

Predictors of Atopic Disease: Cord Blood IgE and Month of Birth

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The cumulated incidence of atopic disease before 7 years of age was highly influenced by the cord blood IgE concentration and moderately influenced by the month of birth: obvious atopic disease was more than twice as common in children with high cord blood IgE and born in May than in children with a similar IgE and born in November ($P < 0.05$). There was no similarly increased risk for atopic disease among those born in May with low cord blood IgE. Environmental factors thus seem important merely for a high risk population. The findings lend support to family planning when there is especially high genetic risk for atopic disease.

Key words: allergy; prediction; IgE; season.

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The predictive value of high concentrations of IgE in cord blood has repeatedly been demonstrated since 1976 (3, 4, 6, 7, 10, 11, 12, 13). The influence of month of birth and early allergen exposure has also been investigated by several groups. Atopic disease seems to develop more often in children born in the month(s) preceding the peak pollen season (1, 2, 14, 15, 16). From a follow-up from birth to 7 years of age (11) the combined information of cord blood IgE concentrations and the cumulated history of atopic disease were available. This communication aims at presenting the additional effect of the month of birth.

MATERIAL AND METHODS

1652 families of a consecutive group of 1701 newborn infants born from December 1974 to end of December 1975 volunteered to answer a questionnaire when the children had reached 7 years of age concerning atopic symptoms and signs. Doubtful answers were checked by telephone interview. Medical records at the Pediatric Department were scrutinized. A cumulated diagnosis of obvious or probable atopic

disease (bronchial asthma, allergic rhinitis, atopic eczema, allergic urticaria or gastrointestinal allergy) was established. Most results have been published in detail (11) but a few additional data have been included in this presentation. The cumulated diagnosis is compared with the month of birth of the children. The determination of cord blood IgE was performed with Phadebas IgE PRIST® calibrated for a detection limit of 0.9 kU/l. All results from 0.9 kU/l and higher were regarded as elevated (11).

Chi-square test was used for comparison of frequencies between periods and between groups with different IgE concentrations.

RESULTS

205 of 1652 newborn infants (12.4%) showed serum IgE concentrations above the detection limit of the test (0.9 kU/l). The incidence of elevated IgE concentrations in cord blood varied between 6.9% (January) to 18% (September) but the distribution appears to be at random (Table 1). Obvious atopic disease developed in 328 children (19.9%), among

these in 119 of 205 children with high cord blood IgE (58 %) and in 209 of 1447 children with low cord blood IgE (14.4 %, $P < 0.001$). When also probable atopic disease is taken into consideration, 83.2 % of children with high and 31.8 % of children with low IgE concentration at birth had developed atopic disease ("total atopic disease") before 7 years of age.

Obvious atopic disease was more than twice as often found (Fig. 1) in high-IgE producing neonates born in May (78.6 %) as compared to November (33.3 %; $P < 0.05$). In the whole material the peak incidence (28.8 %) was found in August and the lowest incidence in November (14.6 %). However, when calculating on differences between children born April-September and those born October-March, no significant difference was found in the whole material, nor was such a difference found when focusing on children with low or high cord blood IgE concentration.

Allergic rhinitis was reported in 3.4 % of the children. The highest incidence was found among children born in May (6.7 %) and the lowest among those born in October (0.9 %).

Among the children with a high cord blood IgE concentration, obvious atopic disease was found in 61.4 % of boys (range: 44.4–80.0 % during the year) and in 56.8 % of girls (range: 20.0–100 %). The total incidence of atopic

disease in these children was 80.6 % in boys and 84.0 % in girls.

DISCUSSION

High cord blood IgE concentrations are highly predictive of subsequent atopic disease (3, 4, 6, 7, 10–13). From the present study it was also evident that having a high cord blood IgE and being born in May indicated a doubled risk for developing atopic disease in comparison with being born in November. This finding is in accordance with a higher incidence of allergy among children who are exposed to pollen during the first 2 months of life, which seems to be an especially vulnerable period of life, and with previous experience (1, 2, 14–16). Furthermore, allergic rhinitis seemed overrepresented among children born in May. However, the low total incidence of allergic rhinitis does not permit further analysis. Subsequent follow-up, including specific allergy diagnosis after 10 years of age when allergic rhinitis is expected to be more common, will allow further elucidation of risk factors.

In children with low IgE at birth a slightly higher incidence was found among those born in August. Possibly, the high number of respiratory tract infections in September and October may be important for this group of children

Table 1
Atopic disease compared with month of birth and serum IgE concentrations in cord blood

Month	No. of children	IgE ≥ 0.9 kU/l		Obvious atopic disease		
		%	Total atopic (%)	IgE ≥ 0.9 (%)	< 0.9 (%)	Total (%)
January	144	6.9	90.0	70.0	19.4	22.9
February	140	11.8	82.4	70.6	20.3	26.4
March	155	12.9	85.0	55.0	11.1	16.8
April	178	14.6	73.1	50.0	9.8	15.7
May	149	9.4	100.0	78.6	14.8	20.8
June	143	9.8	78.6	64.3	11.6	16.8
July	149	14.1	81.0	52.4	11.7	17.4
August	104	14.4	86.7	60.0	23.6	28.8
September	116	18.1	90.5	57.1	14.7	22.4
October	112	9.8	90.9	63.6	9.9	15.2
November	89	10.1	88.9	33.3	12.5	14.6
December*	173	15.6	63.0	51.9	15.8	21.4
Total/mean	1652	12.4	83.2	58.0	14.4	19.9

* Two years taken together.

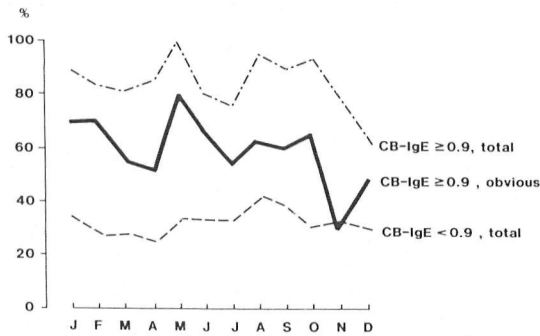


Fig. 1. Influence of cord blood IgE and month of birth on the development of atopic disease from birth to 7 years of age.

(5, 8). No peak in the incidence of atopic disease was found in May among these children. This higher sensitivity to environmental factors in high as compared to low IgE producers was seen previously regarding early feeding (3, 4). Similarly, cow's milk appeared to increase the risk for atopic disease only in infants with low as compared to high numbers of E-rosetting cells (9).

Families with a high genetic risk for atopic disease might benefit from this and other studies showing peak risk periods and low risk periods for the development of atopic disease. Family planning has been advocated in these families (2) and a significant reduction in the prevalence of atopic disease could be reached if the high risk periods are avoided.

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