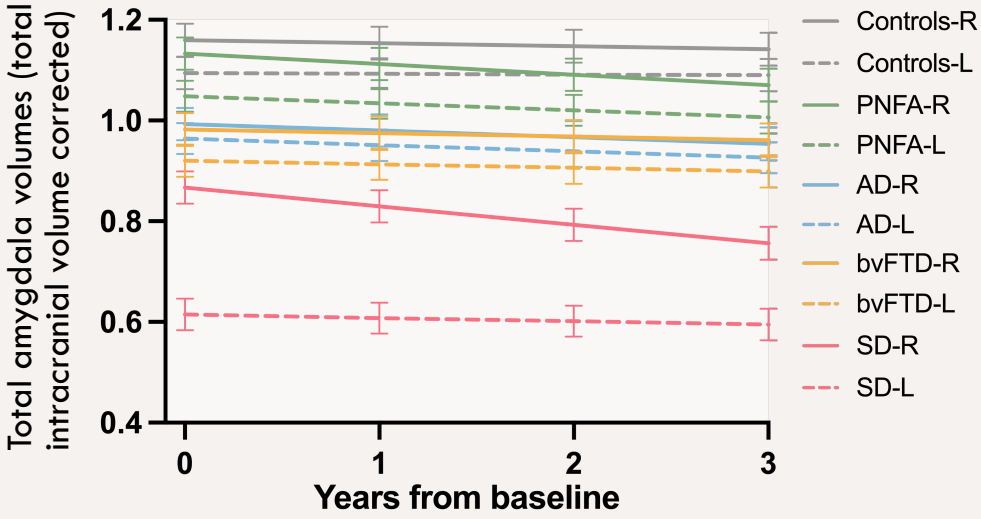


Figure 3. Longitudinal changes of left and right amygdala volumes.

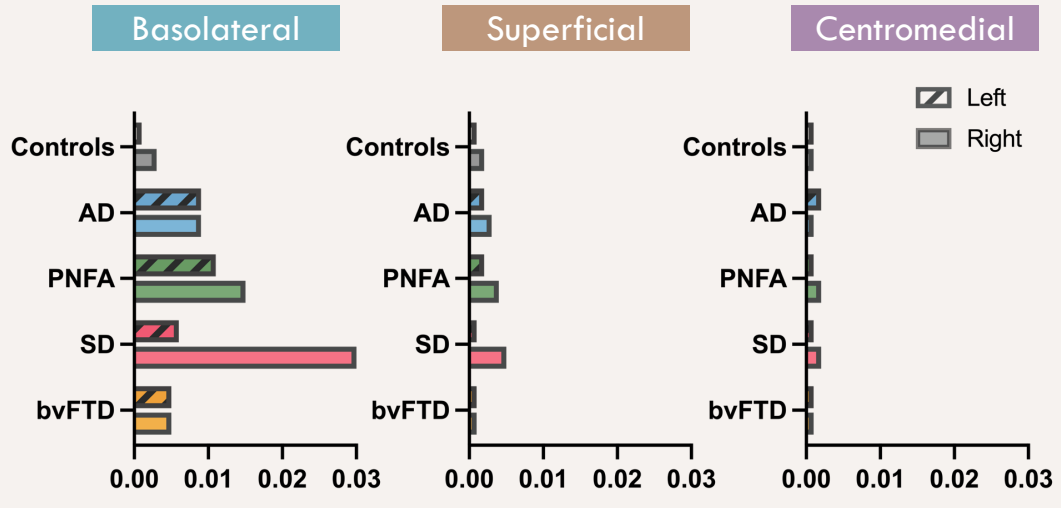


Figure 3. Estimated mean annual rate of decline in amygdala volumes.

CONCLUSIONS

HIGHLIGHTS OF FINDINGS

1. FTD subtypes demonstrated distinct amygdala subnuclei atrophy profiles across the disease course
2. SD showed increasing involvement of the right amygdala as disease progresses
3. PNFA showed comparable volumes with controls at baseline, but more rapid decline over time

FUTURE RESEARCH

- What are the associations between amygdala subnuclei abnormalities and behavioural symptoms in FTD?
- Are individual nuclei differentially affected by FTD pathology?

REFERENCES

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