

Medial thalamic stroke and its impact on familiarity and recollection

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Objectives. Recognition memory allows us to determine whether a stimulus has been previously encountered, based on either recollection or familiarity. Models of recognition memory have postulated the anatomical and functional independence of these processes, and have hypothesized that the mammillothalamic tract (MTT) / anterior thalamic nucleus (AN) complex is critical for recollection, while the mediodorsal nucleus (MD) supports familiarity (Aggleton and Brown, 1999). A more recent proposal is that the MD plays a direct role in familiarity and an indirect role in recollection (Aggleton et al., 2011). Support for this division between the thalamic nuclei has so far been conflicting.

Methods. Twelve patients with left thalamic stroke and 25 controls underwent a neuropsychological assessment, three recognition memory tasks assessing familiarity and recollection, and a high-resolution structural MRI scan. Lesions were manually segmented, automatically localized and quantified using a specific digitalized atlas of the thalamus. MTT lesions were assessed using two different approaches.

Results. Patients showed impaired recollection and spared familiarity in every task. No patient had significant AN lesions. All the patients had lesions in the MD region, with lesions of the MTT in seven cases. Patients with damage to the MD region exhibited impaired recollection but preserved familiarity. Patients with damage to the MTT had lower recollection and familiarity indices.

Conclusions. Recollection is impaired following MD damage, but familiarity is not. Lesions to the MTT increase impairment of both familiarity and recollection. This suggests that models of familiarity, which assign a critical role to the MD, should be reappraised.