



# ECHO

Environmental influences  
on Child Health Outcomes

A program supported by the NIH

## Study Summary

### ***Different Viruses that Cause Wheezing Illnesses Provide Limited Protection Against Each Other***

*Authors: Yury Bochkov, James Gern, et al.*

#### Who sponsored this study?

The Environmental influences on Child Health Outcomes (ECHO) Program, Office of the Director, National Institutes of Health supported this research.

#### Why was this study needed?

Rhinovirus (RV) is the most common virus detected in both mild and acute respiratory illnesses, such as the common cold and wheezing. While three species of rhinoviruses (A, B, and C) can cause upper respiratory illnesses, RV-A and RV-C are more likely to cause wheezing illnesses in preschoolers and in children and adults who have asthma. No specific vaccines for these viruses exist yet, in part because the large diversity of rhinovirus strains makes vaccine development difficult.

After a natural infection, neutralizing antibody responses develop in infected persons that help reduce the risk of illness on a second exposure. The goal of this study was to test whether RV-C infections are more likely than RV-A infections to induce long-lasting antibodies that can protect against other RV-C strains.

#### What were the study results?

Both RV-A and RV-C infections induced neutralizing antibody responses of similarly long durations but did not provide strong protection against each other. The researcher's data analysis suggests that RV-C types are less likely than RV-A types to create a strong immune response against different virus strains. Footnote: Results reported here are for a single study. Other or future studies may provide new information or different results. You should always consult with a qualified healthcare provider for diagnosis and for answers to your personal questions.

#### What was the study's impact?

The results showed that while protective antibody responses to RV-C last for several years, they have only modest cross-protection that is limited to genetically similar viruses. These findings suggest that vaccines against RV-C might need to include many of the most common RV-C types to offer broad protection.

#### Who was involved?

Over 4,000 children were enrolled in 14 independent studies across Australia, Finland, and the United States. Study participants varied in age from 0 to 19 years and had RV-induced illnesses of varying severity. Some studies included participants with asthma, in addition to healthy participants.

### What happened during the study?

Researchers tested whether RV-C infections cause protection against multiple RV-C types. Researchers analyzed samples collected between 1998 and 2019. Each of the 14 sites collected nasal samples that were analyzed for RV species and type. Data from 11 studies and 3,199 children included serial sampling for analysis across more than one RV illness. Many children in this study contracted a series of illnesses caused by various RV-A and RV-C types. The investigators examined the sequence of illnesses that children had experienced to understand which kinds of rhinovirus might provide protection against which other kinds of rhinovirus. Researchers also analyzed blood specimens to see whether RV-C infections are more likely to create antibodies to fight other rhinoviruses or produce antibody responses of longer duration than RV-A infections do.

### What happens next?

Researchers want to determine why RV-C infections occur so frequently in preschool children, and why they are more likely to cause wheezing illnesses. These studies aim to help researchers design a practical RV-C vaccine that could protect high-risk children.

### Where can I learn more?

Access the full journal article, titled “Rhinoviruses A and C Elicit Long-lasting Antibody Responses with Limited Cross-neutralization,” in the [Journal of Medical Virology](#).

*The content is the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.*