

Homocysteine

Homocysteine is a non-proteinogenic α -amino acid. It is a homolog of the amino acid [cysteine](#), differing by an additional methylene bridge. It is biosynthesized from methionine by the removal of its terminal C ϵ methyl group.

High serum homocysteine levels were independently associated with [idiopathic normal pressure hydrocephalus](#) in deep perforating [arteriopathy](#) (DPA). However, further research is needed to determine the predictive value of homocysteine and to confirm the underlying mechanism between homocysteine and iNPH ¹⁾

There is minimal evidence for the use of TGF- β 1, TBR-II, [homocysteine](#), and interleukins (particularly IL-1 β , IL-6, and IL-10). However, the available evidence suggests that these biomarkers warrant further investigation. A β 42, tau, p-tau, NFL, and LRG have the greatest amount of evidence for their predictive value in determining shunt responsiveness in iNPH patients. Future research should be guided by, but not limited to, these biomarkers ²⁾.

Increasing evidence indicates that an elevated total serum homocysteine level is directly and indirectly associated with [Cerebral small vessel disease](#) (cSVD), and endothelial dysfunction plays an active role in this association. Hyperhomocysteinemia affects endothelial function through [oxidative stress](#), inflammatory pathways, and epigenetic alterations at an early stage, even before the onset of small vessel injuries and the disease. Therefore, hyperhomocysteinemia is potentially an important therapeutic target for cSVD. However, decreasing the homocysteine level is not sufficiently effective, possibly due to delayed treatment, which underlying reason remains unclear. In a review, Li et al. examined endothelial dysfunction to understand the close relationship between hyperhomocysteinemia and cSVD and identify the optimal timing for the therapy ³⁾.

Serum homocysteine might have the potential to be a useful and cost-effective [biomarker](#) for predicting the occurrence of Delayed cerebral ischemia in [Aneurysmal Subarachnoid Hemorrhage](#) patients ⁴⁾.

According to the results of a study, there was a significant correlation between the plasma Homocysteine (Hcy) levels and severity of [trauma](#) and prognosis in patients with [Traumatic Brain Injury](#) (TBI). ⁵⁾

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Ye S, Feng K, Li Y, Liu S, Wu Q, Feng J, Liao X, Jiang C, Liang B, Yuan L, Chen H, Huang J, Yang Z, Lu Z, Li H. High homocysteine is associated with idiopathic normal pressure hydrocephalus in deep perforating arteriopathy: a cross-sectional study. BMC Geriatr. 2023 Jun 21;23(1):382. doi:

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Pfanner T, Henri-Bhargava A, Borchert S. Cerebrospinal Fluid Biomarkers as Predictors of Shunt Response in Idiopathic Normal Pressure Hydrocephalus: A Systematic Review. *Can J Neurol Sci.* 2018 Jan;45(1):3-10. doi: 10.1017/cjn.2017.251. Epub 2017 Nov 10. PMID: 29125088.

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Li S, Li G, Luo X, Huang Y, Wen L, Li J. Endothelial Dysfunction and Hyperhomocysteinemia-Linked Cerebral Small Vessel Disease: Underlying Mechanisms and Treatment Timing. *Front Neurol.* 2021 Nov 24;12:736309. doi: 10.3389/fneur.2021.736309. PMID: 34899561; PMCID: PMC8651556.

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Zhang T, Zhang L, Nie K, Yang J, Lou H, Wang J, Huang S, Gu C, Yan M, Zhan R, Pan J. Admission Homocysteine as a Potential Predictor for Delayed Cerebral Ischemia After Aneurysmal Subarachnoid Hemorrhage. *Front Surg.* 2022 Feb 8;8:813607. doi: 10.3389/fsurg.2021.813607. PMID: 35211499; PMCID: PMC8861177.

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Rahmani A, Hatefi M, Bezadi S, Moghadas Dastjerdi M, Zare M, Imani A, Shirazi D. Correlation between Serum Homocysteine Levels and Outcome of Patients with Severe Traumatic Brain Injury. *World Neurosurg.* 2015 Sep 16. pii: S1878-8750(15)01179-1. doi: 10.1016/j.wneu.2015.09.016. [Epub ahead of print] PubMed PMID: 26386458.

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