have observed that not infrequently the colic disappears when an infant is taken from the care and handling of a tense nervous person and placed in the care of one who is relaxed and assured.

But these observations, both on the use of the pacifier and the handling of the infant by a relaxed person by no means rule out the importance of allergy, improper diet and specific food intolerances as causative agents. Every pediatrician has observed infants where the signs of colic subside with shifts to hypo-allergenic formulae. And we have also seen infants respond to changes in the milk or carbohydrate content of formulae, and then there are children who react favorably when specific vitamin preparations or orange juice are removed from the diet.

All these possible factors must be considered by the pediatrician when presented with an infant suffering from colic, but he should also consider the possibility of the emotional causes of this condition, as they apparently are of great significance.

It may be that this hypertonicity of the baby makes him more sensitive to certain materials or certain food proportions, or makes his digestive tract more prone to the absorption of specific proteins. We all know the effect of emotional tension on the allergic response of older children and adults. Perhaps some similar relationship exists in the case of the colicky baby.

### AN ANALYSIS OF ETIOLOGY OF COLIC IN INFANTS

By Lawrence Breslow, M.D.

The subject of so-called “three-months-colic” in infancy can be considered from two major viewpoints. The first, and by far the most popular today, is the emotional or psychosomatic; other papers in this panel consider this in some detail. The second point of view is based on the belief that colic in infants is essentially a manifestation of gastroenterospasm, resulting from overloading the small intestine with disturbing substances. This may be due to a low threshold in a hypertonic (psychosomatic) infant when subjected to an ordinary quantity of poorly tolerated material, or to a normal threshold being exceeded by an abnormal quantity.

With the latter in mind, 90 infants who seemed to have the usual manifestations of colic were studied as to etiology. Five main factors were considered:

1. Poor feeding technique.
2. Hunger.
3. Intolerance to carbohydrate added to the formula.
4. Intolerance to butter fat added to the formula.
5. Intolerance for, or allergy to, cows milk proteins.

After the first 2 factors were eliminated by the usual methods from consideration as a cause of gastroenterospasm, carbohydrate was removed from the formula as completely as possible. In those infants in whom the symptoms disappeared, this procedure was repeated one or more times until there was no question as to the role played by the sugars. If the symptoms failed to be alleviated, the infant was placed on a formula low in, or free of, butter fat. Originally a powdered half-skimmed milk was used but more recently, a reconstituted milk (Varamel®) in which animal and vegetable oils have replaced butter fat. Once again, only those infants in whom the symptoms could be reproduced by the addition of butter fat to the formula were classified in the butter fat intolerance group.
In the cow's milk allergy group, a soy-bean formula was usually used as the substitute. There is a tendency to consider all infants who do well on a milk substitute to be allergic to cow's milk. The simple fact that butter fat is also eliminated necessitates each infant being considered individually with this kept in mind. In this study the following criteria were considered in determining whether an infant was placed in the cow's milk allergy group:

1. Satisfactory response to the elimination of cow's milk from the diet.
2. Recurrence of symptoms on returning cow's milk to the diet.
3. A family history of allergy.
4. Presence of other evidence of allergy, e.g., atopic eczema.
5. Persistence of allergy to cow's milk beyond 3 months of age.
6. Evidence of allergy to other antigens later in infancy.

Most workers in the field of food allergies in infancy (Clein, Kunstadter, Glaser, Ratner) found a strong family history of allergy. Therefore, we believe, that when such a history is present, one of the last 3 criteria would be sufficient for a diagnosis; when a family history of allergy is absent, at least 2 of the latter 3 criteria must be present. Additional information may be obtained by the use of the stool eosinophil smear technique described by Nance and by Rosenblum; by skin tests, or passive transfer tests. In general, if the infant fulfills the criteria discussed previously the diagnosis of cow's milk allergy is justified.

Analysis of the findings from the 90 infants studied showed the following:

1. Poor feeding technique--2 per cent.
2. Hunger--11 per cent.
3. Carbohydrate intolerance--31 per cent.
4. Butter fat intolerance--11 per cent.
5. Cow’s milk allergy--10 per cent.
6. Miscellaneous organic causes--13 per cent.
7. Idiopathic or psychogenic--22 per cent.

As a result of this study we concluded that almost 75 per cent of all infants with three-months-colic will be benefited by intelligent management of feeding habits and formulae, and that a "laissez-faire" attitude is not justified.

**COMMENTS ON THE PANEL DISCUSSION OF COLIC**

**Summary**

*By Bret Ratner, M.D.*

Dr. Glaser requested me to summarize the subject matter presented at this panel. In his opening remarks Dr. Glaser implied that the broad pediatric attitude rather than the purely allergic approach towards the subject of colic would be stressed. I do believe that this has been achieved.

It should be obvious that it is not always wise to refer a colicky baby for an allergic work-up. I am certain that if the pediatric allergist did have such an infant referred to him, he would have to muster all his general pediatric knowledge to effect the proper solution.

It appears to me that if the colicky baby has a basic allergic cause for his intestinal spasms the increased use of heat-denatured foods, such as certain of the proprietary modified cow's milk formulas, and other heat denatured milks, hard boiled eggs (in those few instances in which the infant is not sensitive to ovomucoid), either precooked cereals which are marketed today or cereals that are thoroughly cooked at home, and precooked canned foods, would have had a great influence in reducing the incidence of colic in infants. Some of this
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