

# Emerging Respiratory Viruses, Especially Rhinoviruses, are Common in Children Evaluated for Respiratory Illness

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## Abstract

**Background:** Viral respiratory infections are a common reason children seek medical care. At Primary Children's Medical Center (PCMC) in Salt Lake City, UT a direct fluorescent assay (DFA) test for 8 viruses is frequently ordered for rapid diagnosis. Nearly half the children have negative DFA tests. There is limited data regarding the frequency of other respiratory viral infections in children with negative DFA testing.

**Objectives:** Determine the frequency of 16 respiratory viruses by polymerase chain reaction (PCR) in DFA negative nasopharyngeal specimens obtained from symptomatic children.  
**Methods:** PCMC laboratory performs respiratory DFA and viral culture for adenovirus, human metapneumovirus (hMPV), influenza A and B, parainfluenza virus 1, 2, and 3, and, respiratory syncytial virus (RSV). Specimens with residual sample from DFA negative patients were tested by PCR for the 8 viruses assayed by DFA and for 8 additional viruses including: bocavirus, coronavirus 229E, HKU1, NL63, OC43, parainfluenza virus 4, polyomavirus and rhinovirus. Residual DFA sample was also tested by PCR for Bordetella pertussis, Chlamydia pneumoniae, and Mycoplasma pneumoniae. We evaluated PCR results from two time periods, December - March 2006-2008 (winter) and September-November 2006- 2007 (fall).

**Results:** From the winter period, we submitted 195 DFA samples for PCR testing and from the fall period 184 samples, for a total of 379 samples with 204 (54%) DFA negative. During the winter period, 50% of samples were DFA negative compared to 58% in the fall. Overall, 141/204 (69%) of DFA negative samples were positive for a respiratory virus by PCR. In the winter, DFA negative samples were positive by PCR for rhinovirus (38%), bocavirus (13%), hMPV (12%), RSV (12%) and adenovirus (10%). In the fall, DFA negative samples were positive by PCR for rhinovirus (53%), parainfluenza virus 3 (7%), adenovirus (5%) bocavirus, coronavirus HKU1, coronavirus OC43 and parainfluenza virus 4 (3% each). Children in the fall were more likely to have rhinovirus than children in the winter (OR 3.1, 95% C.I. 1.9-5.3, p<0.0001).

**Conclusions:** The majority of DFA negative nasopharyngeal specimens from children with respiratory symptoms are positive for emerging respiratory viruses by PCR. The most common virus detected is human rhinovirus, which was more commonly seen in the fall and in children with multiple viruses detected. Prospective studies evaluating the clinical significance and duration of PCR positivity from nasal secretions for rhinoviruses are warranted.

## BACKGROUND

- Viral respiratory infections are a common reason children seek medical care.
- At Primary Children's Medical Center (PCMC) in Salt Lake City, UT a direct fluorescent assay (DFA) test for 8 viruses is frequently ordered for rapid diagnosis.
- Nearly half the children have negative DFA tests.
- There is limited data regarding the frequency of other respiratory viral infections in children with negative DFA testing.

\*\*A Herbener has documented that she has nothing to disclose.  
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## OBJECTIVES

- Determine the frequency of 16 respiratory viruses by polymerase chain reaction (PCR) in DFA negative nasopharyngeal specimens obtained from symptomatic children

## METHODS

- Respiratory nasopharyngeal specimens were tested by DFA and viral culture for 8 viruses including adenovirus, human metapneumovirus (hMPV), influenza A and B, parainfluenza virus 1, 2, and 3, and respiratory syncytial virus (RSV).
- Residual specimens were tested by PCR for the 8 viruses assayed by DFA and culture as well as 8 additional viruses and 3 bacteria. These organisms are: adenovirus, bocavirus, Bordetella pertussis, Chlamydia pneumoniae, coronavirus 229E, HKU1, NL63, OC43, human metapneumovirus (hMPV), influenza A and B, Mycoplasma pneumoniae, parainfluenza virus 1, 2, 3 and 4, polyomavirus, respiratory syncytial virus (RSV) and rhinovirus.

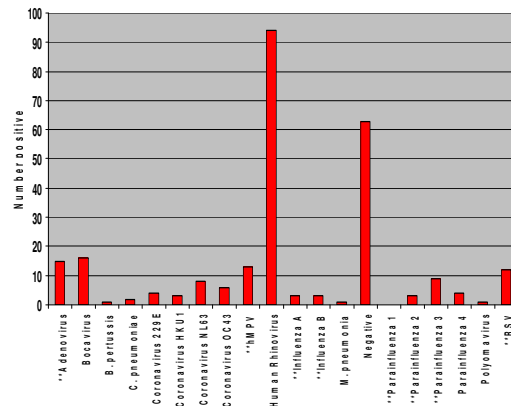
## RESULTS

- 379 DFA samples were tested by PCR. 184 samples were from the fall period (September – November) and 195 samples were from the winter period (December - March).
- 204 (54%) samples were negative by DFA and viral culture.
- 141 of the 204 DFA negative samples were positive by PCR for a respiratory virus (69%).
- In the fall, DFA negative samples were positive by PCR for rhinovirus (53%), parainfluenza virus 3 (7%), adenovirus (5%), bocavirus, coronavirus HKU1 and OC43 and parainfluenza virus 4 (3% each).
- In the winter, DFA negative samples were positive by PCR for rhinovirus (38%), bocavirus (13%), hMPV (12%), RSV (12%) and adenovirus (10%).
- Children in the fall were more likely to have rhinovirus than children in the winter. (OR 3.1, 95% C.I. 1.9-5.3, p<0.0001).

## CONCLUSIONS

- The majority of DFA negative specimens from children with respiratory symptoms are positive for emerging viruses by PCR.
- The most common virus detected is human rhinovirus.
- Rhinovirus was more common in the fall than in the winter.
- Prospective studies evaluating the clinical significance and duration of PCR positive test results from nasal secretions for rhinoviruses are warranted.

Respiratory pathogens by PCR in DFA negative specimens (n=204)  
 \*\* indicates viruses included in DFA testing



Respiratory pathogens by PCR in DFA negative specimens during fall and winter  
 \*\* indicates viruses included in DFA testing

