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Title: Age-related changes within the hippocampus: attenuation of glial activation and synaptic loss by a cell adhesion molecule mimetic (FGL)

Text: Altered synaptic morphology, progressive loss of synapses and glial (microglia and astrocyte) activation are characteristic hallmarks of ageing within the hippocampus. FGL (an NCAM mimetic) has been proposed to attenuate glial activation and prevent synaptic loss. The mechanisms of FGL action are unclear, but have been linked to neuronal CD200, which exerts an inhibitory effect on glial cells via interaction with its receptor CD200R. FGL could mediate its neuroprotective effect at the synapse by regulating CD200 protein expression and glial activation, or through direct effects on synaptic integrity/transmission. Preliminary evidence suggests that CD200 co-localizes at synaptic terminals with synaptophysin, a presynaptic protein. This study investigated whether systemic treatment with FGL alters expression of synaptophysin, CD200 and glial activation markers within the rat hippocampus at 4 and 22 months of age. A series of 50 micron-thick sections obtained throughout the dorsal hippocampus (5 animals per group) were immunostained for synaptophysin, CD200, MHCII and GFAP. Relative expression levels of these markers were determined within hippocampal subfields, using optical segmentation and densitometry (Image-Pro Plus, Media Cybernetics). GFAP levels were elevated and synaptophysin levels significantly reduced in all hippocampal subfields in aged animals. CD200 expression levels were significantly reduced within the CA3 and dentate gyrus in 22-month old animals. These changes correlated with an age-related increase in MHCII expression. Treatment with FGL reduced GFAP and MHCII expression and attenuated the age-related loss of synaptophysin and CD200 (the latter, within the CA3 only). These results provide evidence that FGL mediates its neuroprotective effects by preserving synaptophysin expression, increasing availability of CD200 and dampening glial activation within the aged hippocampus. Supported by EU FP6 "ProMemoria" (Ref:512012) & FP7 "MemStick" (Ref:201600).

Theme: B - Excitability, synaptic transmission, network functions
Glia-neuron interactions - Cell biology and signalling

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