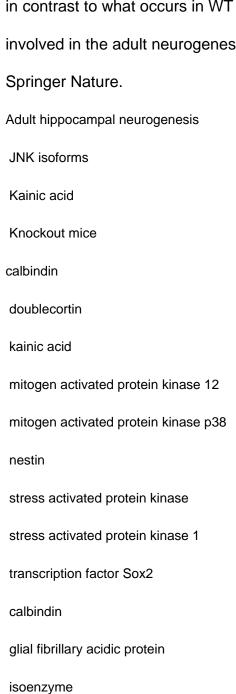
JNK Isoforms Are Involved in the Control of Adult Hippocampal Neurogenesis in Mice, Both in Physiological Conditions and in an Experimental Model of Temporal Lobe Epilepsy

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Neurogenesis in the adult dentate gyrus (DG) of the hippocampus allows the continuous generation of new neurons. This cellular process can be disturbed under specific environmental conditions, such as epileptic seizures; however, the underlying mechanisms responsible for their control remain largely unknown. Although different studies have linked the JNK (c-Jun-N-terminal-kinase) activity with the regulation of cell proliferation and differentiation, the specific function of JNK in controlling adult hippocampal neurogenesis is not well known. The purpose of this study was to analyze the role of JNK isoforms (JNK1/JNK2/JNK3) in adult-hippocampal neurogenesis. To achieve this goal, we used JNK-knockout mice (Jnk1?/?, Jnk2?/?, and Jnk3?/?), untreated and treated with intraperitoneal injections of kainic acid (KA), as an experimental model of epilepsy. In each condition, we identified cell subpopulations at different stages of neuronal maturation by immunohistochemical specific markers. In physiological conditions, we evidenced that JNK1 and JNK3 control the levels of one subtype of early progenitor cells (GFAP+/Sox2+) but not the

GFAP+/Nestin+ cell subtype. Moreover, the absence of JNK1 induces an increase of immature neurons (Doublecortin+; PSA-NCAM+ cells) compared with wild-type (WT). On the other hand, Jnk1?/? and Jnk3?/? mice showed an increased capacity to maintain hippocampal homeostasis, since calbindin immunoreactivity is higher than in WT. An important fact is that, after KA injection, Jnk1?/? and Jnk3?/? mice show no increase in the different neurogenic cell subpopulation analyzed, in contrast to what occurs in WT and Jnk2?/? mice. All these data support that JNK isoforms are involved in the adult neurogenesis control. © 2019, Springer Science+Business Media, LLC, part of Springer Nature.



kainic acid

nerve cell adhesion molecule L1

nestin
polysialyl neural cell adhesion molecule
sialic acid derivative
stress activated protein kinase
transcription factor Sox
adult
animal experiment
animal model
Article
cell maturation
cell subpopulation
controlled study
homeostasis
immunocompetent cell
immunohistochemistry
immunoreactivity
knockout mouse
mouse
nerve cell
nervous system development
nonhuman
temporal lobe epilepsy
aging
animal
C57BL mouse
cell count

dentate gyrus
disease model
enzymology
hippocampus
metabolism
neural stem cell
pathology
temporal lobe epilepsy
Aging
Animals
Calbindins
Cell Count
Dentate Gyrus
Disease Models, Animal
Epilepsy, Temporal Lobe
Glial Fibrillary Acidic Protein
Hippocampus
Isoenzymes
JNK Mitogen-Activated Protein Kinases
Kainic Acid
Mice, Inbred C57BL
Nestin
Neural Cell Adhesion Molecule L1
Neural Stem Cells
Neurogenesis
Neurons

Sialic Acids

SOXB1 Transcription Factors