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Childhood Asthma: Overview

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DEFINITION

Asthma is a syndrome characterized by increased responsiveness of the trachea and bronchi to various stimuli and is manifested by widespread reversible narrowing of the airways that changes in severity either spontaneously or as a result of therapy.1 The hyperresponsiveness ("twitchiness") of airways is a fundamental abnormality and is dynamic in nature. Asthma is a disease of persistent or recurrent airway inflammation characterized by the presence of inflammatory cells (eosinophils and polymorphonuclear cells), edema of the wall, and changes in epithelial cells. Airway response to allergens and certain irritants may be acute (occurring within minutes to one hour following exposure), delayed or late (occurring within four to eight hours following exposure), or dual (combination of acute and late phase). Some reactions are only delayed. The late phase reaction is largely attributed to ongoing inflammation. Because of the variability of its presentation (complete or partial reversibility of airways obstruction, hyperreactivity accompanying other respiratory disease, chronic cough, or recurrent pneumonia with or without wheeze), children have often been denied appropriate antiasthmatic medications and their symptoms have been attributed instead to "wheezy bronchitis," "recurrent bronchiolitis," "spastic bronchitis," or "wheezy baby syndrome." For years pediatricians have been schooled to approach the wheezing child skeptically ("all that wheezes is not asthma"). Although the old adage may hold an element of truth (largely due to foreign bodies as a cause of wheezing), one of the most common clinical pitfalls even today is the underdiagnosis of asthma in the pediatric population. Although consideration of a complete medical differential is always important, lack of physician recognition of asthma places the pediatric patient at considerable risk for increased morbidity. Perhaps it is time for us to reevaluate our thinking ("if you hear hoof beats, think horses"). The wheezing child may indeed have asthma.

EDUCATIONAL OBJECTIVES

Asthma is the most common chronic illness in children. The four educational objectives for 1988/89 address only a small part of the knowledge that pediatricians need to diagnose asthma and manage these children effectively. The authors have prepared a comprehensive review that appears in two issues of Pediatrics in Review.

108. The pediatrician should have appropriate familiarity with the use of aerosol treatment of acute asthma (Recent Advances, 88/89).
110. The pediatrician should have appropriate understanding of the use of cromolyn sodium in the treatment of chronic asthma (Recent Advances, 88/89).
111. The pediatrician should have appropriate appreciation of the advantages and disadvantages of the RAST test in management of allergic children (Recent Advances, 88/89).
112. The pediatrician should have appropriate appreciation of the advantages and disadvantages of skin testing in management of allergic children (Recent Advances, 88/89).

EPIDEMIOLOGY AND NATURAL HISTORY

The prevalence of childhood asthma varies greatly within the United States.2 The rate of 8.3% was

Self-Evaluation Quiz—CME Credit

As an organization accredited for continuing medical education, the American Academy of Pediatrics certifies that completion of the self-evaluation quiz in this issue of Pediatrics in Review meets the criteria for two hours of credit in Category I of the Physician's Recognition Award of the American Medical Association and two hours of PREP credit.

The questions for the self-evaluation quiz are located at the end of each article in this issue. Each question has a SINGLE BEST ANSWER. To obtain credit, record your answers on your quiz reply cards (which you received under separate cover), and return the cards to the Academy. On each card is space to answer the questions in five issues of the journal: CARD 1 for the July through November issues and CARD 2 for the December through April issues. To receive credit you must currently be enrolled in PREP or a subscriber to Pediatrics in Review—and we must receive both cards by June 30, 1989.

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The correct answers to the questions in this issue appear on the inside front cover.
particularly in the child with a strong atopic family history. From the child who has been labeled as having recurrent wheezy bronchitis an IgE level should be obtained in an effort to define the cause of wheezing. An IgE level should be obtained in the child with steroid-dependent asthma or whose asthma is exacerbated by recurrent pneumonia to screen for allergic bronchopulmonary aspergillosis (ABPA). IgE levels are extremely elevated (1,000 to 10,000 IU/mL) in children with this condition. Conditions other than asthma are associated with a high serum IgE levels, many of which are unrelated to the respiratory tract. Therefore, testing of serum IgE is indicated only on an individual basis in the evaluation of childhood asthma.

**Skin Testing**

Immediate-type hypersensitivity skin testing is an important in vivo method used for detecting specific IgE antibody. Skin testing is indicated (and not limited by age) when the asthma is thought to be primarily exacerbated by identifiable and/or avoidable allergens. Caution must be exercised when evaluating skin test results. Proper antigens and proper methods of applying antigen, preparing exposure area to which antigen is applied, and skin test reading (wheal/flare) are crucial to reliable interpretation of such testing and appropriate application of results in patient treatment. Skin tests may be done by prick, scratch, or intradermal methods. Both false-positive reactions (improper technique, dermatographism) and false-negative reactions (improper technique, loss of potency of allergen solution, medications that suppress skin reactivity such as antihistamines) do occur. Interpretation of the clinical relevance of skin testing requires correlation with a well-taken medical history, physical examination, and other laboratory testing.

**In Vitro Tests for Specific IgE Levels**

Several diagnostic tests, including a variety of radioallergosorbert test assays and enzyme-linked immunoassorbent assay may be used in the semiquantitation of antigen-specific IgE antibodies in serum. These tests are usually reserved for situations in which immediate-type hypersensitivity skin testing cannot be done (ie, extensive atopic dermatitis, dermatographism, an uncooperative child). In vitro quantitation of IgE-specific antibody may also be used in the workup of specific allergy (usually food) in an infant, because extensive skin testing would not then be warranted. The routine use of in vitro specific IgE testing should be discouraged. The major advantage of these tests include the lack of risk of systemic reaction, the lack of dependence on skin reactivity (which may be modified by drug or disease), and the stability of the antigen used for testing. The major disadvantages include limited reliable allergen selection (good correlation with pollens, epidermals, and some foods, although correlation with dust, mold, and dog allergens may be poor), reduced sensitivity compared with skin testing, lack of immediate test results, expense of testing, and variability of test results between laboratories.

**Diagnostic tests for cystic fibrosis, immunodeficiency, and gastroesophageal reflux should be pursued when indicated.**

The second part of this paper will be published in the next issue of *Pediatrics in Review*.

**REFERENCES**


**SUGGESTED READING**


**Self-Evaluation Quiz**

1. Each of the following is a significant risk factor for life-threatening asthma, except:
   A. Childhood onset of exercise-induced asthma.
   B. Labile asthma with pronounced "morning drooping."
   C. Dependence on corticosteroids.
   D. Adolescent with long-standing asthma of early onset.
   E. Frequent hospitalizations required to control asthma.

2. Which of the following is least likely to be a reason for asthma mortality?
   A. Lack of recognition of severity of disease by patient, family, or physician.
   B. Improper or delayed use of corticosteroids.
   C. Misuse (abuse) of β-adrenergic metered dose inhalers.
   D. Inadequate home monitoring.
   E. Lack of patient compliance.

3. Each of the following is a true statement pertaining to asthma, except:
   A. Asthma is characterized by both hyperresponsiveness and inflammation of the lower airways.
   B. Pulmonary function tests are helpful in objectively monitoring the severity and reversibility of airways obstruction.
   C. Childhood asthma most commonly has its onset in the first few years of life.
Problem Behaviors

6. Centers for Disease Control: Psychosocial predictors of smoking among adolescents. MMWR 1987;45:15–455

SUGGESTED READING

E. The progression from abstinence to substance use usually begins with alcohol.

8. Which of the following is not a true statement about motor/recreational vehicle accidents?
A. They account for the majority of accidental deaths in 15- to 24-year-old persons.
B. Alcohol is implicated in about 50%.
C. The peak time for motor vehicle accidents among 15- to 19-year-old persons is approximately midnight on weekends.
D. Young people who openly claim to be engaging in risky vehicular activities are at no more risk for injuries than their peers.
E. Related injuries account for the largest number of hospital days for teenagers.

9. Antecedent factors that increase the likelihood of premature sexual activity in female adolescents include each of the following, except:
A. Being black.
B. Lower socioeconomic status.
C. Earlier pubertal development.
D. Substance use.
E. Living with both parents.

10. Which of the following is least likely to be a true statement regarding the medical history of adolescents?
A. One goal is to determine the extent and nature of engagement in problem behaviors.
B. The presence of one problem behavior often serves as a marker for the presence of others.
C. Information about the familial use of cigarettes and alcohol contributes no useful information.
D. Assuring confidentiality will assist the youth in divulging more sensitive information.
E. It is important to determine the degree to which involvement in risk-taking behavior has affected the youth’s medical and psychosocial well-being.

11. The pediatrician’s role when caring for adolescents includes each of the following, except:
A. Identifying those at risk and those actively involved in risk-taking behaviors.
B. Discouraging participation in potentially serious problem behaviors.
C. Basic counseling regarding the nature and consequences of problem behaviors.
D. Suggesting alternative activities that foster positive developmental goals.
E. Discouraging participation in community intervention programs.

Self-Evaluation Quiz
7. True statements pertaining to substance use in the United States include each of the following, except:
A. US youth have the highest rate of substance use of all industrialized nations.
B. Cocaine is the most widely used illicit substance.
C. Cigarette smoking is the most important preventable environmental factor causing death and disability.
D. Alcohol is the most widely used substance in adolescents.

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Self-Evaluation Quiz

12. Of the following, the sign least suggestive of dyspraxia in a child would be:

A. A history of feeding difficulties in infancy.
B. Dysarthria in a toddler.
C. Hyperkinesia in a kindergartner.
D. Adiadochokinesis in a school-aged youngster.

13. Among the following, the finding most characteristic of children with dyspraxia is:

A. Faulty proprioceptive input.
B. Impaired language development.
C. Impaired memory.
D. Impaired cortical integration.

14. A clumsy-5-year-old child has difficulty buttoning her shirt on request but has no other problem putting on the shirt by herself.

15. Management of the clumsy child is least likely to be helped by:

A. Reassurance that he or she will ultimately catch up with his or her peers in athletic skills.
B. Encouragement to develop athletic skills in individual rather than team activities.
C. Encouragement to practice intensively motor tasks that he or she finds difficult.
D. Referral to an occupational therapist.

Cat Scratch Disease


Cat-scratch disease typically begins with a reddened papule appearing a few days to weeks after skin injury, usually caused by a young cat. This primary lesion lasts from 1 to 2 weeks, evolving through a vesicular, pustular, and crusty stage. About 5% of affected persons have one or more yellow-white granuloma(s) on the palpebral conjunctiva. Regional adenopathy, often accompanied by a mild febrile illness, is noted soon after appearance of the skin lesion. As a rule, only one or two lymph nodes are enlarged, most frequently in the axillary or cervical areas. When inoculation occurs in the eye, the preauricular node is almost always involved (Parinaud oculoglandular syndrome). Although affected nodes can remain tender and painful for several weeks, significant inflammatory changes of the overlying skin are uncommon. In most patients, swelling gradually recedes without treatment after several weeks to months. In about 10% to 20% of cases the adenitis will progress to suppuration and require needle aspiration.

Unusual manifestations of cat scratch disease include splenomegaly (12%), parotid swelling (3%), encephalopathy/radiculitis (2%), prolonged systemic disease (1%), and, rarely, primary atypical pneumonia, osteolytic lesions, and thrombocytopenic purpura. Transient morbilliform and maculopapular rashes have been reported, as well as erythema multiforme and erythema annulare; erythema nodosum occurs in less than 1% of cases. Other infectious causes of erythema nodosum include streptococcal, mycobacterial and systemic fungal infections.

A clinical diagnosis of cat scratch disease can be made when three of four criteria are met: (1) history of cat contact and/or scratch with a primary skin or eye lesion (2) a positive skin test for cat scratch disease (induration >5 mm at 72 hours), (3) negative test results for other causes of lymphadenopathy, and (4) characteristic histopathologic findings in a lymph node biopsy. In atypical cases all four criteria must be met. The diagnosis can be confirmed by demonstration of cat scratch disease agent, visible with Warthin-Starry silver stain as small pleomorphic bacilli, in biopsies of a primary lesion (skin or ocular granuloma) or an infected node.

By far the best recent article for the practitioner unfamiliar with this condition is in a journal not listed in Index Medicus: Margileth AM, Hadfield TL: Could the infection by cat-scratch disease? Contemporary Pediatrics 1985;2:52–72. In this article is the statement: "CSD [cat scratch disease] antigen for diagnosis is usually available from Dr Margileth upon written request (c/o F. Edward Hebert School of Medicine, 4301 Jones Bridge Rd, Bethesda, MD 20814)." (S. Michael Marcy, MD, PIR Editorial Board)