

Specific gene linked to adult growth of brain cells, learning and memory

June 9 2014

Learning and memory are regulated by a region of the brain known as the hippocampus. New research from City of Hope has found that stimulating a specific gene could prompt growth – in adults – of new neurons in this critical region, leading to faster learning and better memories.

Understanding the link between this gene and the growth of new neurons – or neurogenesis – is an important step in developing therapies to address impaired learning and memory associated with [neurodegenerative diseases](#) and aging. The new research was published June 9 in the *Proceedings of the National Academy of Sciences*.

The study, which used an animal model, found that over-expressing the gene – a [nuclear receptor](#) called TLX – resulted in smart, faster learners that retained information better and longer.

"Memory loss is a major health problem, both in diseases like Alzheimer's, but also just associated with aging," said Yanhong Shi, Ph.D., lead author of the study and a neurosciences professor at City of Hope. "In our study, we manipulated the expression of this receptor by introducing an additional copy of the gene – which obviously we cannot do outside the laboratory setting. The next step is to find the drug that can target this same gene."

The discovery creates a new potential strategy for improving cognitive performance in elderly patients and those who have a neurological

disease or [brain injury](#).

The bulk of the brain's development happens before birth, and there are periods –largely in childhood and [young adulthood](#) – when the brain experiences bursts of new growth. In the past couple of decades, however, scientists have found evidence of neurogenesis in later adulthood – occurring mostly in the hippocampus, the region of the brain associated with learning and memory.

The new study is the first to firmly link the TLX gene to a potential for enhancing [learning and memory](#).

Researchers found that over-expression of the gene was actually associated with a physically larger brain, as well as the ability to learn a task quickly. Furthermore, over-expression of the gene was linked with the ability to remember, over a longer period of time, what had been learned.

More information: Nuclear receptor TLX stimulates hippocampal neurogenesis and enhances learning and memory in a transgenic mouse model, *PNAS*: www.pnas.org/cgi/doi/10.1073/pnas.1406779111

Provided by City of Hope

Citation: Specific gene linked to adult growth of brain cells, learning and memory (2014, June 9) retrieved 18 April 2024 from

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