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Plasma membrane protein may help generate new neurons in the adult hippocampus

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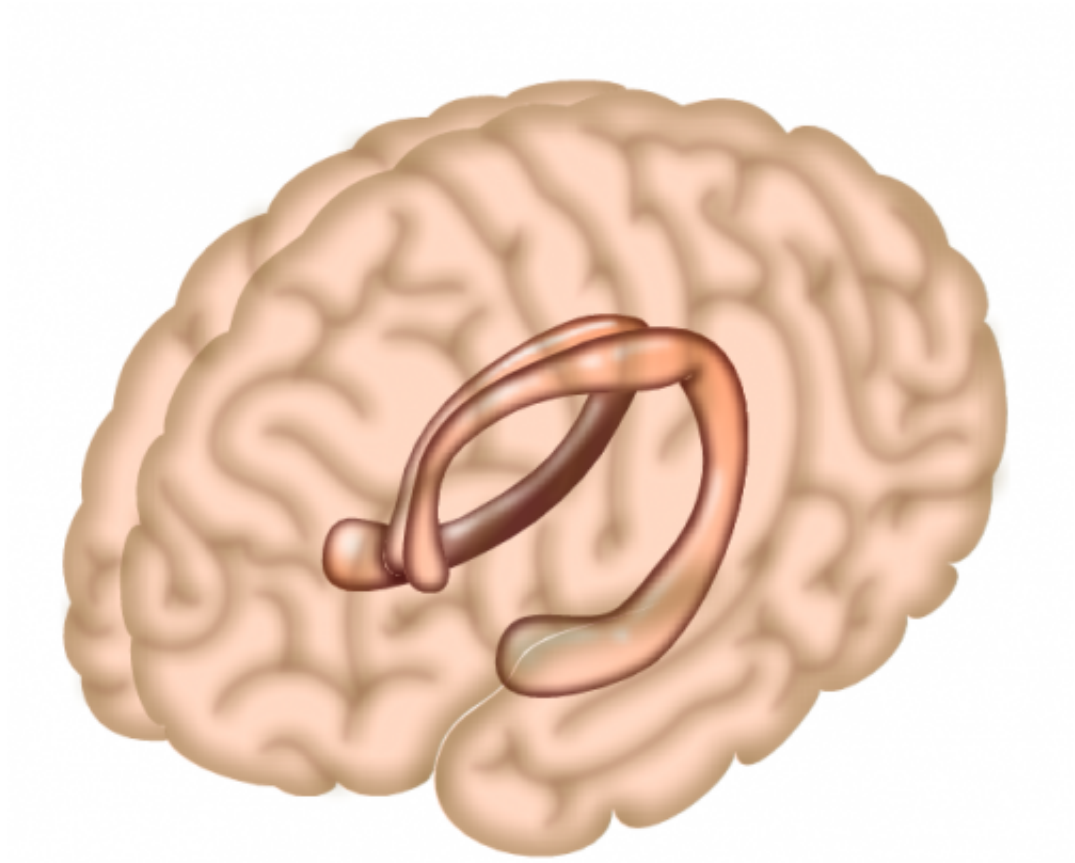

The hippocampus is a region of the brain largely responsible for memory formation. Credit: Salk Institute

New research published online in *The FASEB Journal* sheds important light on the inner workings of learning and memory. Specifically,

scientists show that a plasma membrane protein, called Efr3, regulates brain-derived neurotrophic factor-tropomyosin-related kinase B signaling pathway (BNDF-TrkB) and affects the generation of new neurons in the hippocampus of adult brains. In turn, this generation of new neurons plays a significant role in learning and memory.

"Our study demonstrates that Efr3a is associated with BDNF signaling and adult neurogenesis, which are important for learning and memory," said Binggui Sun, Ph.D., a researcher involved in the work at the Department of Neurobiology, Key Laboratory of Medical Neurobiology (Ministry of Health of China), Key Laboratory of Neurobiology of Zhejiang Province, Zhejiang University School of Medicine, Hangzhou, Zhejiang, China. "We hope our results will provide new insights into the mechanisms underlying learning and memory."

To draw their conclusions, Sun and colleagues bred Efr3af/f mice and then crossed these mice with another group to delete Efr3a, one of the Efr3 isoforms, specifically in the brain. Brain-specific ablation of Efr3a promoted adult hippocampal neurogenesis by increasing survival and maturation of newborn neurons without affecting their dendritic tree morphology. Also, the BDNF-TrkB signaling pathway was enhanced in the hippocampus of Efr3a-deficient mice, as reflected by increased expression of BDNF-TrkB, and the downstream molecules, including phospho-MAPK (mitogen-activated protein kinase) and phospho-Akt.

"This study once again emphasizes the extreme importance of neurogenesis specifically linked to neurotrophic signaling in the hippocampus." said Thoru Pederson, Ph.D., Editor-in-Chief of *The FASEB Journal*. "We are again reminded of how far we have come from the era in which neurogenesis in the adult mammalian brain was not believed to even occur."

More information: Qi Qian et al, Brain-specific ablation of Efr3a

promotes adult hippocampal neurogenesisthe brain-derived neurotrophic factor pathway, *The FASEB Journal* (2017). DOI: 10.1096/fj.201601207R