Effects of Exercise on Hippocampus-Dependent Learning and Hippocampal Activity in Rats

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Rodents given free access to a running wheel in their home cage exhibit faster learning in a variety of procedures that engage the hippocampus, a brain structure required for remembering what, where, and when things occur. Wheel running has also been shown to promote structural change and improve functioning of the hippocampus. Here we examined whether wheel running would improve hippocampus-dependent trace eyeblink classical conditioning in rats. Half of the rats had access to an unlocked running wheel in their home cage (Group Exercise) and the other half had access to a locked running wheel (Group Sedentary). A subset of these rats had recording electrodes implanted in hippocampus to monitor activity during conditioning sessions. Trace eyeblink conditioning consisted of trials (100/day) in which a 250-ms tone was followed by a 500-ms stimulus-free trace interval that ended with the delivery of a brief stimulation of the left eyelid. The learned response is an eyeblink between tone onset and eyelid stimulation. Preliminary results suggest that there was an equivalent percentage of learned responses across days between Group Exercise and Group Sedentary, contrary to our prediction. Recording data are currently being analyzed.