Title

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IMAGE

Preferential loss of dorsal-hippocampus synapses underlies memory impairments provoked by short, multi-modal stress

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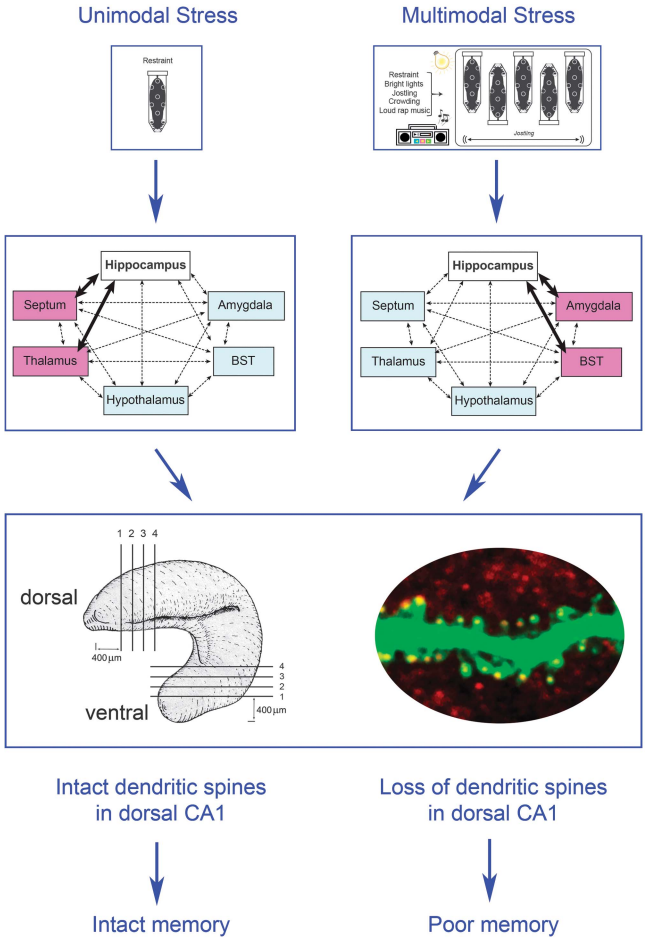

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The image illustrates the cascade of events that follow short multi-modal, 'modern-life'-like stress or a less complex stress such as restraint or loud noise. These distinct pathways result in different outcomes: Whereas concurrent physical, psychological and 'social' stresses lasting several hours (multi-modal) impaired memory function tested 24 h later, a less complex stress ('uni-modal') did not. These divergent outcomes took place even though the intensities of the multi-modal and uni-modal stresses—measured by the output of stress hormones and by the activation of hypothalamic neurons—were indistinguishable. Looking at measures of network activation patterns, there was much overlap between multi-modal and less complex stresses. However, cross-correlation analyses demonstrated ventral-hippocampus–amygdala network predominance after the multimodal stress, and dorsal-hippocampus, sensory-processing network activation after the restraint stress. Analyses of the consequences of these stresses on synaptic integrity demonstrated that only multi-modal stress destroyed synapse-bearing dendritic spines in dorsal-hippocampus CA1, an area crucial for some forms of memory. Indeed, object memory, partially dependent on intact hippocampal function, was profoundly impaired only in mice experiencing multi-modal stress. For more information on this topic, please refer to the article by Maras *et al.* on pages 811–822.

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