BACK PAGE

Early RSV in human infants can increase risk of childhood asthma; early RSV prevention study in mice showed promise

Twenty-five to 50% of healthy infants born at term are infected with respiratory syncytial virus (RSV) in the first year of life. In addition, 2-3% have small airway bronchiolitis and lower respiratory tract infection that requires hospital admission. Scientists have previously shown a link between RSV and asthma but proving the virus causes the condition has been difficult.

Now, Belgian scientists from the Vlaams Instituut voor Biotechnologie (VIB) and Ghent University (UGent) Center for Inflammation Research (IRC), together with Danish colleagues, have discovered evidence that infection with RSV early in infancy may significantly increase the risk of developing childhood asthma, particularly for children with one or both parents who have asthma or allergy. They have also determined how an early viral infection can magnify the impact of inherited allergy risk. Furthermore, their study, published in *Science Immunology*, suggests that protecting newborns against RSV could substantially reduce asthma cases later in life.

"Childhood asthma is a complex disease with many contributing factors," said Professor Bart Lambrecht, MD, PhD, science director at IRC and senior author of the study. "We found that early-life RSV infection and genetic allergy risk interact in a very specific way that pushes the immune system toward asthma. The encouraging news is that this process can be prevented."

Utilizing patient data and a mouse model

Utilizing the Danish National Patient Registry, the researchers analyzed data on more than 24,000 RSV-related hospitalizations among approximately 1.5 million infants younger than 6 months of age as well as data on the receipt of specialized asthma care among parents and their children from 1994 to 2018. The team also evaluated inhaler and nasal corticosteroid prescriptions from the Danish National Prescription Registry and the link between outcomes and age and parents and children using the Danish Civil Registration System. Children were followed for asthma development up to 24 years of age.

To study causality between RSV and asthma, the researchers utilized a mouse model of the closely related pneumovirus (PVM) and the house dust mite (HDM) allergen.

Patient data: Early RSV increased risk of childhood asthma

Analysis of patient data showed that children born to nonasthmatic parents and hospitalized for RSV bronchiolitis during their first 6 months of life had a threefold higher cumulative risk of asthma than those not hospitalized for RSV in the same period (hazard ratio [HR] 3.32).

In addition, children born to an asthmatic parent and not hospitalized for RSV bronchiolitis were at nearly double the risk of asthma than those born to parents without asthma (HR 2.06 for children of an asthmatic mother; HR 1.71 for an asthmatic father), confirming the strong influence of parental asthma on this risk.

The highest cumulative asthma risk was seen in children both hospitalized for RSV and born to an asthmatic mother (HR 5.38) or asthmatic father (HR 4.73) com-

pared with uninfected children of nonasthmatic parents.

Furthermore, having a parent with allergic rhinitis (AR, i.e., hay fever) was a risk factor for asthma development, with the highest risk among those children both hospitalized for RSV and born to a parent with AR. The risk was higher when the mother was taking an AR medication (HR 4.09) than when the father was taking an AR medication (HR 3.77) and greater still when both parents were taking an AR medication (HR 4.98) than in uninfected children of parents without AR.

The results showed that "even children without a parental history of asthma have an increased risk of developing asthma following hRSV [human RSV] hospitalization," Lambrecht and colleagues noted. "This finding challenges the notion that only genetically predisposed children are hospitalized for hRSV and later go on to develop asthma."

A limitation of the study was the inclusion of asthma and RSV infection diagnosed in hospitals only, "with a risk of missing milder disease forms seen only by general practitioners in community medical care," the researchers explained. "It was initially thought that only severe bronchiolitis requiring hospitalization was a risk factor for asthma, but recent, elegant work employing surveillance hRSV detection in cohorts of newborns suggest that milder hRSV infection could also be a risk factor for asthma. Therefore, our study likely underestimates the true hRSV-attributable asthma risk."

In mice: Early RSV magnified immune response to allergens

In the experimental model using mice, the researchers found that infant mice who suffered severe RSV infections in their first months of life were more likely to develop immune responses that overreacted to common allergens including house dust mites.

This tendency became stronger when asthma or allergy was present in the mouse families because allergen-specific antibodies were passed from mouse parents to their newborns, thereby increasing that sensitivity further.

In mice: Early RSV protection prevented development of asthma

Importantly, the researchers discovered that when the mouse newborns were protected from RSV, those harmful immune shifts did not occur and asthma development was prevented.

Based on their findings, the researchers suggest that protecting newborns from RSV could substantially reduce asthma cases later in life. In addition, the results could help encourage RSV vaccination, given that it may help boost children's respiratory health in the long-term.

RSV vaccines available but use is inconsistent

The first RSV vaccines were approved and introduced in 2023, including GSK's Arexvy® and Pfizer's Abrysvo®. Current regulatory approvals vary by age group, vaccine and country. As of late 2025, more than 40 countries, primarily in high-income regions, including the US, UK, Canada, Australia and multiple European countries, have rolled out vaccination programs.

To protect infants, those programs consist of either maternal vaccination (typically in the third trimester) or long-acting monoclonal antibodies (nirsevimab) for infants. When women are immunized during pregnancy, the vaccine is designed to generate antibodies that transfer to a developing fetus.

The World Health Organization (WHO) recommends global introduction of both maternal vaccines and monoclonal antibodies. However, the researchers noted, despite their strong ability to prevent RSV hospitalizations, vaccine uptake remains inconsistent.

Opportunity to prevent RSV in humans while reducing risk of childhood asthma

"With RSV prevention now becoming widely accessible, we have an opportunity to improve long-term respiratory health, not just prevent RSV hospitalizations," said Hamida Hammad, PhD, co-senior author and a research lead at IRC. "This is not just a laboratory insight. It's a message that should help parents choose RSV prevention with confidence."

"This is a moment where policy, science, and pediatricians can come together," added Lambrecht. "If preventing RSV infection also reduces asthma risk, the benefits for families and health systems could be enormous."

The study was funded by the Excellence of Science BENEFICIARIES consortium, the European Research Council, the Special Research Fund of Ghent University Methusalem and Fonds Wetenschappelijk Onderzoek. Lambrecht reported receiving consulting fees from GSK. His co-authors declared no competing interests.

References

Content for this article was based on, excerpted and quoted from:

- Galvin, G. Protecting babies against this common virus may help prevent childhood asthma, study says. Euronews. November 11, 2025. https://www.euronews.com/health/2025/11/30/protecting-babies-against-this-common-virus-may-help-prevent-childhood-asthma-study-says.
- Phend, C. Severe RSV may increase inherited asthma risk. Med Page Today. December 1, 2025. https://www.medpageto

day.com/allergyimmunology/asthma/118758.

- Early-infancy infection with RSV increases the risk of developing childhood asthma. News Medical. November 29, 2025. https://www.news-medical.net/news/20251129/Early-infancy-infection-with-RSV-increases-the-risk-of-developing-childhood-asthma.aspx.
- RSV prevention in newborns could cut asthma risk. Science Daily. November 30, 2025. https://www.sciencedaily.com/releases/2025/11/251129044459.htm.
- Newborn RSV immunization may offer longer-term asthma protection. Technology Networks. December 2, 2025. https://www.technologynetworks.com/tn/news/newborn-rsv-immunization-may-offer-longer-term-asthma-protection-407589.
- Van Beusekom, M. Early-infancy RSV infection, inherited allergy may amplify risk of childhood asthma. Center for Infectious Disease Research and Policy (CIDRAP). December 1, 2025. https://www.cidrap.umn.edu/respiratory-syncytial-virus-rsv/early-infancy-rsv-infection-inherited-allergy-may-amplify-risk.
- De Winter, G. RSV protection could prevent one in six asthma cases. Vlaams Instituut voor Biotechnologie (VIB). November 29, 2025. https://vib.be/en#/news/rsv-vaccines-could-offer-protection-against-asthma.
- De Leeuw, E. Maternal allergy and neonatal RSV infection synergize via FcR-mediated allergen uptake to promote the development of asthma in early life. Science Immunology. 2025. https://www.science.org/doi/10.1126/sciimmunol.adz4626.