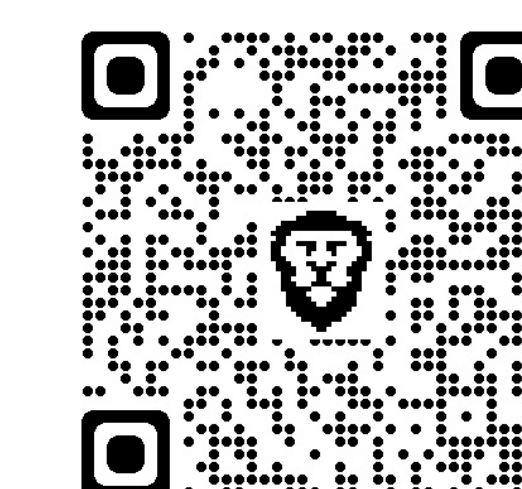


# Subcortical Shape Analysis in Patients with Neurocysticercosis Presenting with Seizures

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We provide evidence that, compared to their seizure-free counterparts, individuals with NCC and recurrent seizures were significantly more likely to show oedema, two or more calcified lesions, and inwards deflation of the right hippocampus. Results also suggest seizure recurrence is related to whole volume reductions of the right hippocampus & left amygdala, and greater caudate asymmetry.



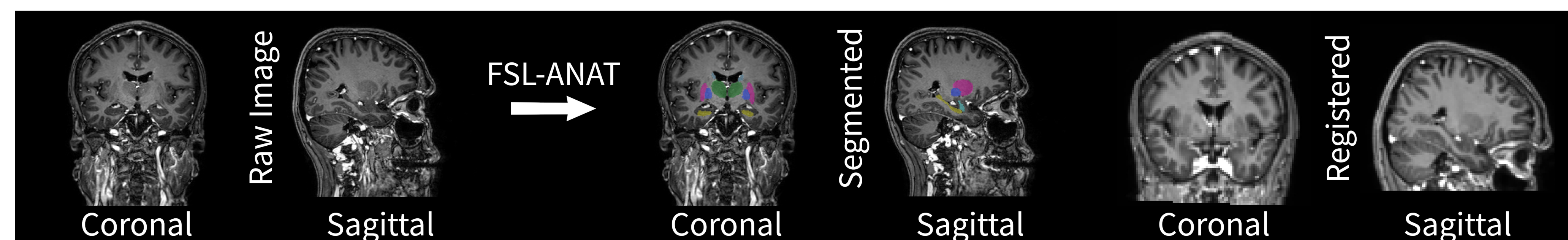
## Background

Neurocysticercosis (NCC) is the leading global cause of acquired epilepsy, yet efforts to predict epileptogenesis in NCC have proved inconclusive, relying predominantly on visual inspection. Sub-cortical abnormalities have previously been reported in epilepsy, such as hippocampal sclerosis and thalamic atrophy<sup>1,2,3,4</sup>.

We aimed to investigate the putative role of abnormal sub-cortical structures in the development of NCC-based epilepsy, using advanced MRI.

## Methods

We collected clinical histories and imaging data from 83 patients with probable NCC, 49 with recurrent seizures (seizure-recurrent) and 34 without (seizure-free). Sub-cortical shape analysis was performed using the FSL-ANAT pipeline in the FMRIB Software library<sup>5</sup>, which also provided data for whole volume analyses. Age was identified as a possible confound, and was consequently modelled in all analyses as a covariate, alongside sex. Clinical evaluation was completed by two independent assessors, who were blinded to seizure status.



## Conclusions

Current understanding suggests that seizures in NCC-based epilepsy are multi-factorial, and indeed, we found evidence that seizure recurrence correlates with both imaging - significant hippocampal abnormalities - and clinical factors - perilesional oedema and multicystic presentation. Our results provide justification for the exigency of advanced imaging methods in NCC research.

**Key references:** <sup>1</sup>Keller et al., 2015; <sup>2</sup>Perani et al., 2018; <sup>3</sup>Leek et al., 2020; <sup>4</sup>Jama-António et al., 2019; <sup>5</sup>Jenkinson et al., 2012

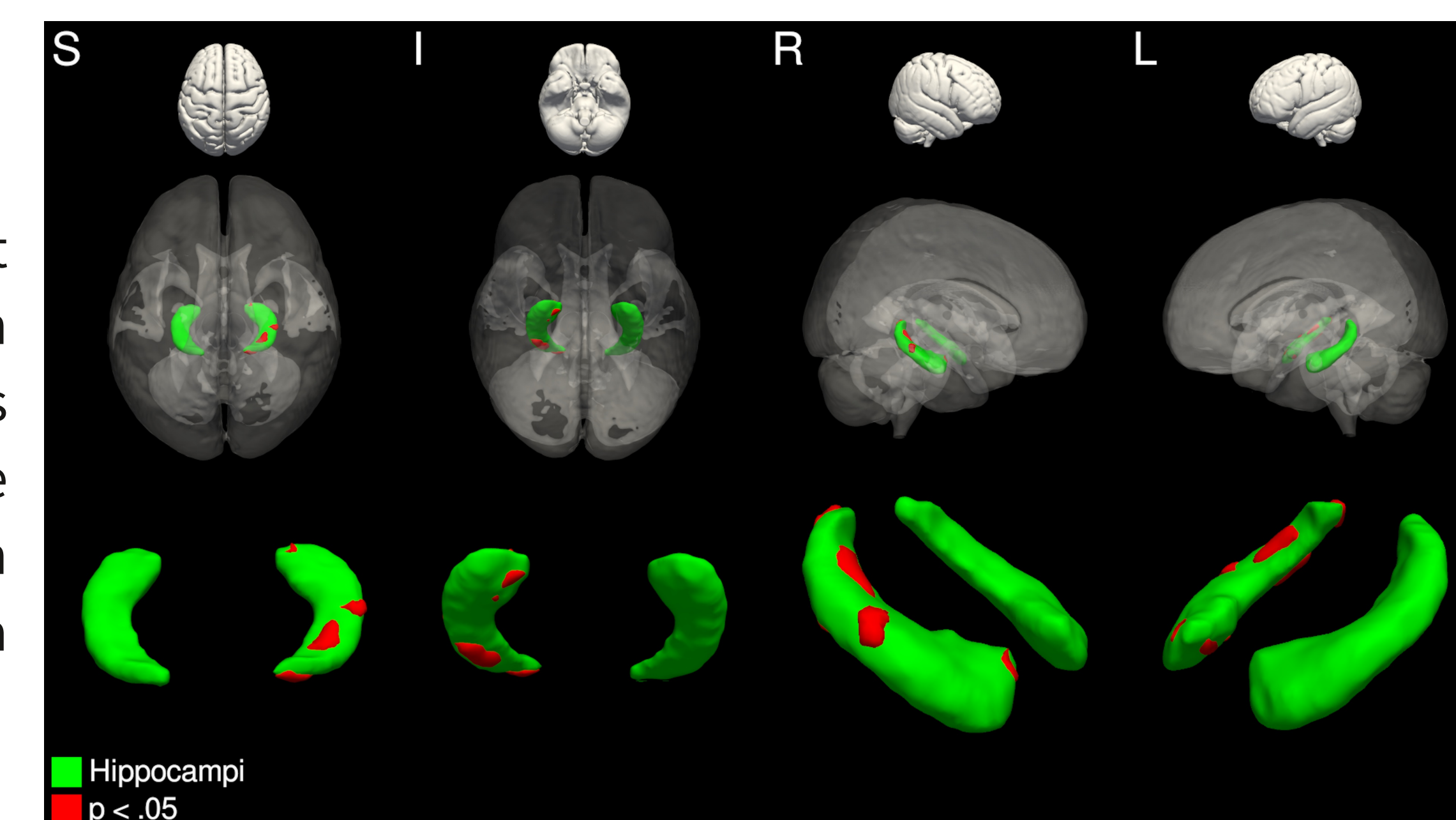
## Results

### Neuroradiological Evaluation

A greater proportion ( $\chi^2=1.05$ ,  $p=.310$ ) of the seizure-recurrent group showed evidence of more than one calcified granulomatous lesion. Furthermore, perilesional oedema was more common amongst the seizure-recurrent sample ( $\chi^2=7.77$ ,  $p=.050$ ).

### Sub-cortical Shape Analysis

The seizure-recurrent group showed significant (corrected  $p < .050$ ) inward surface deflation in localised regions of the right hippocampus compared to the seizure-free group. There were no other significant differences, including when contrast enhancement and perilesional oedema were included as coregressors.



### Whole Volume

The seizure-recurrent group tended towards reduced volumes in the right hippocampus ( $F=3.46$ ,  $p=.067$ ), reduced volumes in the left amygdala ( $F=3.12$ ,  $p=.081$ ), and left-greater-than-right asymmetry of the caudate nuclei ( $F=3.16$ ,  $p=.080$ ).

Differences between measures of asymmetry and volume were not significant for any other whole structure.

