

# The TIME Study: Topographical Memory in Transient Epileptic Amnesia prior to Treatment.

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## Background

- Transient epileptic amnesia (TEA) is a sub-syndrome of temporal lobe epilepsy (TLE).<sup>1</sup>
- Seizures manifest as brief spells of amnesia.<sup>1</sup>
- In a third of TEA cases, patients report interictal disturbance of memory for familiar places and routes.<sup>1</sup>
- Similar problems have been observed in clinical populations with other temporal lobe pathologies (e.g. TLE<sup>2</sup> and Alzheimer's<sup>3</sup>).
- Here, we describe the first empirical investigation into topographical memory performance in a group of pre-treatment TEA patients.

## Hypothesis

Participants with TEA will perform at a lower level than a group of healthy matched controls.

## Method

- Patients with TEA and control participants were recruited to 2 groups. See Table 1 for further information.

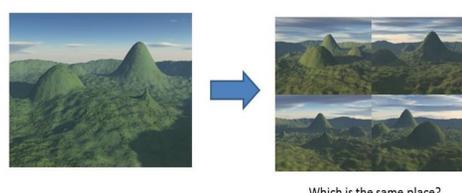
**Table 1**

*Demographic characteristics of participants.*

Group	Total N	M Age	Gender Distribution
TEA	16	64.4	13m to 3f
Control	26	64.0	19m to 7f

- Eligibility criteria for TEA included:
  - $\geq 2$  amnesic episodes
  - within 2 weeks of starting treatment.
- Healthy controls were matched to patients on age, gender distribution, education history.
- All participants were cleared of other history of neurological conditions or psychiatric disorders.
- We report the results on measures of:
  - IQ (Wechsler Test of Adult Reading)
  - Visuospatial processing (Rey & Modified Taylor Complex Figure Copy - CFT)
  - Visuospatial recognition memory (Warrington's Recognition Memory Test for Faces - WRMT)
  - Topographical memory (4 Mountains Test – 4MT).<sup>3</sup>
- The 4MT is illustrated in Figure A. Participants inspect images of mountain landscapes for 10", then identify the same location at a different angle from a choice of four.

- One point is awarded for each correct answer (max. 30).



**Figure A:** An example of stimuli used in the 4MT.

- Prior to assessment, all patients were asked if they had experienced topographical amnesia.

## Results

- 62.5% participants in the TEA group reported experiencing interictal topographical amnesia.
- Group means were compared independently for the aforementioned measures with one-way ANOVAs.
- No significant differences were found between groups, for measures of age ( $F = .02, p = .89$ ); IQ ( $F = 3.4, p = .07$ ); visuospatial processing (CFT,  $F = .07, p = .79$ ) and visuospatial recognition (WRMT,  $F < .01, p = .98$ ). See Table 2 for further details.
- In comparison of performance on the 4MT, the control group correctly identified more locations on average than the TEA group. This difference was found to be significant ( $F = 12.7, p < 0.01$ ). See Figure 1 for a group comparison.

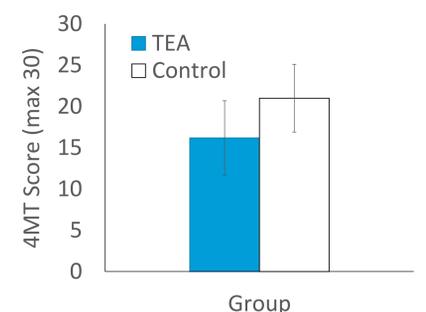
**Table 2**

Comparison of task performance.

Measure	TEA	Control
M IQ	106.1	110.3
M CFT (36)	33.3	33.1
M WRMT (50)	41.3	41.3
M 4MT (30)*	16.2	21

Note: () = maximum score.

\*Significance met at  $p < 0.01$ .



**Figure 1.** M performance on 4MT by group. Error bars represent standard deviation.

## Discussion

- The results here document topographical memory impairment in TEA patients for the first time.
- This also indicates that the 4MT is a sensitive measure of topographical memory in the TEA population.
- Future testing will investigate whether treatment can help improve topographical memory in TEA.
- Additional research could investigate if TEA patients perform similarly on other tests of topographical memory.

## Conclusion

Topographical memory disturbance is present and measurable in TEA with the 4 Mountains Test.

## Contact Details

Our website is <https://projects.exeter.ac.uk/time/> and we can be contacted via email on [time@exeter.ac.uk](mailto:time@exeter.ac.uk).

## References

1. Butler, C. R., Graham, K. S., Hodges, J. R., Kapur, N., Wardlaw, J. M., & Zeman, A. Z. (2007). The syndrome of transient epileptic amnesia. *Annals of Neurology*, 61(6), 587-598. doi:10.1002/ana.21111
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## Declaration of Interest

The researchers declare no conflict of interest. **Funded by:** The Dunhill Medical Trust [grant number R322/1113]; C.Butler: MRC Clinician Scientist award [MR/K010395/1]