The Presence of Rhinovirus in Lower Airways of Patients With Bronchial Asthma

Wos M, Sanak M, Soja J, Olechnowicz H, Busse WW, Szczeklik A. Am J Respir Crit Care Med. 2008;177(10):1082–1089

PURPOSE OF THE STUDY. To determine if there was identifiable rhinovirus in the bronchi of stable asthmatic subjects and whether there is a difference in the prevalence of bronchial rhinovirus in asthmatic subjects versus nonasthmatic controls.

STUDY POPULATION. Adult asthmatic subjects having bronchoscopy for clinical indications were enrolled if they had a forced expiratory volume in 1 second of <80% of predicted and had >12% improvement with bronchodilator or airway hyperreactivity to methacholine. Subjects must have had stable symptoms for at least 2 weeks and no upper airway infection in the previous 3 weeks. Control subjects were nonasthmatic patients who were undergoing diagnostic bronchoscopy for symptoms such as dyspnea, hemoptysis, or tumor or having lobectomy or pulmonectomy for tumor. Controls must not have had upper airway infection within 3 weeks.

METHODS. Mucosal biopsies and lung tissue samples were analyzed by immunohistochemical staining using monoclonal antibody to rhinovirus and by in situ reverse-transcription polymerase chain reaction to identify rhinoviral RNA.

RESULTS. Immunohistochemical staining showed rhinovirus in 64% (9 of 14) of the bronchial biopsies from asthmatic subjects and in 33% (2 of 6) of the controls. With the polymerase chain reaction method, 73% of biopsies from asthmatic subjects and 22% of the controls had evidence of rhinovirus RNA. Asthmatic subjects who tested positive for rhinovirus had worse pulmonary function and increased serum and tissue eosinophilia and increased tissue leukocytes compared with subjects in the virus-negative group.

CONCLUSIONS. Rhinovirus is more often present in the lower airways of asthmatic patients, and its presence is associated with worse lung function and increased eosinophilic inflammation.

REVIEWER COMMENTS. Traditional teaching has been that rhinovirus does not replicate at 37°C but instead only at the nasal temperature of 35°C. However, our local experience indicates that this may not be an absolute; we have followed an infant with severe combined immunodeficiency with persistent pulmonary infiltrates and respiratory failure who had only rhinovirus grow from bronchoscopy several times and from lung-biopsy tissue. In hosts with supposedly normal immune systems, this study is intriguing and provides a possible therapeutic opening if agents for enterovirus (which includes the rhinovirus group) are eventually available. The studied asthmatic subjects are not a representative population of asthmatic people, because they are a convenience sample with illness for which bronchoscopy was indicated, but the data certainly should stimulate further investigation in better characterized asthmatic people who do not otherwise have an indication for bronchoscopy.

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Childhood Asthma After Bacterial Colonization of the Airway in Neonates


PURPOSE OF THE STUDY. To investigate a possible association between bacterial colonization of the hypopharynx in asymptomatic neonates and later development of recurrent wheeze, asthma, and allergy during the first 5 years of life.

STUDY POPULATION. The subjects were children from the Copenhagen Prospective Study on Asthma in Childhood who were born to mothers with asthma. Samples were obtained from 321 subjects at the age of 1 month when the infants were asymptomatic.

METHODS. Aspirates from the hypopharyngeal region were cultured for Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis, and Staphylococcus aureus. Wheeze was monitored prospectively on diary cards during the first 5 years of life. Peripheral eosinophil count, total immunoglobulin E (IgE) levels, and specific IgE levels were measured at 4 years of age. Lung function was measured and asthma was diagnosed at the age of 5.

RESULTS. Overall, 21% of the infants were colonized with S pneumoniae, M catarrhalis, H influenzae, or a combination of these organisms. Colonization with ≥1 of these organisms, but not S aureus, was significantly associated with persistent wheeze, acute severe exacerbation of wheeze, and hospitalization for wheeze. Eosinophil counts and total IgE levels at age 4 were significantly increased in children colonized at age 1 month with S pneumoniae, M catarrhalis, or H influenzae, but the specific IgE level was not significantly affected. Children who had been colonized neonatally with S pneumoniae, M catarrhalis, or H influenzae also had, at age 5, increased prevalence of asthma, increased risk for hospitalization for wheeze, and increased reversibility of airway resistance after the administration of a bronchodilator.

CONCLUSIONS. Neonates colonized in the hypopharyngeal region with S pneumoniae, M catarrhalis, H influenzae, or a combination of these organisms are at increased risk for recurrent wheeze and asthma early in life.
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