The effects of voluntary exercise on discrimination and set-shifting in male Wistar rats.

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Beyond the obvious health benefits of physical activity, exercise also has positive effects on neural plasticity and learning. Most previous research has focused on exercise-related changes in the hippocampus and improvement in hippocampus-dependent learning. The effect of exercise on learning that requires other brain regions, such as the prefrontal cortex and striatum, has been largely unstudied. Here we looked at the effects of voluntary exercise on the ability of rats to discriminate rewarded from unrewarded arms in a T maze based on one stimulus dimension of the arms (e.g., black vs. white), and their ability to set-shift, in which they have to discriminate based on another stimulus dimension of the arms (e.g., smooth vs. rough) . The initial discrimination requires frontal sensorimotor cortex and dorsolateral striatum while the set-shift requires medial prefrontal cortex and dorsomedial striatum. Exercising rats were better at the initial discrimination but did not show an enhanced ability to set-shift. Currently we are looking at dopamine transporter levels from striatal tissue of rats used in the first experiment and examining the dorsolateral striatum as one of the substrates for the beneficial effects of exercise on discrimination learning.