Risk Factors for Developing Allergy in Children

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The factors which seem to influence or *turn on* the allergic response in children can be *prenatal, perinatal* and *postnatal.*

In prenatals *heredity* takes the first place but *environmental factors* contribute as well as genetic ones. Of *prenatal peristatic (environmental)* factors *highly allergenic food* in allergic mothers and *progesterone* therapy may be important in *turning on* the allergic process in potentially allergic infants. The mother's progesterone therapy during pregnancy was shown to increase significantly the mean IgE levels and the mean percentage of detectable IgE in the cord blood. This hormone has been reported to be immuno-suppressive in vitro. As 20-alpha-hydroxy-steroid dehydrogenase was discovered in the mouse thymus, the hypothesis has been put forward that this enzyme, engaged in the progesterone metabolism, may have a protective role in reducing progesterone activity in the thymocytes. Thus, the progesterone administered to pregnant women might interact with fetal thymus maturation and because a delayed thymic maturation was involved in the allergy onset, a hypothetical role of progesterone may be explained. According to another hypothesis progesterone may modify the placental biology including a placental transfer of IgE.

Certain *perinatal factors* may significantly affect the likelihood of a child's developing serious atopic disease:

a) The incidence of *neonatal complications* has been found to be two times greater among asthmatic children compared to non-asthmatics.

b) Asthma occurs more frequently among the children born in *pollinating seasons*, suggesting that seasonal differences in neonatal antigen contacts are important for development of allergy.

Of *postnatal factors,* probably the most important early influence is the infant's diet. The incidence of atopic dermatitis in potentially allergic infants fed cow's milk, eggs and wheat has been found to be seven times that of the exclusively breast-fed ones. 60-80% of these eczematous children later developed major respiratory allergic diseases, especially asthma. compared to 15% of those in whom cos's milk products were witheld from birth till 9 months of age. Even babies breast-fed for only 6 weeks were found to be considerably less likely to develop asthma or atopic dermatitis.

Why? Because human breast milk contains a large amount of IgA antibodies and also a factor which stimulates development of intestinal mucosa, the child's own production of secretory IgA being enhanced IgA antibodies prevent the transport of foreign proteins across the gut wall and this is the most probable mechanism whereby maternal IgA antibodies to cow's milk antigen prevent sensitization of the breast-fed baby. However, it is important to remember that while advocating breast feeding in potentially allergic newborns, certain potentially harmful allergens may gain entrance to the infant's relatively leaky gut via the mother's breast milk.

Allergy often begins early in life, in many cases during the first year. The detection of a newborn at high risk of allergy is therefore important. A recent study showed that 71% of the newborns, who subsequently developed clinical allergy, had detectable IgE in their cord blood compared to 21% of the symptom-free infants. Cord blood IgE level was, therefore, shown to be a good predictor of subsequent atopic disease, along with raised level of IgE and presence of specific IgE antibodies in the mother's serum. IgE can be detected in human foetuses by the 11th week of gestation but under normal circumstances is not *turned on* in utero.

In *turning on* this system, prominent role has been attributed to transient lack of IgA and its local protective function in the intestinal mucosa during the first 3 months of life.

- Children with permanent IgA deficiency develop serum precipitating (IgG) antibodies to cow's milk protein much more frequently than normals, suggesting that their gastro-intestinal tracts are unusually *leaky:*
- IgA deficiency was found in a significantly increased proportion of atopic subjects.
- Transient deficiency of secretory IgA in young infants' gastro-intestinal tract is a physiological phenomenon and one should withold commonly allergenic food in allergic infants until their guts are coated with IgA of their own making. Failure to withold the potential allergens will *turn on* the IgE system.

In early infancy, *surgery necessitating anaesthesia* (pyloric stenosis, hernia repair etc.) as well as *early hospitalization* for non-surgical reasons seem to *turn on* the allergic diathesis. Early viral low respiratory tract infections can delay maturation and

normal functioning of IgA system, as synthesis of secretory IgA requires complete integrity of the epithelial cells. A clinical continuum of infantile bronchiolitis and childhood asthma has been suggested by some authors. General anaesthesia, associated with early surgery, is supposed to transiently impair the protective layer containing secretory IgA, thus rendering the respiratory mucosa permeable for common airborne allergens.

Another factor influencing the triggering of the onset of asthma in early infancy is the *home exposure* to many *potent allergens.* Important sources of increasing the allergic load in the house are the *presence of pets, stuffings of pillows, matrasses, furniture,* and *toy stuffing. Cigarette smoking* in the house of allergic infants increases both the risk of triggering the onset of the allergic response and of subsequent asthma attacks.

During pollinating season, a child's exposure to pollen can be decreased by keeping the bedroom windows and door closed. To further ensure an interruption of pollen exposure it is important to keep in mind that pollen sticks to human hair and is water soluble. It is thus desirable that pollen-allergic children rinse the pollen out of their hair after coming in from playing out of doors and at bed time.

In the first year of life allergy may involve the *intestinal tract, skin and respiratory tract.* Allergy to food in the first few months of life may be the causative factor of the so-called *coeliac syndrome.* Even a serious form of bloody diarrhoea due to milk allergy has been described. Symptoms subside dramatically when cow's milk is withdrawn from the infant's diet. In the first 2-8 months of life, *nasal stuffiness, brought on by allergy to foods,* interferes with a child's sucking, while post nasal dripping may cause coughing.For this coughing it is important *not to prescribe codeine containing cough mixtures.* Elimination diet and appropriate use of antihistamines usually suffice to solve the problem.

Later, children with allergic rhinitis may develop allergic swelling of the lower end of their Eustachian tubes. This may result in repeated ear infections, ear pain from sterile middle ear effusion, ear popping and hearing difficulties. Children in 3-7 year age group with secretory otitis media may have sufficient conductive hearing impairment to give the impression of being *inattentive, immature,* or *not bright.*

Bronchial asthma in the first year of life may result from food allergy while later it usually results from allergy to inhaled allergens, such as pollens, house dust, animal danders and moulds.

In an effort to put much of the mentioned clinical and experimental evidence to practical use, programmes of prophylaxis of atopic disease in the offspring of atopic parents have been proposed. Their main premises are the following:

1. Simply *planning in advance for the time of birth to coincide with non-pollen season* may lessen the likelihood of those infants going on to develop hay fever or asthma.

2. Avoidance of highly allergenic foods in allergic women during pregnancy and lactation.

3. Breast-feeding for at least 6 months as numerous studies have shown that it significantly lowers the incidence of major allergic diseases.

References:

1. **Bahma, S.L.:** *Concordance in atopic twins.* J. Allergy Clin. Immunol. 71, 1 (suppl.), 1983.
2. **Bonini, S. et. al.:** *Atopy in twins.* J. Allergy Clin. Immunol. 71, 1 (suppl), 1983.
3. **Buckley, R. Dees, S.C.:** *Correlation of milk precipitins with IgA deficiency.* N. Engl. J. Med., 281:465, 1969.
4. **Evans, R.W. et al.:** *Maternal diet and infantile colic in breast-fed infants.* Lancet, 1:1340, 1981.
5. **Heiner D.C.:** *Food allergy. N. Engl. J. Med., 304:55 1981.*
6. **Jakobson, 1., Lindberg, T:** *Cow's milk proteins cause infantile colic in breast-fed infants.* Lancet, 2:437, 1978.
7. **Jakobson, I., Lindberg, T.:** *Cow's milk proteins cause infantile colic in breast-fed infants: a double-blind crossover study.* Ped. 74,
8. **Johnstone, E.D.:** *Current concept in the natural history of allergic disease in children.* Ann. Allergy, 46:1 1981.
9. **Johnstone, E.D.:** *Immunotherapy in children: Past, present and future* (parts I,II) Ann. Allergy. 46:1 (I) and 59 (II) 1981.
10. **Juto, P. and Bjorkstein, B.:** *Serum IgE in infants and influence of type of feeding.* Clinical Allergy 10:593 1980.
11. **Juto, P.:** *Elevated serum IgE in T-cell defecient infants fed cows' milk* J. Allergy Clin. Immunology 66:462, 1980.
12. **Kaufman, H.S. and Hobbs, J.R.:** *Immunoglobulin deficiencies in an atopic population.* Lancet 2:1061 1970.
13. **Kaufman, H.S. and Frick, O.L.:** *Prevention of asthma.* Clin. Allergy 11.549 1981.
14. **Kjellman, N.I.M.:** *Predictive value of high IgE levels in children.*
15. **Lake, A.M. et al:** *Dietary protein-induced colitis in breast-fed infants.* J. Ped. 101, 6:906, 1983.
16. **Liebman, W.M. and Frick, O.L.:** *Serum IgE levels and RAST for cow's milk protein. Use in children with recurrent abdominal pain.* Am. J. Dis. Child., 135:741 1981.
17. **Machtinger, S. et al:** *Infantile allergy and milk-specific antibodies in breast milk.* J. Allergy Clin. Allergy. 71,1 (suppl), 1983.
18. **Mathue S. et al:** *Sex steroid hormones and circulating IgE levels.* Clin. Exp. Immunol. 30:40 1977.
19. **Mathews, D.J. et al.:** *Prevention of eczema.* Lancet, 1:321 1977.
20. **Mc. Intosh, K.:** *Bronchiolitis and asthma.* J. Allergy Clin. Immunol. 57: 595 1976.
21. **Mellon, M. et al.:** *No increase in cow's milk sensitization after delayed ingestion in infancy.* 7 Allergy Clin. Immunol. 71, 1 (suppl) 1983.
22. **Michel, F. B. et al.:***Comparison of cord blood IgE concentrations and maternal allergy for prediction of atopic diseases in infancy.* J. Allergy Clin. Immunol. 65:422 1980.
23. **Midwinter R.E. et al:** *Infant feeding and atopy.* Lancet 1:339 1982.
24. **Papangelli, P et al.:** *Difference between normal and milk allergic subjects in their immune response after milk ingestion.* Arch. Dis. Child. 58:201, 1983.
25. **Reisman, R.E., Berinstein, J.:** *Allergy and secretory otitis media. Clinical and immunological studies.* Ped. Clin. North Am. 22:251 1975.
26. **Roberts, S.A. and Soothill, J.F.:** *Provocation of allergic response by supplementary feeds of cow's milk.* Arch. Dis. Child. 57: 127 1982.
27. **Soothill, J.F.:** *Immunodeficiency and allergy.* Clin. Allergy. 2:511 1974.