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RUNNING ENHANCES NEUROGENESIS, LEARNING AND LONG-TERM POTENTIATION (LTP) IN MICE.

H. van Praag[1*], B. R. Christie[2], T. J. Sejnowski[2], F. H. Gage[1]. [1]Laboratory of Genetics, [2]Laboratory of Computational Neurobiology, Salk Institute for Biological Studies, La Jolla, CA92037.

Running increases neurogenesis in the dentate gyrus (DG) of the hippocampus (van Praag et al., Nature Neurosci. 2, 266-270, 1999), a brain area important for memory function. Consequently, spatial learning as well as the ability to sustain LTP were tested in mice housed with a running wheel (Runners) or under standard conditions (Controls). At the onset of the study, female C57BL/6 mice were injected with bromodeoxyuridine (BrdU, 50 μg/g) over 10 days. Four weeks after the last BrdU injection mice were trained on the Morris water maze task over 6 days. Thereafter, one hemisphere was used for morphology and the other for electrophysiology. The results of our study showed that running improved acquisition of the water maze task and increased DG BrdU-positive cell number. In addition, DG LTP was doubled in slices from Runners compared to slices from Controls. Thus, physical activity can regulate hippocampal neurogenesis, synaptic plasticity and memory function. Supported by NIA, NINDS, Pasarow Foundation, Holfelder Foundation.