



AMYLOID IMAGING IN CEREBRAL AMYLOID ANGIOPATHY- RELATED INTRACEREBRAL HAEMORRHAGE AND ALZHEIMER'S DISEASE: A VOXEL-WISE APPROACH

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Introduction

Retention of positron emission tomography (PET) amyloid ligand, such as [¹¹C]-PIB and [¹⁸F]-florbetapir is increased in Alzheimer's disease (AD) and cerebral amyloid Angiopathy (CAA) [1-3].

Few studies suggest that the regional distribution of the amyloid tracer may differ between CAA and AD patients with a greater proportion of PiB retention in the occipital lobe among patients with CAA (Johnson et al, 2007; Ly et al., 2010).

Methods

Florbetapir PET from 15 nondemented patients with probable CAA-related intracerebral haemorrhage (CAA-ICH) and 20 patients with mild cognitive impairment due to AD (MCI-AD) were analyzed.

Regional standard uptake was obtained in the 5 cortical lobes (temporal, parietal, occipital, frontal, and insular) using composite ROIs from the AAL [4] anatomical atlas. A **voxel-wise approach** was also performed for amyloid quantification.

SUVr quantification was only performed in the contralateral hemisphere for the CAA group.

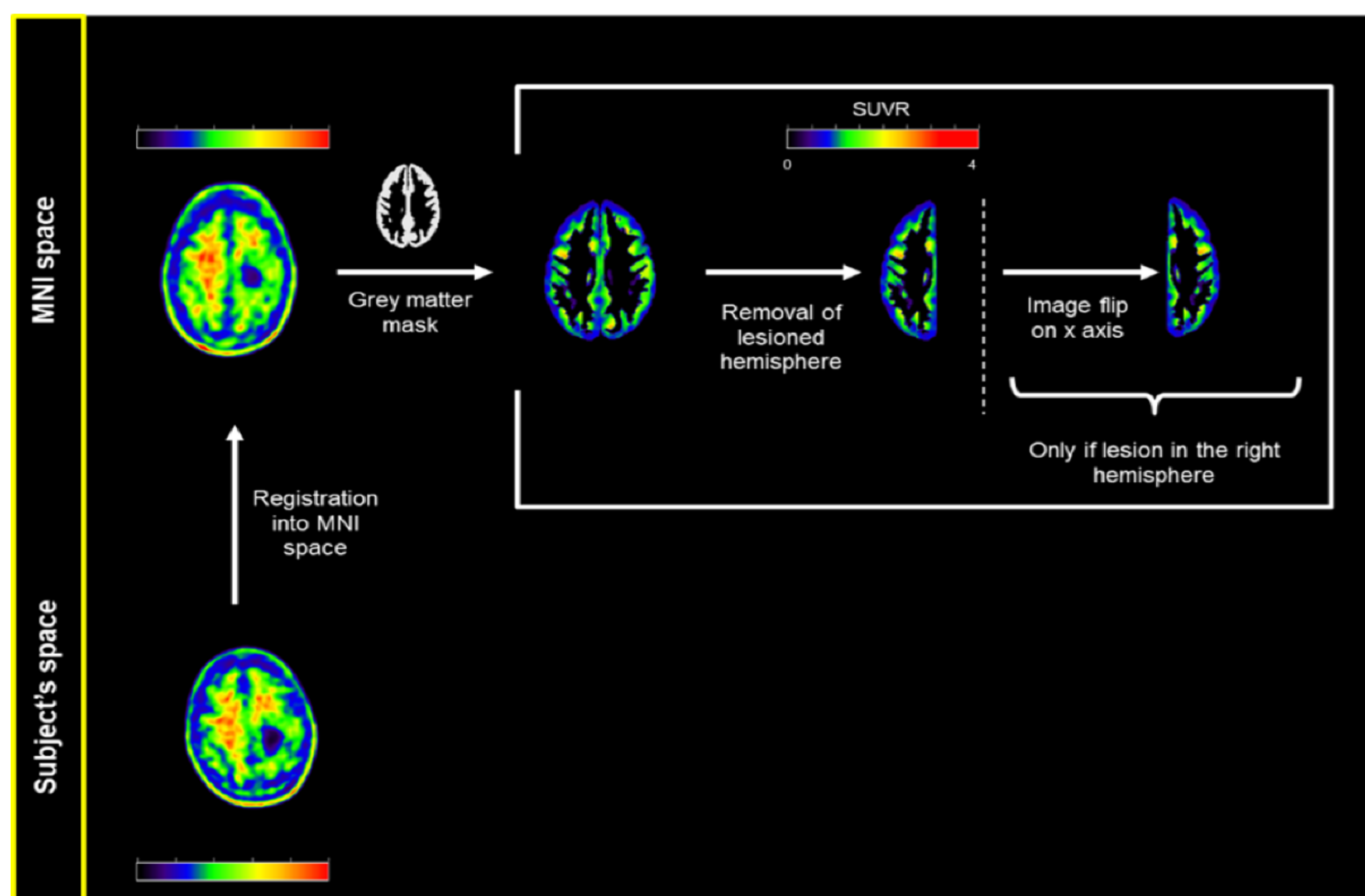


Figure 1: Processing of the [¹⁸F]florbetapir-PET scan of a representative case from the CAA-ICH group with right fronto-parietal hematoma.

Results

Groups were similar in age (CAA-ICH median age 68 [59.5-78.0], MCI-AD 72 [67.8-78.0]) and sex. Frequencies of the ApoE ε4 and ε2 alleles were no different between the groups.

Global florbetapir retention was lower in patients with CAA-ICH than MCI-AD (median SUVr [IQR] 1,32 [1,22-1,41], 1,46 [1,35-1,64] $p=0.024$, figure 2A).

ROI-based analysis

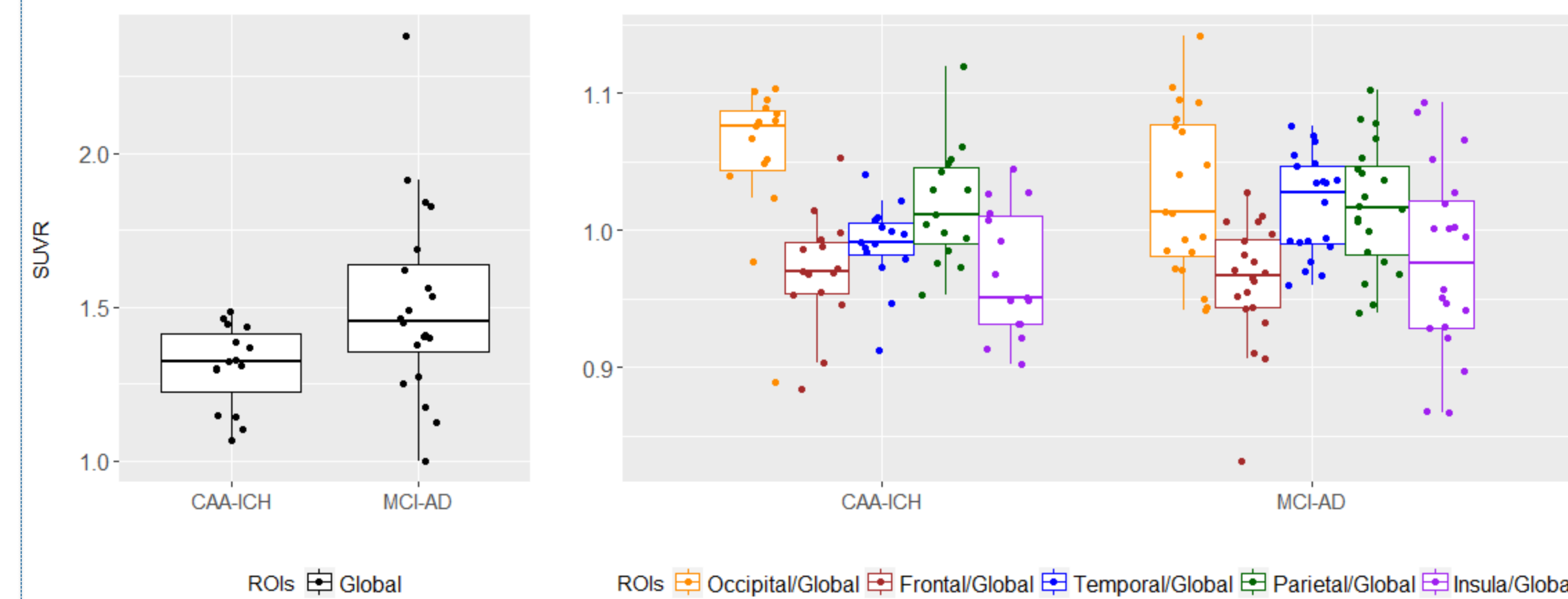


Figure 2. Median florbetapir SUVr in the two groups.
A. Median global Median florbetapir SUVr ratios; B. florbetapir SUVr.

Voxel-wise analysis

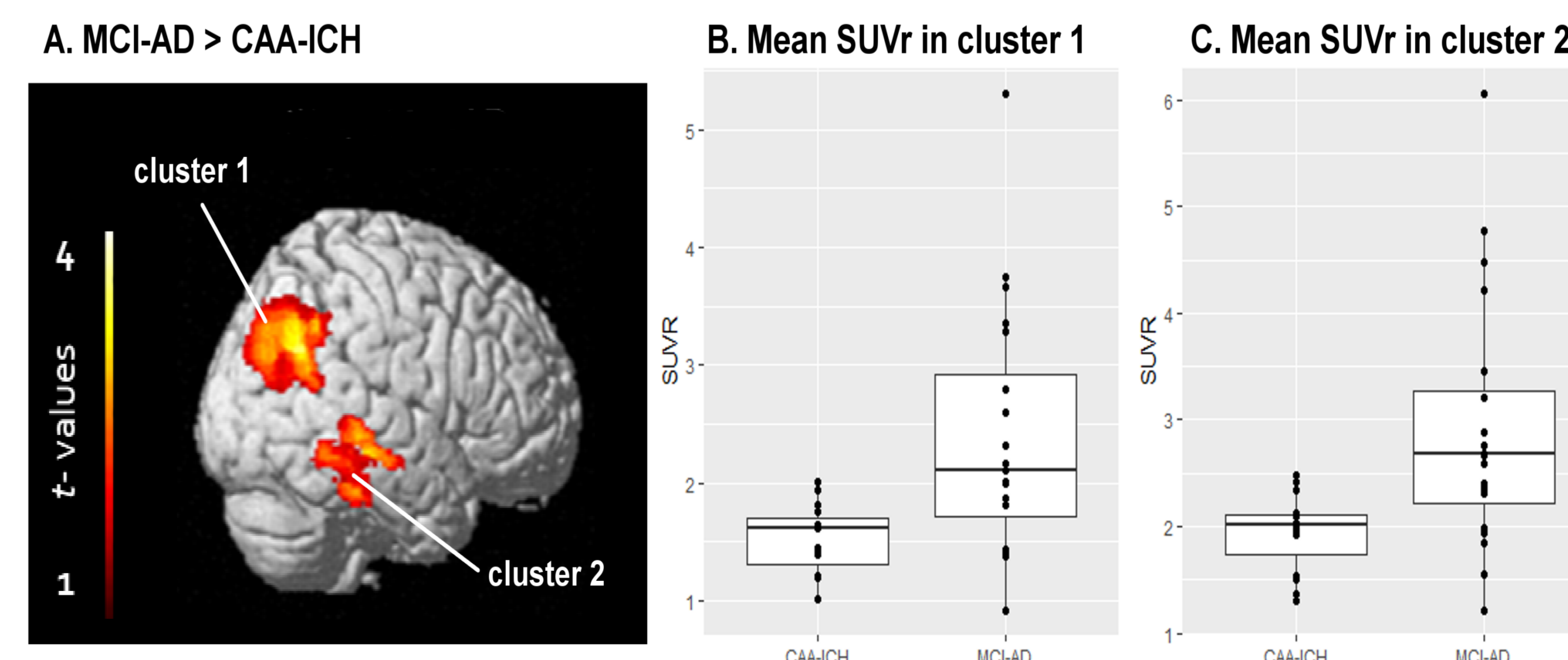


Figure 3. Groups compared using a voxel-wise approach.
A. Statistical parametric map displaying SUVr differences between the groups ($p < 0.05$ FWE-corrected); B. Mean SUVr values in cluster 1; C. Mean SUVr values in cluster 2.

Discussion

The distribution of florbetapir assessed by ROI analysis was similar between the two groups.

However, in the voxel-wise analysis, patients with MCI-AD had higher florbetapir retention in the temporal and parietal regions compared to patients with CAA-ICH.

No region showed significantly higher uptake in CAA-ICH versus MCI-AD patients.

→ We found that patients with CAA had a high occipital uptake of florbetapir, however, the relative florbetapir retention in the occipital lobe was not different between groups.

- A pathological overlap between the two population is not excluded.
- The posterior predominance of amyloid tracer retention in CAA patients previously reported in Ly et al. [2] and Johnson et al. [3] studies, may be partly driven by the relative increased frontal (and decreased occipital) uptake in patients with AD dementia.

→ The temporal and the parietal regions found in our analysis were reported to be affected by stage II of amyloid deposition, in a recently four-stage model proposed by Grothe et al.

→ The development of a CAA-specific amyloid tracer is required.

References

1. Gurol et al., 2016. Neurology
2. Johnson et al., 2007. Ann Neural
3. Ly et al., 2010 Neurology
4. Tzourio-Mazoyer et al., 2002. Neuroimage
5. Grothe et al., 2017. Neurology