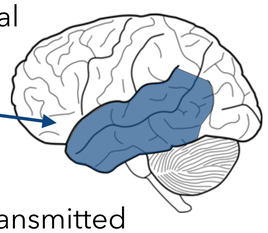
A STEREOLOGICAL EXAMINATION OF TEMPORAL LOBE VOLUME IN DEMENTIA WITH LEWY BODIES

Matthew Mankarious

INTRODUCTION

Dementia affects 800,000 people in the UK, of which 15% are thought to be affected by **dementia with Lewy Bodies** (DLB).

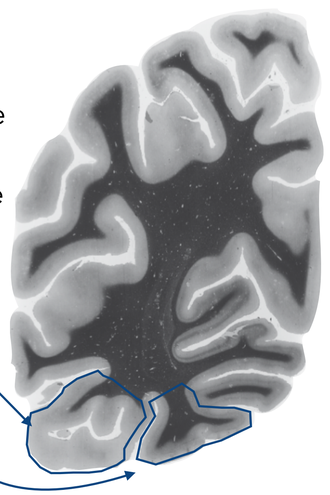
Visual Hallucinations are a common symptom of DLB. Because of this, we examined the brain's visual components in the TEMPORAL LOBE



The 2 stream hypothesis describes how vision is transmitted to the brain. Visual information comes from the retina, to the primary visual cortex, then through the dorsal and ventral streams.

Vision for action is transmitted by the dorsal stream, and the ventral stream is responsible for identification of objects and faces, which are commonly described as subjects of the hallucinations.

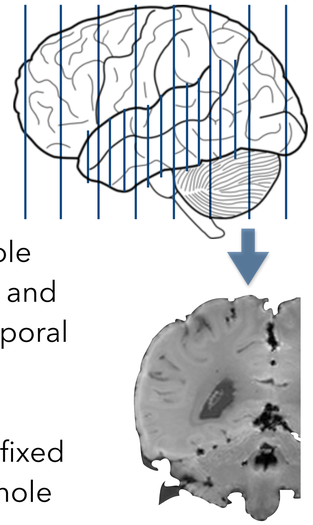
Due to this nature of the hallucinations, my research focused on the **ventral stream**, specifically the INFERIOR TEMPORAL GYRUS (ITG) and the FUSIFORM GYRUS of the temporal lobe.



METHODS

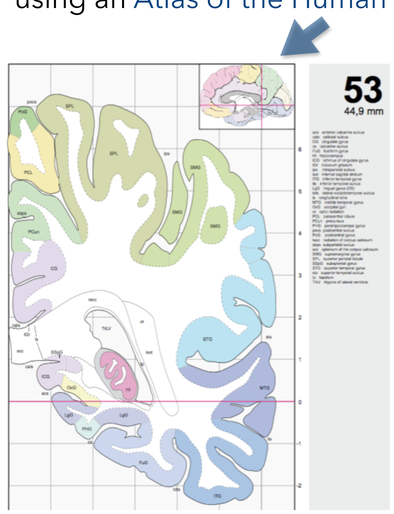
Stereology was the main method used to calculate the volume of the temporal lobe and its constituent regions. This was done for healthy age-matched controls, Alzheimer's Disease controls (AD), diagnosed DLB patients, and mixed AD/DLB pathologies.

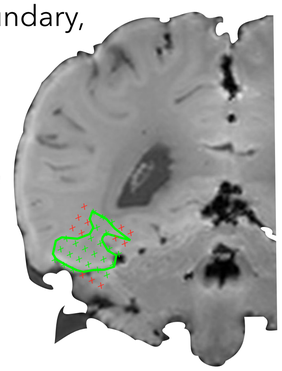
Based on Cavalieri's principle of geometry, the sterology software used input of an **x-y area**, in combination with a set **z axis distance,** to calculate an accurate estimate of volume (xyz).



This z-axis distance was 1500µm for whole hemisphere and temporal lobe volume, and 500µm for the individual gyri of the temporal lobe.
Area was manually plotted on magnetic resonance imaging (MRI) images of the fixed post-mortem tissues, first to calculate whole (hemisphere) volume.

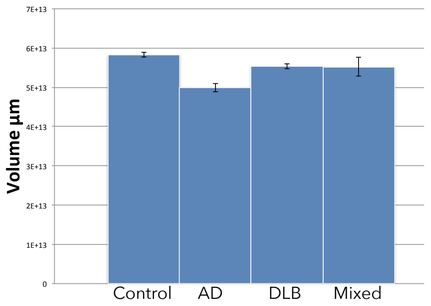
For volume of the fusiform gyrus and the ITG to be calculated, the regions first needed to be delineated on the MRI images, using an Atlas of the Human Brain. Volume was then calculated from the area of points selected within the region's boundary, on multiple coronal images to form a z-line stack.



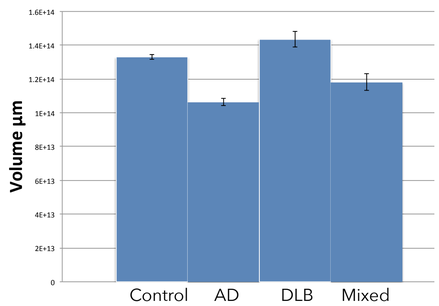


RESULTS

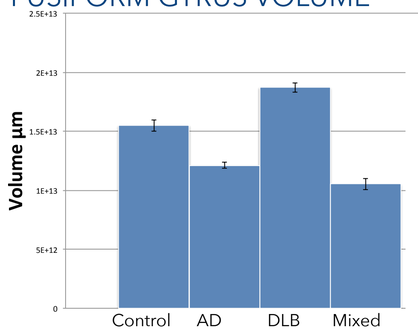
WHOLE BRAIN VOLUME



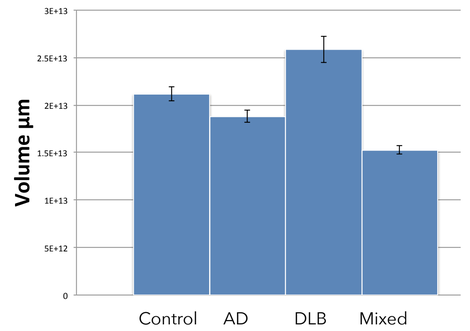
TEMPORAL LOBE VOLUME



FUSIFORM GYRUS VOLUME



ITG VOLUME



Data shown with standard error after ANOVA with LSD and Bonferroni post-hoc testing

DISCUSSION

My data shows that there is some decrease in whole brain volume between the control and the AD pathology. There is however more significant decreases in temporal lobe, fusiform gyrus and ITG volumes of patients with Alzheimer's Disease and AD/DLB mixed pathology.
This decrease in volume suggests that the temporal lobe is preferentially vulnerable to atrophy in Alzheimer's Disease, with volumetric change suggesting cell loss.

This however is not the case in DLB brains, with no significant decrease in volume identified. This suggests that cell loss does not occur in DLB, and does not appear to have an importance in the occurrence of visual hallucinations experienced by patients.

With thanks to
Dr Ahmad Khundakar,
Institute for Ageing and Health
Newcastle University Vacation Scholarship

Newcastle University