



For lectures, symposia and workshops, time indicates the beginning of the session.
For posters, authors are expected to be present at their posters at the time indicated.

First author: Stewart, Michael G. (poster)

Poster 380 - Mon 12/07, 11:30 - Hall II

Session 089 - Stress I

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Title	The effects of stress and spatial learning on synaptic and dendritic structures in mammalian hippocampus: a quantitative electron microscopy and 3-dimensional reconstruction study.
Text	Exposure to chronic restraint stress (CRS) in rats induces raised corticosteroid levels and cognitive impairment and a variety of morphological changes in area CA3 of the hippocampus, inducing a loss of simple unperforated synapses on thorns in stratum lucidum of CA3 (Sandi et al, <i>Eur. J. Neurosci</i>, vol 17, 2447-2456; 2003). Whilst 2-photon imaging techniques have been used to study hippocampal spines in slices, their optical resolution does not permit examination of the structure of synaptic contacts and their use in vivo has been limited mainly to study of spines in superficial layers of the cortex. Here, we used 3-dimensional (3D) reconstruction methods at electron microscope (EM) level to describe how 21 days of chronic restraint stress affects spine morphology, and synaptic structure in the hippocampus, and how this effect is alleviated by a spatial learning paradigm. 3D reconstructions were made from EM images of ultrathin serial sections of dendritic segments from hippocampal area CA3 from each of the 4 experimental animal states: (i) Undisturbed control rats, (ii) Chronic restraint stressed rats, (iii) Water maze-trained rats and (iv) Water maze-trained rats following restraint stress. Detailed quantitative analyses were made of thorny excrescences on the dendritic segments, and of the organization of postsynaptic densities (PSDs) on these structures. Following stress, our 3D data show a marked retraction of thorns compared to unrestrained (control rats) which is substantially reversed 24h following water maze training. Water maze training alone induces an increase in the size and volume of thorns, in comparison to thorns of unrestrained (control) rats. These data show the remarkable plasticity of area CA3 of the hippocampus, where the deleterious effects of stress can be rapidly reversed by a behavioural training task. They also provide a neuroanatomical basis for stress-suppressing and learning-inducing plasticity properties.
Theme	Autonomic, limbic and other systems Stress and the brain / Cellular actions of stress