Oleanolic Acid Alleviates Cerebral Ischemia/Reperfusion Injury via Regulation of the GSK-3 β /HO-1 Signaling Pathway

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Abstract

Oleanolic acid (OA), a bioactive ingredient of Panax ginseng, it has the role of anti-inflammatory, hypoglycemic, lipid-regulating and anti-atherosclerotic pharmacological. And also, OA exhibits neuroprotective pharmacological effects.However, the protective role of OA in cerebral ischemia and involved mechanisms remain unclear. The goal of this study was to look at the therapeutic benefits of OA both *in vitro* and *in vivo*. In oxygen-glucose deprivation/reoxygenation (OGD/R)-exposed SH-SY5Y cells, OA reduced cytotoxicity and overproduction of intracellular reactive oxygen species (ROS) through regulating the GSK-3/heme oxygenase-1 (HO-1) signal. Additionally, OA administration significantly reduced the area of cerebral infarction and the neurological scores in the rat models of cerebral ischemia with middle cerebral artery occlusion (MCAO). In the infarct region of MCAO rats, the OA treatment group had a larger proportion of Nissl+ and NeuN+cells, as well as lower TUNEL+ratios. Furthermore, OA treatment decreased ROS generation while suppressing GSK-3 activation and increasing HO-1 expression in infarcted tissue. Our results illustrated that OA significantly counteracted cerebral ischemia-mediated injury through antioxidant effects induced by the regulation of the GSK-3 β /HO-1 signaling pathway. This means that OA is expected to be a promising neuroprotective drug for the treatment of ischemic stroke.

Image

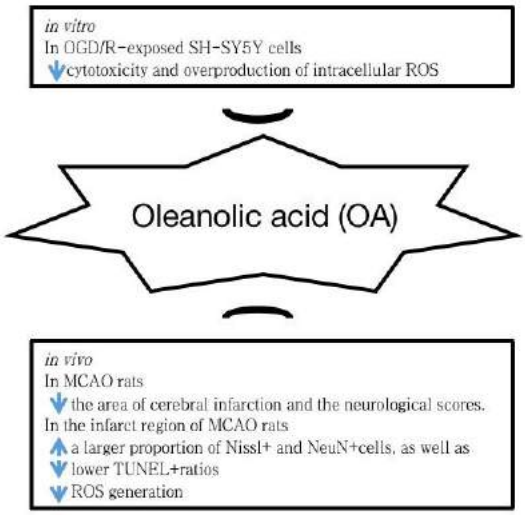


Figure 1.Brief flow chart of Oleanolic Acid (OA) alleviates cerebral ischemia/reperfusion Injury. (: decrease; : increase)

Recent Publications

1.Lin, K., **Zhang, Z.**, Zhang, Z., Zhu, P., Jiang, X., Wang, Y., ... & Zhang, S. (2022). Oleanolic Acid Alleviates Cerebral Ischemia/Reperfusion Injury via Regulation of the GSK-3β/HO-1 Signaling Pathway. Pharmaceuticals, 15(1), 1.

2.Lin, K., Sze, S. C. W., Liu, B., **Zhang, Z.**, Zhang, Z., Zhu, P., ... & Zhang, S. (2021). 20 (S)-protopanaxadiol and oleanolic acid ameliorate cognitive deficits in APP/PS1 transgenic mice by enhancing hippocampal neurogenesis. Journal of ginseng research, 45(2), 325-333.

3.Zhang, S., Jiang, X., Wang, Y., Lin, K., **Zhang, Z.**, Zhang, Z., ... & Yung, K. K. L. (2021). Protective effect of An-Gong-Niu-Huang wan pre-treatment against experimental cerebral ischemia injury via regulating GSK-3β/HO-1 pathway. Frontiers in pharmacology, 12.

4.Zhu Zhang, Shiqing Zhang, Cathy Nga-Ping Lui, Peili Zhu, **Zhang Zhang**, Kaili Lin, Yiwu Dai, and Ken Kin-Lam Yung. "Traditional Chinese medicine-based neurorestorative therapy for Alzheimer's and Parkinson's disease." Journal of Neurorestoratology 7, no. 04 (2020): 207-222.

5.Zhang, Z., Zhang, S., Fu, P., **Zhang, Z.**, Lin, K., Ko, J. K. S., & Yung, K. K. L.

(2019). Roles of glutamate receptors in Parkinson's disease. International journal of molecular sciences, 20(18), 4391.

Photograph



Biography

Zhang zhang received the B.S. degree in clinical medicine from Hubei University of Arts and Science, Xiangyang, China in 2017 and the M.S. degree in environmental and public health management from Hong Kong Baptist University, HongKong, China in 2018. She is currently working toward the Ph.D. degree in neuroscience with the Department of biology, Hong Kong Baptist University, HongKong, China.Her research interests include neurodegenerative disease and neurotoxicity.

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