

Brain cell regrowth linked to benefits of exercise, sexual behaviors and reproductive issues

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Two studies published by an interdisciplinary team of Hong Kong researchers in the current special issue of *Cell Transplantation* (20:1), now freely available on-line, link the regrowth of key adult brain cells (neurogenesis) in two critical areas of the brain to both the benefits of exercise as a stress reducer and also to sexual behavior and reproductive issues. The two studies reviewing the causes and impacts of neurogenesis came out of a recent Pan Pacific Symposium on Stem Cell Research held in Taichung, Taiwan.

Until the 1960s, the idea that the adult brain could experience neural cell re-growth was not accepted; research over the next 30 years confirmed that adult [brain cells](#) could, and did, in fact, regenerate. Recent research has focused on the role of neurogenesis. Subsequent important findings promise to change not only therapeutic interventions, but our understanding of aging, sexual potency and psychiatric diseases as well.

"The discovery of [neural stem cells](#) in the adult brain was a spectacular event that revolutionized the traditional view that the [central nervous system](#) did not generate new neurons in adulthood," said corresponding author Dr. Kwok-Fai So of the University of Hong Kong in the People's Republic of China. "Our research is focused on questions about the function and physiological significance of neurogenesis and what factors promote or suppress neurogenesis."

Physical exercise may counteract stress by promoting neurogenesis

"The beneficial effects of running correlated with increased adult neurogenesis, which may provide a hint that newborn neurons could be involved in counteracting stress-related disorders," said Dr. So.

"Research has shown that exercise can improve mood and cognition and has also demonstrated that a deficit in adult neurogenesis may result in depressive disorders. Our research is aimed at examining the relationship between exercise as a way of combating stress and the possibility that exercise may promote neurogenesis and that neurogenesis functions as the mechanism of benefit."

According to the researchers, one important adult brain area that is a 'neurogenic zone' is the hippocampus, an area involved in memory and emotional regulation. The role of new neurons in hippocampal functions "remains poorly defined," however, but they add that the effect of stress on the hippocampus is well known. Stress, especially depression and post-traumatic brain injury, have been shown to shrink the hippocampus. Recent research has shown that exercise has a link to enhancing hippocampal 'plasticity' and the regrowth of neurons – neurogenesis.

"Recent findings suggest that hippocampal neurogenesis plays a role in the beneficial effects of exercise in countering stress," they concluded.

Citation: Yau, S-K.; Lau, B. W-M.; So, K-F. Adult Hippocampal Neurogenesis: A Possible Way How [Physical Exercise](#) Counteracts Stress. *Cell Transplantation* 20(1):99-111; 2011.

Adult neurogenesis, reproduction and sexual behavior

According to the researchers, recent studies suggest adult neurogenesis

in the brain's subventricular zone (SVZ), which lines the ventricles (cavities) of the [brain](#) that contain cerebrospinal fluid, plays a role in reproductive function and possibly in maternal behaviors, although the function of "SVZ neurogenesis is obscure." They suggest that emerging evidence points to reproductive action and sexual cues, such as pheromones (known to play an important role in reproductive function), may play a role in regulating neurogenesis in the olfactory system, where the sense of smell is located, and in the SVZ. The precise contribution of newborn neurons to sexual behavior is still "under debate," the researchers point out. They cite animal studies showing that neurogenesis plays a role in female mate selection and that suppressed neurogenesis has been associated with decreased sexual performance.

"The potential importance of neurogenesis in sexual behavior, sexual cues and reproductive function has provided new insights," said Dr. So. "These insights might provide a better understanding of sexual dysfunction, sexual disorders and normal sexual functioning."

"These reviews show that the process of neurogenesis has far-reaching implications, including a beneficial exercise-induced response to stress and some degree of involvement with sexual behavior and reproduction," said Prof. Shinn-Zong Lin, professor of neurosurgery at China University Medical Hospital, Taiwan and chair of the Pan Pacific Symposium on [Stem Cell Research](#) where this work was first presented. "The studies reinforce the importance of a naturally occurring process that, until recently, was believed to be impossible."

Citation: Lau, B. W-M.; Yau, S-Y.; So, K-F. Reproduction: A New Venue for Studying Function of Adult Neurogenesis? [Cell Transplantation](#) 20(1):21-35; 2011.

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