

Hydrogen sulfide: The next anti-aging agent?

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Hydrogen sulfide (H₂S) may play a wide-ranging role in staving off aging, according to a paper published online ahead of print in the journal *Molecular and Cellular Biology*. In this review article, a team from China explores the compound's plethora of potential anti-aging pathways.

"H₂S has been gaining increasing attention as an important endogenous signaling molecule because of its significant effects on the cardiovascular and nervous systems," the team writes. The evidence is mounting, they note, that [hydrogen sulfide](#) slows aging by inhibiting free-radical reactions, by activating SIRT1, an enzyme believed to be a regulator of lifespan, and probably through its interactions with a gene, *klotho*, which appears to have its own market basket of anti-aging activity.

Hydrogen sulfide is produced within the human body, and has a variety of important physiological effects. For example, it relaxes the [vascular endothelium](#) and [smooth muscle cells](#), which is important to maintaining clean arteries as one ages, says first author Zhi-Sheng Jiang, of the University of South China, Hunan. It functions as an antioxidant. And it inhibits expression of pro-inflammatory factors, all of which "imply an important role in aging and age-associated diseases," according to the paper. For example, mice lacking CSE, the gene for an enzyme involved in producing H₂S, manifest extensive, premature arteriosclerosis, an inevitable consequence of aging, says Jiang.

The gene, *klotho*, which appears to be upregulated by hydrogen sulfide, is thought to extend lifespan via a number of different pathways, some

of which promote production of endogenous antioxidants, according to the report. Produced in the kidneys, it has direct angiotensin-converting enzyme (ACE) inhibiting activity; that is, it's an [ACE inhibitor](#), just like certain drugs that mitigate [high blood pressure](#). Not surprisingly, plasma H₂S declines with age, and is lower in spontaneously [hypertensive rats](#) than in those with [normal blood pressure](#). More generally, a lack of H₂S is implicated in cardiovascular disease.

A decline in H₂S is also thought to undermine neurological health. Endogenous H₂S has been found wanting in an animal model of Parkinson's disease, and is found to be depressed in the brains of patients with Alzheimer's disease. There are even suggestions, mostly in animal models, but also in human studies, that H₂S may be protective against cancer, according to the report.

"Data available so far strongly suggest that H₂S may become the next potent agent for preventing and ameliorating the symptoms of aging and age-associated diseases," concludes Jiang. In the future, he says, people may take H₂S via food, or as an anti-aging supplement.

Formal publication is scheduled for the late March 2013 issue of [Molecular and Cellular Biology](#).

More information: Y. Zhang, Z.-H. Tang, Z.-R., S.L. Qu, M.-H. Liu, L.-S. Liu, Z.-S. Jiang, 2013. Hydrogen sulfide: the next potent preventive and therapeutic agent in aging and age-associated diseases. *Mol. Cell. Bio.* Online ahead of print, 7 January 2013, [doi:10.1128/MCB.01215-12](https://doi.org/10.1128/MCB.01215-12)

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