

# Wogonin

Wogonin is a [flavonoid](#) compound with an antioxidant effect extracted from *Scutellaria baicalensis* Georgi. However, the function and mechanism of wogonin in protecting brain injury remain to be elucidated. A study established a TBI model of Sprague-Dawley rats and treated them with wogonin following trauma. The results showed that wogonin treatment significantly reduced neurobehavioral disorders, brain edema and hippocampal neuron damage caused by TBI. It was found that in TBI rats, administration of wogonin increased the levels of antioxidant factors glutathione, superoxide dismutase and catalase in the CA1 region of the hippocampus and significantly inhibited the production of malondialdehyde and reactive oxygen species. Western blotting data showed that wogonin exerted antioxidant activity by downregulating the level of NOX2 protein. In inhibiting cell apoptosis, wogonin upregulated the expression of Bcl-2 protein in the hippocampal CA1 region of TBI rats and inhibited caspase-3 and Bax proteins. Additionally, wogonin inhibited the progression of injury following TBI through the PI3K/Akt/nuclear factor-erythroid factor 2-related factor 2 (Nrf2)/heme oxygenase-1 (HO-1) signaling pathway. Wogonin increased the expression of phosphorylated Akt, Nrf2 and HO-1 in the hippocampus of TBI rats. Following the administration of PI3K inhibitor LY294002, the upregulation of these proteins by wogonin was partly reversed. In addition, LY294002 partially reversed the regulation of wogonin on NOX2, caspase-3, Bax and Bcl-2 proteins. Therefore, wogonin exerts antioxidant and anti-apoptotic properties to prevent hippocampal damage following TBI, which is accomplished through the PI3K/Akt/Nrf2/HO-1 pathway <sup>1)</sup>.

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Wogonin might promote the apoptosis of glioma cells by upregulating proapoptotic factors, downregulating antiapoptotic factors, and inhibiting the inflammatory response, thereby inhibiting glioma progression <sup>2)</sup>.

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Zhuang et al. demonstrated that wogonin dramatically attenuated inflammatory and oxidative stress responses in a murine model of ICH by reducing the expression of pro-inflammatory cytokines and pro-oxidant enzymes such as TNF- $\alpha$ , IL-1 $\beta$ , and inducible nitric oxide synthase (iNOS) after ICH. The effects of wogonin were abolished by administration of the PPAR- $\gamma$  inhibitor GW9662. In conclusion, our data suggest that wogonin facilitates hematoma clearance and neurobehavioral recovery by targeting PPAR- $\gamma$  <sup>3)</sup>.

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4: Xu Y, Yang B, Hu Y, Lu L, Lu X, Wang J, Xu F, Yu S, Huang J, Liang X. Wogonin prevents TLR4-NF- $\kappa$ B-mediated neuro-inflammation and improves retinal ganglion cells survival in retina after optic nerve crush. *Oncotarget*. 2016 Nov 8;7(45):72503-72517. doi: 10.18632/oncotarget.12700. PMID: 27756890; PMCID: PMC5341925.

5: Zeng Z, Liu H. [Inhibitory effect of wogonin on the proliferation and invasion of glioblastoma U87 cells and related mechanism]. *Xi Bao Yu Fen Zi Mian Yi Xue Za Zhi*. 2015 Mar;31(3):302-6. Chinese. PMID: 25744831.

6: Lee DH, Lee TH, Jung CH, Kim YH. Wogonin induces apoptosis by activating the AMPK and p53 signaling pathways in human glioblastoma cells. *Cell Signal*. 2012 Nov;24(11):2216-25. doi:

10.1016/j.cellsig.2012.07.019. Epub 2012 Jul 28. PMID: 22846543.

7: Dandawate S, Williams L, Joshee N, Rimando AM, Mittal S, Thakur A, Lum LG, Parajuli P. Scutellaria extract and wogonin inhibit tumor-mediated induction of T(reg) cells via inhibition of TGF- $\beta$ 1 activity. *Cancer Immunol Immunother*. 2012 May;61(5):701-11. doi: 10.1007/s00262-011-1130-3. Epub 2011 Nov 6. PMID: 22057676; PMCID: PMC3903381.

8: Parajuli P, Joshee N, Chinni SR, Rimando AM, Mittal S, Sethi S, Yadav AK. Delayed growth of glioma by Scutellaria flavonoids involve inhibition of Akt, GSK-3 and NF- $\kappa$ B signaling. *J Neurooncol*. 2011 Jan;101(1):15-24. doi: 10.1007/s11060-010-0221-x. Epub 2010 May 14. PMID: 20467782; PMCID: PMC3901059.

9: Parajuli P, Joshee N, Rimando AM, Mittal S, Yadav AK. In vitro antitumor mechanisms of various Scutellaria extracts and constituent flavonoids. *Planta Med*. 2009 Jan;75(1):41-8. doi: 10.1055/s-0028-1088364. Epub 2008 Nov 24. PMID: 19031366.

1)

Feng Y, Ju Y, Yan Z, Ji M, Yang M, Wu Q, Wang L, Sun G. Protective role of wogonin following traumatic brain injury by reducing oxidative stress and apoptosis via the [PI3K/Nrf2/HO-1](#) pathway. *Int J Mol Med*. 2022 Apr;49(4):53. doi: 10.3892/ijmm.2022.5109. Epub 2022 Feb 18. PMID: 35179214.

2)

Wang Z, Cheng L, Shang Z, Li Z, Zhao Y, Jin W, Li Y, Su F, Mao X, Chen C, Zhang J. Network Pharmacology for Analyzing the Key Targets and Potential Mechanism of Wogonin in Gliomas. *Front Pharmacol*. 2021 Apr 7;12:646187. doi: 10.3389/fphar.2021.646187. PMID: 33897434; PMCID: PMC8058408.

3)

Zhuang J, Peng Y, Gu C, Chen H, Lin Z, Zhou H, Wu X, Li J, Yu X, Cao Y, Zeng H, Fu X, Xu C, Huang P, Cao S, Wang C, Yan F, Chen G. Wogonin Accelerates Hematoma Clearance and Improves Neurological Outcome via the PPAR- $\gamma$  Pathway After Intracerebral Hemorrhage. *Transl Stroke Res*. 2021 Aug;12(4):660-675. doi: 10.1007/s12975-020-00842-9. Epub 2020 Sep 12. PMID: 32918259.

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