REDUCED NEUROGENESIS MAY CONTRIBUTE TO HIPPOCAMPAL ATROPHY IN PARKINSON'S DISEASE

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Introduction: Hippocampal volume is decreased in patients with Parkinson's disease (PD) independent of medication use or dementia, a finding correlating with verbal memory deficits.¹ Surprisingly significant hippocampal neuronal loss is not a feature of PD.² A previous study found a significant reduction in neural precursors in PD,³ although the relationship to hippocampal size has not been established.

Aims: To determine whether altered hippocampal neurogenesis relates to hippocampal size in PD.

Methods: Photographs of 3mm coronal brain slices and a 3mm formalin-fixed coronal mid-hippocampal tissue slice from 16 PD patients and 8 matched controls were obtained from the Sydney Brain Bank following appropriate approvals. Hippocampal volumes were estimated from serial photographs using a point counting method² and neural precursor cells identified and estimated in spaced serial 40µm sections immunohistochemically-stained for PCNA and PSA-NCAM.³

Results: We confirm both hippocampal atrophy (reduced ~30%) and decreased neural precursor cells (reduced 30-45%) in patients with PD compared with controls (non-parametric p< 0.01). Hippocampal volume strongly correlated with the number of PSA-NCAM-positive neurons (Rho=0.52, p=0.015) and also with PCNA-positive neurons. As PCNA-positive neuron number varied with age of PD onset (Rho=-0.48, p=0.069), however, this later relationship was weaker (Rho=0.39, p=0.067). These variables were not affected by the presence or absence of dopamine replacement therapies or disease duration.

Conclusions: Our data suggest that reduced neurogenesis contributes to reduced hippocampal volume in PD, potentially predisposing patients to memory deficits.

¹Ibarretxe-Bilbao et al. Mov Disord 2009;24 Suppl2:S748-53