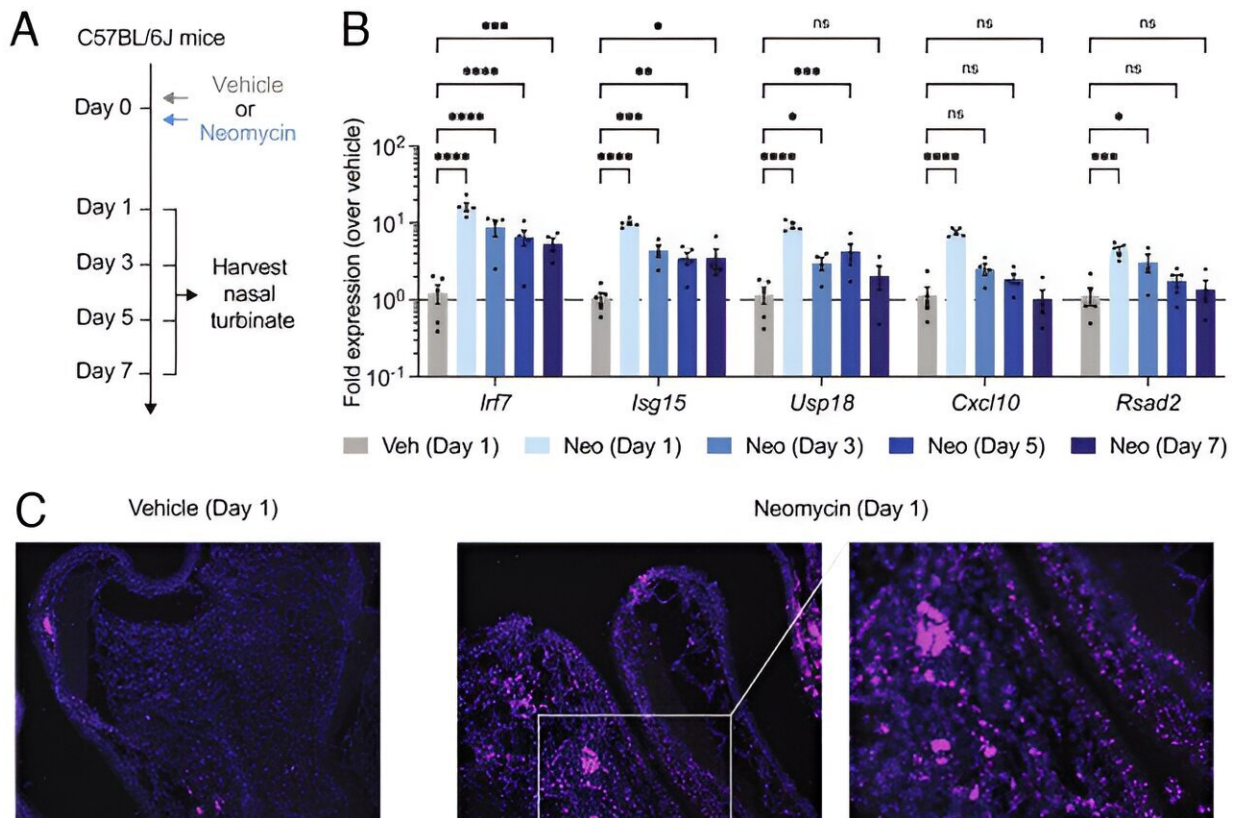


# Common antibiotic may be helpful in fighting respiratory viral infections

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Intranasal application of neomycin induces an upper respiratory ISG response independent of commensal microbiota. Credit: *Proceedings of the National Academy of Sciences* (2024). DOI: 10.1073/pnas.2319566121

A new, Yale-led study suggests that a range of respiratory viral infections—including COVID-19 and influenza—may be preventable or

treatable with a generic antibiotic that is delivered to the nasal passageway.

A team led by Yale's Akiko Iwasaki and former Yale researcher Charles Dela Cruz successfully tested the effectiveness of neomycin, a common antibiotic, to prevent or treat respiratory viral infections in animal models when given to the animals via the nose. The team then found that the same nasal approach—this time applying the over-the-counter ointment Neosporin—also triggers a swift immune response by interferon-stimulated genes (ISGs) in the noses of healthy humans.

The findings were [published](#) in the journal *Proceedings of the National Academy of Sciences*.

"This is an exciting finding, that a cheap over-the-counter antibiotic ointment can stimulate the human body to activate an antiviral response," said Iwasaki, the Sterling Professor of Immunobiology and professor of dermatology at Yale School of Medicine and co-senior author of the new study.

"Our work supports both preventative and therapeutic actions of neomycin against viral diseases in animal models, and shows effective blocking of infection and transmission," said Iwasaki, who is also professor of molecular, cellular, and [developmental biology](#) in Yale's Faculty of Arts and Sciences, professor of epidemiology at Yale School of Public Health, and an investigator at the Howard Hughes Medical Institute.

Respiratory viruses affect millions of people each year. The global COVID-19 pandemic, caused by the coronavirus SARS-CoV-2, has led to 774.5 million cases worldwide as of February 2024, with global mortality of 6.9 million people. Influenza viruses account for up to 5 million cases of severe illness and 500,000 deaths annually worldwide.

Currently, most therapies used to fight respiratory viral infections—including antivirals, [monoclonal antibodies](#), and convalescent plasma therapy—are delivered intravenously or orally. They focus on stopping the progression of existing infections.

A nasal-centered therapy has a much better chance of stopping infections before they can spread to the [lower respiratory tract](#) and cause severe diseases, the researchers said.

"This collaborative multi-disciplinary work combined important insights from animal pulmonary [infection](#) modeling experiments with human study evaluation of this intranasal approach to stimulate antiviral immunity," said Dela Cruz, former associate professor of pulmonary, [critical care](#), and sleep medicine, and of microbial pathogenesis at Yale School of Medicine and former director of the Center for Pulmonary Infection Research and Treatment. Dela Cruz is currently at the University of Pittsburgh.

In their study, the researchers found that mice treated intranasally with neomycin showed a robust ISG line of defense against both SARS-CoV-2 and a highly virulent strain of influenza A virus. The researchers also found that an intranasal treatment of neomycin strongly mitigated contact transmission of SARS-CoV-2 in hamsters.

In healthy humans, intranasal application of Neosporin (containing neomycin) also initiated a strong expression of ISGs in a subset of volunteers, the researchers said.

"Our findings suggest that we might be able to optimize this cheap and generic antibiotic to prevent viral diseases and their spread in human populations, especially in global communities with limited resources," Iwasaki said. "This approach, because it is host-directed, should work no matter what the virus is."

The co-first authors of the new study, all from Yale, are Tianyang Mao, Jooyoung Kim, and Mario Peña-Hernández.

**More information:** Tianyang Mao et al, Intranasal neomycin evokes broad-spectrum antiviral immunity in the upper respiratory tract, *Proceedings of the National Academy of Sciences* (2024). [DOI: 10.1073/pnas.2319566121](https://doi.org/10.1073/pnas.2319566121)

Provided by Yale University

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