

Exercise and the Brain

For years many exercise enthusiasts have suspected that exercise positively affects the brain as well as the body. But while it seemed logical that an active lifestyle would help the brain, the scientific evidence was lacking. Now several biological studies indicate that working out does benefit the brain. The new insights help confirm the notion that exercise has overall health benefits and also may lead to specialized physical activity programs for patients.

Kickboxing. Salsa aerobics. A spinning class. Or maybe you'll simply run some laps around the park. Then again, watching the barbecue cook-off on the food channel from your recliner or hot tub seems the most appealing. Why even bother with the whole work-out thing?

The reasons to get moving are greater than you think. It's common knowledge that physical activity generally makes you feel good and helps keep your body lean and in prime working order. Now researchers also are finding biological evidence that exercise benefits specific brain mechanisms.

The findings, culled from a spattering of animal studies, are leading to:

- A better understanding of the overall health rewards of exercise.
- Heightened support for exercise regimens that could aid recovery from a wide range of illnesses.

Much of the new research suggests that exercise positively affects the hippocampus, a sea-horse shaped brain structure that is vital for memory and learning.

In one recent study, researchers found that adult mice doubled their number of new brain cells in the hippocampus when they had access to running wheels. The fact that the mammalian adult brain can increase its number of brain cells is surprising in itself. It was once thought that the brain stopped producing new brain cells early in its development. And presumably brain power dimmed as cells died over the years. But in the past decade, researchers have found definitive evidence that the brain continues to generate new brain cells throughout life, even in humans. Studies indicated that challenging environments, which included a number of

components, such as pumped-up learning opportunities, social interactions and physical activities, were key to boosting the growth.

In the new study, the scientists found that voluntary physical activity alone was enough to trigger a boost in brain cell proliferation. So far, the proliferation is seen only in relation to the running wheel. Swimming produced no change in mice and rats, but this may be because these rodents had pool access for only a brief stint per day. The runners had round-the-clock wheel access. It's also possible that rodents don't enjoy swimming and it causes a stress to their systems that counters any benefit. Researchers believe that rodents particularly enjoy the running wheel because they will voluntarily trot away on one if it's in their cage. Mice will log some 20,000 to 40,000 revolutions or four to six miles per day.

In the next phase of the research, scientists are trying to map the biological steps that induce the brain cell proliferation in the runners. One participant in the growth phenomenon may be brain-derived neurotrophic factor, which supports the function and survival of brain cells. The factor increased in the hippocampi of rats that voluntarily exercised on running wheels, according to an earlier report.

In addition, scientists are studying whether exercise alters the molecular mechanisms that are important for learning and memory. It seems likely since the cell research shows that changes occur in the brain's learning and memory center. In addition, past behavioral research on mice indicated that treadmill running improved certain learning and memory tasks. Even members of a family of mice that were poor learners improved their performances on the tasks. The exercise also prevented an age-related decline in mouse performance.

Researchers also are finding biological evidence that exercise can help the brain on other fronts. For example, animal studies are determining that exercise prevents the negative effects of chronic stress on the brain at the molecular level and boosts the brain's biological battle against infection.

Together the group of studies suggests that an active lifestyle, whether filled with exotic gym classes or simple jogs, plays an important role in maintaining the function of the brain. Furthermore, the research indicates that specialized exercise regimens may help repair damaged or aged brains. Scientists are currently investigating this possibility.
