

## A Longitudinal, Population-Based, Cohort Study of Childhood Asthma Followed to Adulthood

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### Abstract

**Background:** The outcome of childhood asthma in adults has been described in high-risk cohorts, but few population-based studies have reported the risk factors for persistence and relapse.

**Methods:** We assessed children born from April 1972 through March 1973 in Dunedin, New Zealand, repeatedly from 9 to 26 years of age with questionnaires, pulmonary-function tests, bronchial-challenge testing, and allergy testing.

**Results:** By the age of 26 years, 51.4 percent of 613 study members with complete respiratory data had reported wheezing at more than one assessment. Eighty-nine study members (14.5 percent) had wheezing that persisted from childhood to 26 years of age, whereas 168 (27.4 percent) had remission, but 76 (12.4 percent) subsequently relapsed by the age of 26. Sensitization to house dust mites predicted the persistence of wheezing (odds ratio, 2.41;  $P = 0.001$ ) and relapse (odds ratio, 2.18;  $P = 0.01$ ), as did airway hyperresponsiveness (odds ratio for persistence, 3.00;  $P < 0.001$ ; odds ratio for relapse, 3.03;  $P < 0.001$ ). Female sex predicted the persistence of wheezing (odds ratio, 1.71;  $P = 0.03$ ), as did smoking at the age of 21 years (odds ratio, 1.84;  $P = 0.01$ ). The earlier the age at onset, the greater the risk of relapse (odds ratio, 0.89 per year of increase in the age at onset;  $P < 0.001$ ). Pulmonary function was consistently lower in those with persistent wheezing than in those without persistent wheezing.

**Conclusions:** In an unselected birth cohort, more than one in four children had wheezing that persisted from childhood to adulthood or that relapsed after remission. The factors predicting persistence or relapse were sensitization to house dust mites, airway hyperresponsiveness, female sex, smoking, and early age at onset. These findings, together with persistently low lung function, suggest that outcomes in adult asthma may be determined primarily in early childhood.

### Key words

Asthma, children, health surveillance, research

**Sears MR, Greene JM, Willan AR, Wiecek EM, Taylor DR and 5 others. A longitudinal, population-based, cohort study of childhood asthma followed to adulthood. Reprinted with kind permission from *N Engl J Med.* 2003; 349: 1414-22.**

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### Commentary by Paul Thomas

*"Give me the boy until age seven, and I will show you the man."*

Melbourne researchers took children at age seven with asthma and have followed them up for nearly 40 years. This has spawned a number of papers relating to the prognosis for children with asthma and has provided much useful information, leading to predictions about the prognosis for childhood asthma, rather like the quotation above from the Jesuits who predicted that they could influence adult behaviour if given the child at an early stage.

The study shows that those with 'mild wheezy bronchitis' or 'wheezy bronchitis' would have few symptoms and normal lung function at age 42. Those who had severe

asthma, which in this study would be persistent asthma (as opposed to severe episodic asthma) tended to have a reduction in lung function (mean FEV<sub>1</sub> 85% of predicted), and were more likely to have asthma persisting into their current life.

What does this mean for the diving community? It suggests that if asthma is mild in childhood it will most likely resolve in adult life and there will be no residual decrement in resting lung function. It does not exclude the fact that these individuals may have a hyper-reactive response to inhaled bronchial challenge testing. Those who had severe disease as a child are likely to have persisting symptoms and clinical features of asthma.

While these results may not be entirely surprising it does suggest that mild asthma of childhood is less likely to be

associated with symptoms or abnormal spirometry. They may have airway hyper-reactivity (untested in this study), but does such hyper-reactivity matter or mean anything? We would not treat airway hyper-reactivity without symptoms.

The study by Sears et al used a large group of children recruited in New Zealand, who have been followed up since initial assessment at age three years, but first reviewed for asthma at age nine years. They were reviewed every two years thereafter until age 15, then at 18, 21 and 26 years old. The drop-out rate was relatively low considering the time and number of interventions that were performed (40%). The reported rates of ever having had wheezing were high at 72.6%, suggesting that a single episode of wheezing should not be classified as asthma. Nonetheless, 26.9% were classified as having continuing symptoms of asthma, which is a high prevalence rate, while two thirds were thought to have had remission from their asthma, although this includes all those who ever wheezed.

The risk of relapse was associated with an early age of onset, atopy (especially sensitivity to house dust mite) and airway

hyper-reactivity, while smoking may or may not be a risk factor. Again, while increased airway reactivity is associated with an increased risk of having asthma later in life, it would be interesting to see how many with airway reactivity were essentially asymptomatic and had normal spirometry. This information would be within this data set, but cannot be derived from the tables provided.

In summary, the studies are interesting, showing that two thirds of those with childhood asthma have remission, thus providing a guide to the prognosis of childhood asthma. The studies do not help us make any assessment for diving in relation to asthma. It will be interesting to see the data that emerge using self-reporting surveys from asthmatic divers. There are obviously many people who dive, who have airway hyper-reactivity, and who have not had any problems.

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## Health outcome following multi-day occupational air diving

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Acclimatization to decompression stress has been reported in caisson workers and helium-oxygen divers; however the alternative notion that the risk of decompression sickness increases with successive days of diving is widespread. We examined 201 multi-day series of 2 to 29 diving days identified retrospectively in a database of occupational air dives for evidence of acclimatization or sensitization. Decompression related health status was measured using a self-administered diver health survey; resulting scores were analyzed by linear modelling. Daily diving consisted of 1-3 dives each to mean maximum depth of 17.2 (SD 3.9) meters seawater for a mean duration of 23 (SD 17) min. Daily diver health scores increased with calculated daily risk of decompression sickness but were not influenced by the order of dives in multi-day series. Poor health outcome indicated by treated decompression sickness and diver health scores > 8 occurred early in multi-day series. There was no evidence of sensitization to decompression stress whereas the timing of poor health outcomes suggests an element of acclimatization.

### Key words

Decompression sickness, risk factors, health surveys, health status, diving, occupational health

**Doolette DJ. Health outcome following multi-day occupational air diving. Reprinted with kind permission from *Undersea Hyperb Med.* 2003; 30: 127-34.**

### Editor's comment:

This is one of several papers from Dr Doolette examining the use of a health survey questionnaire (DHS) in field studies of divers. High DHS scores appear to correlate with the occurrence of decompression sickness and may be a useful way to assess decompression stress. Whilst these studies look promising, they have not been corroborated yet by other groups.