Asthma

PATHOPHYSIOLOGY

Reduced Lung Function at Birth and the Risk of Asthma at 10 Years of Age


PURPOSE OF THE STUDY. To evaluate whether reduced lung function at birth predicts the development of asthma and markers of obstructive airway diseases by 10 years of age.

STUDY POPULATION. A prospective cohort of 616 10-year-old Norwegian children from the Environmental and Childhood Asthma (ECA) study who were initially enrolled as healthy term infants and had undergone lung-function testing and passive respiratory mechanics evaluation shortly after birth.

METHODS. Lung function at birth was measured by calculating the fraction of time to peak expiratory flow to total expiratory time ($t_{PEF}/t_E$) on the basis of tidal breathing flow-volume loops. Respiratory mechanics at birth were assessed by calculating respiratory system compliance and resistance during passive maneuvers. Data at the 10-year follow-up were collected during 2 clinical visits including forced expiratory flow-volume loops, methacholine-challenge tests, a treadmill exercise test, and skin-prick testing for common inhalant and food allergens. Parents also completed a validated International Study of Asthma and Allergies in Childhood questionnaire on airway symptoms, asthma-medication use, and previous physician-diagnosed asthma. The follow-up assessments and interviews were blinded with regard to the lung-function measurements at birth.

RESULTS. In this cohort, the prevalence of a history of asthma was 20.2%, and prevalence of current asthma was 11.1%. Children with a $t_{PEF}/t_E$ at or below the median at birth were more likely at 10 years of age to have a history of asthma (24.3% vs 16.2%; $P = .01$), current asthma (14.6% vs 7.5%; $P = .005$), severe bronchial hyperresponsiveness (9.1% vs 4.9%; $P = .05$), and inhaled corticosteroid use (5.9% vs 2.4%; $P = .02$). Children with respiratory system compliance at or below the median were more likely to have a history of asthma (27.4% vs 14.8%; $P = .001$) and current asthma (15.0% vs 7.7%; $P = .009$). Decreased lung-function measurements did not consistently correlate with percent predicted forced flow-volume loops and exercise testing.

CONCLUSIONS. Reduced lung function at birth may be a risk factor for the development of asthma by 10 years of age.

REVIEWER COMMENTS. Other studies to date have shown that infants with reduced lung function have an increased risk for wheezing and asthma in the first few years of life. This study suggests that measuring lung function at birth may be useful in predicting which infants will develop asthma by late childhood. Knowing these risks may allow for directed therapy and prevention.

Lung Function and Exercise Capacity in Young Adults Born Prematurely


PURPOSE OF THE STUDY. To determine long-term effects of prematurity on lung function (volumes, diffusing capacity) and exercise capacity in ex-preterm infants compared with healthy peers.

STUDY POPULATION. Preterm participants ($n = 42$) and healthy term controls ($n = 48$) were recruited for lung-function and exercise tests.

METHODS. Part of a prospective nationwide Dutch study, children born in 1983 with a gestational age of $<32$ weeks and/or a birth weight under 1500 g were followed up to 19 years of age. Measurements included spirometry, diffusing capacity ($DL_{co}$), and bicycle ergometer test.

RESULTS. Most lung-function measurements were within the reference ranges for both groups. Preterm birth was associated with lower forced expiratory volume in 1 second (preterm infants: 95% predicted; controls: 110% predicted) and $DL_{co}$, single breath corrected for hemoglobin (88% predicted vs 96% predicted compared with control subjects at follow-up). Exercise capacity was 15% lower in ex-preterm infants than in control subjects. The anaerobic threshold, maximum minute ventilation, and maximum heart rate as percentage predicted were significantly lower in ex-preterm infants compared with control subjects.

CONCLUSIONS. Long-term effects of prematurity were airway obstruction and a lower diffusing capacity compared with control subjects, although mean lung-function parameters were within the reference ranges. Ex-preterm infants had a lower exercise level, which could not be explained by impaired lung function or smoking habits but might be a result of impaired physical fitness.

REVIEWER COMMENTS. We all see ex-preterm patients in our practices, and there have been conflicting data on lung function as adolescents. No previous studies on exercise capacity have been performed. Without the control group included, one could have concluded that almost all participants had lung-function measurements within the reference ranges. Ex-preterm infants reported fewer
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