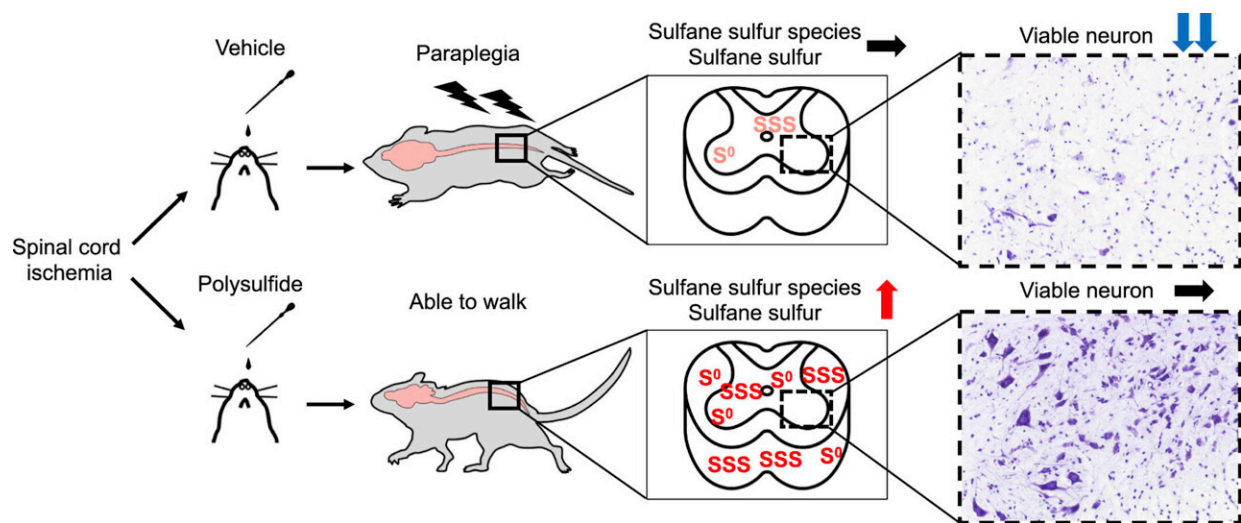


# Nasal drops of polysulfides may prevent a serious side effect after surgery to repair the aorta

February 6 2023, by Noah Brown



Graphical abstract. Credit: *Redox Biology* (2023). DOI: 10.1016/j.redox.2023.102620

Lower body paralysis is a devastating complication that can occur in patients who undergo surgery to repair the aorta, the largest artery in the body. Post-surgical paraplegia is caused by reduced blood flow to the spinal cord and may develop 48–72 hours after the surgical procedure.

New research in [mice](#) that was led by investigators at Massachusetts General Hospital (MGH), a founding member of Mass General Brigham

(MGB), indicates that nasal drops of chemical compounds called polysulfides may prevent this serious side effect of aortic surgery.

For the study, which is published in *Redox Biology*, scientists found that when mice were treated in a manner to simulate what happens when patients undergo aortic repair (called thoracoabdominal aortic surgery), the mice have normal limb function and can walk for up to 48 hours but then develop hind limb paralysis.

"Because of the delayed nature of paraplegia, there seems to be a window of opportunity for therapy," says senior author Fumito Ichinose, MD, Ph.D., an attending physician in the Department of Anesthesia, Critical Care and Pain Medicine at MGH and the William Thomas Green Morton Professor of Anesthesia at Harvard Medical School.

Ichinose and his team previously showed that breathing hydrogen sulfide (a colorless gas with a characteristic rotten-egg odor) prevents mice from experiencing delayed paraplegia after temporary [blood flow](#) restriction to the spinal cord. Because inhaled [hydrogen sulfide](#) increases the levels of polysulfides, the investigators tested various polysulfides for their ability to prevent paraplegia after aortic surgery.

Intranasal administration of a naturally occurring polysulfide (glutathione trisulfide) or a novel synthetic polysulfide (pantethine trisulfide) after transient occlusion of the aorta prevented delayed paraplegia in mice. The treatments prevented inflammation, inhibited cell death signals, and preserved spinal cord motor neurons.

"If these polysulfides are found to be safe in patients, it may be possible to prevent delayed paraplegia in patients undergoing thoracoabdominal aortic surgery or after other types of [spinal cord](#) injury," says Ichinose. "We are actively seeking to develop this technology with support from external funding for clinical use in partnership with a pharmaceutical

company. MGH has filed several patents related to this technology."

Additional co-authors include Eiki Kanemaru, Yusuke Miyazaki, Eizo Marutani, Mariko Ezaka, Shunsaku Goto, Etsuo Ohshima, and Donald B. Bloch.

**More information:** Eiki Kanemaru et al, Intranasal administration of polysulfide prevents neurodegeneration in spinal cord and rescues mice from delayed paraplegia after spinal cord ischemia, *Redox Biology* (2023). [DOI: 10.1016/j.redox.2023.102620](https://doi.org/10.1016/j.redox.2023.102620)

Provided by Massachusetts General Hospital

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