Aerobic exercise grows brain cells

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Jogging with dog at Carcavelos Beach. Image credit: Wikipedia.

(PhysOrg.com) -- Aerobic exercises such as running or jogging have long been known to be good for the health, but now new research, published in the *Proceedings of the National Academy of Sciences (PNAS)* has shown that it also stimulates the growth of new brain cells and improves the memory and ability to learn.

Neuroscientists from University of Cambridge in the UK and the National Institute on Aging in Baltimore in the US have joined forces to study the effects of running. Working on mice, they showed that even a few days of running stimulates the brain to grow new cells in a part of the brain involved in memory and recall.

The scientists divided the mice into two groups: one of which had a running wheel they could use at any time, and the other of which did not. They trained each mouse by placing it in front of a computer screen

displaying two squares. If the mouse used its nose to nudge the square on the left it was given a sugar pellet as a reward. If it nudged the other square, there was no reward.

The mice were then given brief memory tests designed to see how effectively they could separate similar memories. They scored higher points the more they nudged the square on the left, but the squares began 30 cm apart and were brought progressively closer together during the tests until they were almost touching.

In the memory tests the scores of mice with access to the running wheel were almost double those of the non-running group. The difference between scores was greatest in the later stages, when the squares were almost touching. Bussey said during the later stages the memories the mice formed of the squares were quite similar, and the new brain cells in the running mice made much more difference in their ability to put them together. In the non-runners the memories were too similar for them to distinguish between them.

In another experiment the researchers changed the square that produced the reward, and found the running mice caught on to the switch more quickly than the sedentary mice.

When the brain tissue of the mice was examined, the scientists found the running mice had grown an average of 6,000 new brain cells per cubic millimeter in the dentate gyrus part of the hippocampus, which is one of only a few areas of the brain that can grow new cells in the adult brain.

Researcher Timothy Bussey said the studies build on earlier work showing exercise keeps the brain healthy by increasing synaptic plasticity and by stimulating the brain to produce new cells, a process known as neurogenisis. Among these studies was work done on patients suffering from depression. In these patients neurogenisis was found to be

limited, but improved if they exercised regularly.

The researchers are not yet clear on exactly why exercise triggers the growth of brain cells, but speculate it may be because exercise increases blood flow, or because it elevates certain hormone levels. Exercise may also reduce the level of the hormone cortisol, which is associated with stress.

More information: www.pnas.org/content/early/201 …/0911725107.abstract