Unilateral temporal lobe epilepsy and changes in the engagement and connectivity of the autobiographical memory network

Donna Rose Addis[1,2,3] Mary Pat McAndrews[2,3] and Morris Moscovitch[3,4]

[1] Dept. of Psychology, Harvard University, Cambridge, MA
[2] Toronto Western Research Institute, University Health Network, Toronto, Ontario
[3] Dept. of Psychology, University of Toronto, Toronto, Ontario
[4] Rotman Research Institute, Baycrest Centre for Geriatric Care, Toronto, Ontario

Neuroimaging and lesion studies have demonstrated the hippocampus to be a key structure in the network supporting autobiographical memory (AM) retrieval. We investigated the consequences of hippocampal damage in temporal lobe epilepsy (TLE) on the ability to recollect AMs, and on the engagement and connectivity of the AM retrieval network. Firstly, using the Autobiographical Interview, we found that the recollective, episodic aspects of AM were differentially impaired relative to semantic AM. Further, hippocampal atrophy correlated with the ability to retrieve episodic, but not semantic, autobiographical details. We also investigated the neural substrates mediating retrieval of residual AM in TLE using fMRI. In left TLE patients, activation of the hippocampus and other structures comprising the AM network was significantly reduced. Further, the effective connectivity of the network was dramatically different between these patients and controls, with an apparent "bypassing" of the left hippocampus. Hippocampal activity was also reduced in right TLE patients, but notably some extra-hippocampal nodes of the AM network were activated to a greater degree than controls, and new regions were recruited. Together, these findings suggest that with damage to the hippocampus, the AM network fails to engage normally and the ability to recollect the past vividly is diminished.