

## Hippocampal Shape Alterations Are Associated With Pre-And Postsurgical Verbal And Visual Memory Deficits In Temporal Lobe Epilepsy

T. Postma\*; C. Cury\*<sup>†</sup>; S. Baxendale\*; P.J. Thompson\*; I. Cano- López<sup>‡</sup>; J. de Tisi\*; J.L. Burdett\*; M.K. Sidhu\*; L. Caciagli\*;  
G.P. Winston\*; S.B. Vos\*; M. Thom\*; J.S. Duncan\*; M.J. Koepp\*; M. Galovic\*<sup>§</sup>

\*University College London, London, United Kingdom; <sup>†</sup>University of Rennes, Inria, Rennes, France; <sup>‡</sup>University of Valencia, Valencia, Spain; <sup>§</sup>Kantonsspital St. Gallen, St. Gallen, Switzerland

**Purpose:** Disturbances in episodic memory are common comorbidities in temporal lobe epilepsy (TLE). The hippocampus plays an essential role in memory formation but little is known about the relationship of hippocampal morphology with memory.

**Method:** We analysed alterations of hippocampal surface morphology with high-resolution magnetic resonance imaging. We related hippocampal surface-shape patterns to verbal and visual learning measured with the Adult Memory and Information Processing Battery in 145 unilateral (76 left, 85 female, age 38y ± 12) refractory TLE patients undergoing epilepsy surgery and 39 age- and sex-matched healthy volunteers (25 female, age 36y ± 11).

**Results:** Both left (LTLE) and right (RTLE) TLE patients had lower verbal (LTLE 44 ± 11; RTLE 45 ± 10) and visual learning (LTLE 34 ± 8; RTLE 30 ± 8) scores than healthy controls (verbal 58 ± 8; visual 39 ± 6; p < 0.001). Verbal learning impairment in TLE was associated with selective atrophy of the left superolateral hippocampal head. In contrast, visual memory impairment was associated with bilateral inferiomedial hippocampal atrophy. After anterior temporal lobe resection, postsurgical verbal memory decline was more common in LTLE than in RTLE (27% vs. 7%, p = 0.006), whereas there were no differences in postsurgical visual memory decline (9% vs. 6%, p = 0.55). Preoperative atrophy of the left hippocampal tail predicted verbal memory decline after left temporal epilepsy surgery.

**Conclusion:** We showed that memory deficits in TLE are associated with specific morphological alterations of the hippocampus, and that these distinct hippocampal surface-shape patterns could be helpful to individually stratify TLE patients into those at high vs. low risk of presurgical or postsurgical memory deficits. Our findings argue against a strictly unilateral representation of material-specific memory. This knowledge could be important for planning and prognosis of epilepsy surgery and for neuropsychological counselling in TLE.