Temporal lobe interictal spikes disrupt encoding and retrieval of verbal memory: a subregion analysis

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Objective: The medial temporal lobe (MTL) encodes memories and can be a predominant site for interictal spikes (IS) in patients with focal epilepsy. It is unclear if memory deficits are due to IS in the MTL producing a transient impairment.

Methods: 78 participants undergoing presurgical evaluation for medically refractory focal epilepsy with depth electrodes placed in the temporal lobe participated in a verbal free recall task. IS were manually annotated during the pre-encoding, encoding and recall epochs. We examined the effect of IS on word recall using mixed-effects logistic regression.

Results: IS in the left hippocampus (OR:0.73, CI:0.63-0.84, $p < 0.001$) and left middle temporal gyrus (MTG) (OR:0.46, CI:0.27-0.78, $p < 0.05$) during word-encoding impaired subsequent recall performance. Within the left hippocampus, this effect was specific for area CA1 (OR:0.76, CI:0.66-0.88, $p < 0.01$) and dentate gyrus (OR:0.74, CI:0.62-0.89, $p < 0.05$). IS in other MTL subregions or inferior and superior temporal gyrus and IS occurring during the prestimulus window did not affect word encoding ($p > 0.05$).

Significance: IS in medial and LTC contribute to transient memory impairment during verbal episodic memory.