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Prophylaxis of allergic manifestations in childhood

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THE PROPHYLAXIS OF ALLERGIC MANIFESTATIONS IN CHILDHOOD

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I

INTRODUCTION

It is my belief that medicine of the future will be focused more and more upon the prevention of disease. If we can check the progress of a disease that is already manifest, it seems reasonable to believe that we can arrest or impede progress at an earlier stage.

Some day, perhaps, we shall understand the highest level of medical practice to be the promotion of optimum efficiency and the prevention of disease rather than a belated attention to those who have already suffered disability, who already present advanced body lesions.

One of our leading medical problems affecting millions of people is that of allergy. Allergic manifestations too often have a punishing effect throughout life; they may be extremely handicapping and even persistent. Unless one is closely associated with an infant who has serious eczema, or an adult with marked asthma, he usually has little idea how devastating is the effect these conditions have upon everyday activities and everyday state of mind.

There is a vast amount of medical action that can be taken to prevent the appearance and progress of allergic manifestations. The following thesis deals with allergy

in childhood; its focus is primarily upon children predisposed by heredity toward the pathological state. Although many aspects of the subject are highly controversial, I believe that I have expressed the consensus of opinions of a majority of allergists and pediatricians relating to methods of prophylaxis of allergic manifestations in childhood.

II

GENERAL CONSIDERATION

Swartz (1) states that one out of every eight children in the United States is an allergic child, and that at least 10 per cent of the entire population suffers from allergic diseases. From this, one can rapidly deduct the magnitude of this problem and the benefits to be derived from the prophylaxis of allergic diseases in childhood.

According to Glaser (2), most allergic disorders begin in childhood, and therefore the prophylaxis of allergy is the ideal form of therapy, and is the particular province of those dealing with children. We are only now, through the studies of hypothalmus-pituitary-adrenal axis, beginning to get leads to constitutional abnormalities which render an individual susceptible to allergic disease.

The mechanism of sensitization depends on the type of allergy involved. The inhalants, as the name implies, occur in the environment of the patient or in the atmosphere, creating sensitization through the respiratory tract. Pollens, ubiquitous and probably uncontrollable, fall into this category. Other inhalants, such as feathers and animal dander, are controllable. Allergens found in food cause symptoms upon ingestion, and these symptoms are alleviated by diets.

The presence of the allergic tendency, whether inherited or acquired, does not result in clinical allergy unless sensitization occurs by exposure to potent allergens. A large part of allergic treatment, therefore, consists of elimination of offending allergens from the diet or the environment. It is, therefore, much wiser to avoid exposure in the first place, thereby substituting prevention for the need of cure of allergies.(3)

III

HEREDITARY BASIS FOR ALLERGIC DISEASES IN CHILDREN

According to Peshkin (4), allergic disease is not inherited per se, but the "soil" physiochemic make-up or tendency to develop allergic disease is inherited. A child with such a predisposition in an unfavorable environment

at the proper time will develop allergic disease.

Vaughan (5) points out that the children of allergic parents are more liable to develop allergy, and at an earlier age, than the children of parents who appear to be nonallergic.

The heavier the allergic inheritance, the greater is the number of offspring who will develop allergy. The heavier the allergic inheritance, the earlier will be the ages at which the symptoms appear. It has been estimated that nearly three-fourths of all children with bilateral allergic inheritance will eventually develop the disease. About one-half of those with unilateral inheritance do likewise. The heavier the inheritance, the greater will be the number of different allergic manifestations in each of the offspring.

It is generally agreed that it is not the allergic manifestation itself which is inherited, but rather the tendency to become allergic.

The inheritance of allergy, according to the most logical theory so far presented, is best explained as follows: The inheritance of allergy depends upon the presence of an abnormal or allergenic gene; and when two such genes appear in the chromosome, frank allergy will develop early in life; and when an allergic gene is combined with a normal or non-allergenic gene, allergy may develop later on

in life after puberty or not at all, or else in minor form. However, the tendency is again transmitted to the offspring, and when no allergenic genes are inherited allergy will not develop. There are many apparent exceptions to these rules which may or may not be due to insufficient information about the patient's inheritance.(5)

Urbach (6) states that it is the physician's duty to try to persuade an allergic patient not to marry a mate who also suffers from asthma, migraine or neurodermatitis, for fear of passing their hypersensitivity on to their offspring in increased degree. Although this sounds like a very radical step to take, Glaser (2) also states that individuals that are allergic should be warned that such a marriage carries certain risks with it; but he does not believe it is practical to tell these individuals not to marry.

Glaser also states that even if allergic individuals should marry, not all of their offspring will necessarily suffer from severe allergic diseases. The offspring may not present any allergic tendencies or may merely demonstrate a transient eczema or a mild pollinosis. On the other hand, if one or both of the parents suffer from disabling asthma, then there is a good chance that some or all of the children may be affected with severe asthma or some other allergic disease.

A potentially allergic child may then be defined as one who has one or more allergic parents or siblings. A study by Dr. Glaser (2) in his practice revealed the astonishing fact that approximately 60 per cent of such children developed major allergic disorders before they reached six years of age. This argues strongly in itself for a hereditary factor in allergy, since it is obvious that 60 per cent of the average pediatrician's practice, in regard to children six years of age or less, does not consist of major allergic diseases.

IV

ALLERGY IN INFANTS DUE TO MOTHER'S DIET DURING PREGNANCY

Assuming that one or more of the parents or siblings in a given family are allergic, the next point to consider is whether any form of management of the pregnant mother of a potentially allergic infant may help prevent allergy in the expected child. In Glaser's (2) private practice, he routinely advises the pregnant mothers of potentially allergic infants to avoid eggs as such, and foods consisting largely of eggs. It is also recommended that the mothers drink not more than a pint of milk a day boiled for ten minutes, and that they eat no cheese. They are instructed to eat meat in a variety of forms as their

chief source of protein, and to take added calcium and phosphorous tablets to make up for what they do not get of these elements in the milk. The same diet is given to the mothers who plan to nurse their baby, and is continued as long as she continues to nurse, after which she can go back to her regular diet.

Shannon (7), as long ago as 1922, argued that breast milk may transmit foreign proteins derived from the foods in the mother's diet. He believes that these proteins are responsible for eczema in a large percentage of breast fed babies. He had eight cases in this study, all of which developed eczema early in infancy, and all of which improved after the offending item had been removed from the mother's diet.

In cases in which all the foods cannot be eliminated from the mother's diet, the child should be weaned or the mother should limit the amount of the offending food that she eats. There appears to be a threshold in the mother up to which the food may be eaten without appearing in the breast milk. Also, the mother should eat a large variety of foods in her diet, and only a small quantity of any individual article. Eggs should be restricted rather than forced in the mother's diet.

Ratner (8) believes that intrauterine sensitivity in the fetus may occur, if the mother herself is sensitive to

a food, and that she may then passively sensitize the infant to that particular allergen. The prospective mother should therefore (a) eat a widely varied diet, (b) discourage over-eating, (c) avoid excessive indulgence in any single protein food, and (d) avoid satisfaction of all food cravings.

Sensitization may occur to common foods that are taken in excess, milk, eggs, and wheat being the chief offenders. Seasonal foods that are eaten at infrequent intervals and in great quantities, such as berries, shell food, nuts, seasonal fruits, and vegetables, are also potential sensitizers.

V

BREAST MILK ALLERGY VERSUS ALLERGY TO COW'S MILK

Grulee and Sanford (9) have done a great deal of work on the topic: the influence of breast and artificial feeding on infantile eczema. The 20,061 babies represented in this study represent a five-year period in which each infant was fully followed.

An infant was considered as suffering from infantile eczema if there were any lesions on the face or body at the time of examination. None of these infants received any treatment except the discontinuance of soap and water

to the skin and the use of only olive oil for cleansing purposes. None of the feedings were changed in any way. In the artificially fed infants, 1.5 ounces of boiled cow's milk and .1 ounce of cane sugar per pound body weight per day were used. In all infants cod liver oil, orange juice, cereals, and vegetables were added to the diet.

In the total number of cases recorded, there were twice as many babies with infantile eczema in the partially breast-fed group as in the breast-fed group and seven times as many in the artificially fed group as in the breast-fed group. Another interesting fact is, while in all groups the numbers are almost the same for the first three months, thereafter there is a rapid increase in the artificially fed group, without any particular decrease at the end of the nine month period. While, on the other hand, in both the completely breast-fed infants and the partially breast-fed infants, the incidence of infantile eczema increases until the sixth month, and then decreases markedly through the ninth month.

In the seasonal incidence all groups are increased in the winter and decreased in the summer and autumn.(9)

Seltzer (10) states that in allergic families if the baby must be bottle fed, one should be aware of the statistics that about one out of every fifteen of these babies is allergic to cow's milk, and that one should have some

suspicion of any milk formula in allergic families.

According to Ratner (11), sensitization may occur in the neonatal period of life when a newborn infant receives one or several relief bottles of raw or evaporated milk during the first two weeks. Then when the baby is put back on the breast entirely, the milk sensitivity will not be evidenced until weaning of the infant is attempted.

"One baby's formula may be another baby's poison," according to Clein (12). Although so many babies thrive on cow's milk feedings, others may be distressed by simple colic or become desperately ill as a result of an allergy or sensitivity to cow's milk. Milk is a common factor as a cause of symptoms in infants and children. This study is primarily a clinical analysis of 140 infants allergic to cow's milk whose symptoms were almost immediately relieved by elimination of cow's milk and substitution with soybean milk.

The symptoms in most infants due to milk allergy began at two to four weeks of age. Goat's milk is of doubtless value in such cases as a cow's milk substitute, because of the crossed reactions of the casein in animal milks.

Forty-two per cent of the 140 cases of milk allergy were manifested by eczema; 39 per cent by pylorospasm; 29 per cent had severe colic; 20 per cent were unhappy all

the time; 24 per cent had diarrhea; others, but more rarely, had asthma, toxemia, coughing, and constipation.

A majority of the infants allergic to cow's milk had several symptoms at the same time. Two or more major symptoms occurred in 81 infants of the 140 cases. Eczema accompanied by allergic pylorospasm and colic or both was the most frequent combination.

Most babies were able to tolerate cow's milk after abstaining for three to four months. Fifteen per cent were still unable to tolerate cow's milk after one year of age.(12)

Shulman (3) states that evaporated milk is the first choice whenever breast feeding is not possible for one reason or another. The low antigenicity of the lactalbumin in evaporated milk has been firmly established. If allergic symptoms do appear on an evaporated milk formula, soybean milk should be substituted. Once evaporated milk has been established and no symptoms occur, it should be continued as the only type of milk given for the entire first year of life. At the termination of this period, absorption of undigested protein through the intestinal tract is less likely to occur.

With the knowledge that infants within the short period of the first three to six months of life could develop immunologic protection against such a potent

allergen as egg white, the thought occurred that if the infants could be started on some other food than the traditional cow's milk during this period of physiologic immunologic immaturity, the symptoms of milk allergy might be avoided, or at least minimized. This pertains especially to those children which come from allergic parents as discussed previously in this paper.

For the above reasons a cow's milk substitute needs to be available.(2)

Hill and Stuart (13), in 1929, introduced a commercially available soybean milk for the first time. They fed about 40 babies on soy bean milk formula: one, for more than eight months, several others for periods of two months or more. These babies have done very well, and it was believed by them to be a good substitute for milk when it is not desirable to use the latter.

Shortly after this, Glaser (2) began feeding newborn potentially allergic infants soy bean milk as their sole source of protein. The starting formula was usually one-third of a soy bean preparation and two-thirds water, which was gradually increased to equal parts of soy bean milk and water as the infant became accustomed to the formula. In a few instances this may lead to diarrhea and irritation of the buttocks which may be of serious enough nature that the soy bean feeding may have to be discontinued.

The results of the soy bean feedings from time of birth to six months of age were very good. Only eight per cent of their experimental group developed eczema as compared with 30 per cent of the control group. The eczema in this eight per cent was of course due to other factors than cow's milk. In a few instances where there was a congenital sensitivity to cow's milk the infants reacted when again fed cow's milk at an average of six months of age. In only one instance, however, was the milk sensitivity retained after further prolongation from cow's milk.

Some authorities argued that even if this did prevent milk sensitization it could hardly be expected to prevent subsequent sensitization to other allergens as the child grew older. However, in Glaser's (2) clinic, it was confirmed that once the allergic state is established it tends to be followed by the development of other allergic diseases. For this reason they kept track of their patients as they grew older. They found that only about 15 per cent of their experimental group developed major allergies before the age of ten years as compared with about 60 per cent of their control group. Thus there is a fourfold increase in incidence of allergy in potentially allergic children started on cow's milk from birth as compared with those started on soy bean milk. It must be further emphasized that to be successful this regime must

be instituted from the moment of birth, throughout the first six months of life.(2)

As long as the mother nursed the baby they were kept on this diet, but if at birth any supplementary milk needed to be supplied to a potentially allergic infant, it was supplied as soy bean milk, or if she didn't breast feed at all soy bean milk was used as the sole source of food. Sixty-seven infants were started on this regime. The majority of the infants remained on this special diet five to nine months, and at the time they were taken off soy bean milk 14 weighed less and 28 more than their expected weights for their ages and birth weights. Of the 29 infants who were followed for over one year, the weights of 24 of them exceeded their expected weights at one year of age. There were no clinically detected differences in dentition, activity behavior, intelligence, or other physical attributes between these children and infants of comparable age and social and economic backgrounds in their practice.

Of the 67 infants, nine were thought to be intolerant to soy bean milk during the neonatal period. The symptoms necessitating the discontinuance of soy bean milk in these nine infants were as follows: Two had persistent diarrhea, two had emesis, two had colic, two had diarrhea and emesis, and one had diarrhea, emesis and atopic dermatitis. They felt that this intolerance was probably dependent upon

physiological and anatomical immaturity of the intestinal tract, rather than on allergy to soy bean milk. Eleven infants at some time had emesis while on soy bean milk, but all but five of these responded to customary medication and were able to continue the soy bean milk. Twenty-two infants had varying degrees of diarrhea while on Mul Soy. Only five did not respond well to symptomatic medication and required discontinuance of the soy bean milk. Three infants developed atopic dermatitis while on soy bean milk, but only one case was severe and it was suspected of representing a true intolerance to Mul Soy. Eleven infants had varying degrees of colic, but in only two was this of sufficient magnitude to require discontinuance of the soy bean milk. Two infants developed allergic phenomena due to ingestion of spinach while on Mul Soy formula. There were no other instances of definitely allergic phenomena in these 67 infants while on the Mul Soy formula.

At the time these 67 infants were first given cow's milk feedings, four children were thought to have some difficulty tolerating cow's milk formula. One developed mild loose stools when taken off Mul Soy at eight months of age; another taken off at five months developed severe colic from evaporated milk. A third infant began to vomit when given whole cow's milk in his diet for the first time.

While these cases must be considered as instances of congenital sensitivity to cow's milk, the possibility that these infants, during their hospital stay following their delivery, may have received, by error, one or more unrecorded feedings of cow's milk formula cannot be excluded. (14)

In reply to various critical comments about the feeding of soy bean milk to potentially allergic children instead of cow's milk, Glaser and Johnstone (15) completed the following experiments.

As many varieties of controls as possible were established, and thereby they worked out a control group of infants unrelated by blood to their experimental group. This was done by going through their records serially, selecting as controls infants with a background similar to those of the experimental group, and following these control groups for at least a corresponding period of time.

If a girl infant in the experimental group had a father with asthma, a mother with hay fever, and a brother with eczema, it was attempted to find her counterpart in an unrelated family to use as a control. This was a task of tremendous proportions. It took them 11 months of their spare time to review the records of 4,710 children in 1,215 allergic families. Of this group 175 children were found suitable for such a control group. The results of this

study showed a remarkable correlation between the sibling control group and the unrelated control group. Fifteen per cent of the experimental group were shown to have developed major allergies by the age of six years as compared with 64 per cent of the sibling control group and 52 per cent of the nonrelated control group. Thus the incidence of major allergy in the three groups is approximately four times as great in the two control groups as in the experimental group. The probability that this difference is due to chance is less than one in a hundred. Chi Square equal 16 $p <$ than .01.

Only about seven per cent of their experimental group developed eczema as compared with about 30 per cent of the control groups.

It is not surprising that in preventing early allergy to milk the infants had less allergy later on in life, since it is well known that once an allergic disease appears in a child others commonly follow: as, for example, the well known colic, eczema, hay fever, and/or asthma complex.

It was also of interest to Glaser and Johnstone, in these experiments with infants that were completely fed on soy bean milk from the moment of birth on, whether or not it would make any difference when cow's milk was first introduced into their diet.

The 88 infants who were used in this experiment were first introduced to cow's milk at the following ages: under one month, five; one to three months, 19; three to six months, 17; six to nine months, 50; and over nine months, five. Their allergic histories were reviewed up to the time of this writing for the incidence of allergic disorders previous to and after the introduction of cow's milk into the diet. The follow-up periods were: 7 to 12 months, 15 patients; 1 to 2 years, 14; 2 to 5 years, 45; and 5 to 10 years, 22 patients.

Only three infants developed any symptoms when started on cow's milk; one at 5 months; one at 8 months; and one at 4 months of age. One of these developed mild loose stools, one severe colic, and one had slight vomiting. According to this (16), it made little difference when the infants were started on cow's milk.

VI

ALLERGIC REACTIONS TO FOODS OTHER THAN MILK

Relationship of Allergy to Age of Infant When First Given Various Foods

Indiscretions in diet, such as overeating, eating hurriedly, or the eating of improperly prepared foods, are factors that play some role in allergy. The drinking of

iced liquids and the eating of ice cream may be harmful. When the body is overheated, the drinking of iced liquids may initiate the onset of asthma of a severe degree.(4)

Seltzer (10) states that as the baby grows older the new foods should be added slowly, one at a time, and infant should be watched particularly for food reactions and then these foods eliminated quickly. The problem is not merely that of food allergy alone, since many of these food allergies are outgrown, but rather that one allergic reaction lowers the tolerance to other allergens and may set up a chain of other allergic reactions, like the frequently seen problem of the baby with multiple food allergies who just "outgrows" them, only to be followed by an allergic rhinitis which he again "outgrows" and finally is left with a life-long bronchial asthma.

The period necessary for the development of symptoms after the introduction of a new food is not definitely known. However, an arbitrary time of 14 to 21 days has been adopted. Immediate symptoms are detected readily and such a trial period allows sufficient time for cumulative effect to become apparent.(3)

There are occasional instances reported of sensitization apparently acquired by over-indulgence in specific foods. Ratner and associates (17) have warned that fad diets, which are usually composed of a limited number of

foods and very often raw foods, may be a potential source of food sensitization.

Deisher and Goers (18) divided 85 infants into two groups, to see if they could determine whether the early or late introduction of solid foods into the infant's diet would make any difference in the incidence of allergy in these infants. One group was introduced to solid foods before the fourth week of life and the other group during the ninth to twentieth week period. Growth between the two groups was comparable, as was the number of illnesses, character of the stools, number of stools, incidence of diarrhea, constipation, colic, excessive regurgitation, and number of food refusals. This experiment, therefore, would help us to believe that it makes little difference when the solid foods are introduced into the baby's diet.

However, many pediatricians believe it makes a great deal of difference as to which foods are first introduced into the infant's diet.

Eggs

In 1929 many pediatricians started infants on raw egg yolk at the age of three months, but it was soon discovered that many of these infants developed rashes or other evidence of intolerance, and within a few years this practice was almost universally discontinued. Egg yolk subsequently

was not introduced into the diet until the age of six to nine months of age, when it was much better tolerated. This observation suggested that during the interval between three months of age and six to nine months of age the infant developed some type of protection against allergy to egg. Egg, when eventually added to the infant's diet, should preferably not be given before the age of one year, and should then be started gradually in the form of hard-boiled egg yolk, and hard-boiled egg white should be added only if the yolk is well tolerated. Later on, if the baby gets along well on the hard-boiled egg, eggs can be cooked by other methods and given a trial.(2)

Shulman (3) also agrees that eggs should first be introduced to an infant in the form of hard-boiled egg yolks, and if no reaction occurs after two to four weeks of daily ingestion, one may safely assume that no sensitization has occurred and proceed to add egg white in small quantities. The reason for this is that the egg white is the portion which carries most allergic reactions with it.

Wheat, Cereals, Vegetables

Based on the same general reasoning as for starting potentially allergic infants on soy bean milk instead of cow's milk to avoid sensitization, Glaser (2) feels that it is also unwise to start potentially allergic infants on such an important food as wheat for the first cereal. The

infant should first be started on other cereals, as barley, oats, rice, and corn, using these successively so as to give the infant as great a variety as possible, introducing wheat cereals when the infant is between nine and twelve months of age.

In a study of 27 infants allergic to one or more of the cereal grains, it was found by Vaughan (19) that 10 were allergic to but one; ten to two cereals, five to three, and two to four of them. Twenty-four gave positive reactions to wheat, eight each to rye and rice, seven to corn, and three each to barley and oats. All who had trouble with rye, barley, and oats also had symptoms from wheat cereals.

It is thus obvious that allergy to wheat is decidedly more common than to others of the cereal grains, and that in a large number of cases one or more of the latter may be substituted for wheat. These conclusions were not based on skin reactions but on the actual experiences of the patients following dietary trials over a sufficiently long period to be conclusive.

Shulman (3) prefers the introduction of cereals into the infant's diet in the form of rice, the least antigenic of all the cereals. Wheat may be introduced later on in the pure form but if symptoms occur, it should quickly be withdrawn from the infant's diet.

At about the age of six months, vegetables may be introduced into the diet of the infant, but this should be individual vegetables, not mixtures.

Orange Juice and Vitamins

Sensitivity to meats, fruits, and vegetables occurs much less readily than to the cereal grains, but the same general principles apply, that one should use as much variety as is practical, to avoid sensitization to any one of the foods. The potentially allergic infant should not be fed orange juice daily despite its low antigenicity when free from seeds and oil, the ascorbic acid deficiency being made up by adding ascorbic acid when necessary.(2)

Orange juice protein does not appear to traverse the gastrointestinal wall readily even when ingested in large amounts. Only in rare instances does true orange allergy produce such clinical manifestations as urticaria, asthma, or eczema. In these rare instances the symptoms seem largely or entirely to be due to orange seed protein. Though orange seed protein does not readily traverse the wall of the gastrointestinal tract, it was demonstrated to induce allergic reactions when injected parenterally into passively sensitized subjects.

Orange peel oil possesses toxic and irritative properties, but is non-allergenic. The local dermatitis and

gastrointestinal symptoms generally attributed to allergy due to orange are not always allergic in character, but rather pseudoallergic dermal and gastrointestinal irritation produced by the primarily toxic orange peel oil.

"Bib" orange juice which was the only processed product tested in the present study is devoid of seed protein and orange peel oil. It is, therefore, free from allergenic properties found in seed protein and from the non-allergenic irritant found in orange peel oil. "Bib" orange juice can, therefore, be safely ingested by patients who are allergic to seed protein.(17)

Between the ages of one to four weeks, it is essential to add vitamins A, C, and D to the baby's diet since milk is deficient in adequate amounts of these vitamins. In the potentially allergic infant, this should be done by the use of ascorbic acid for vitamin C, and a synthetic vitamin for A and D.(3)

Fish and Other Foods

Fish should not be added to the infant's diet until he is at least one year old, and nuts not until much later on in life.(2)

Beef juice may be introduced at about eight to nine months of age. If this is well tolerated in the allergic sense, one different well-cooked meat may be added at each monthly change of diet.(3)

The ingestion of such foods as sweet corn, cheese, goose, turkey, pork, ham, radish, mustard, pickle, cucumber, beans, cooked cabbage, mushrooms, parsnips, squash, sweet potatoes, herring, sardines, tuna fish, berries, raw peaches, melons, and delicatessen foods are all predisposing factors to the development of asthma in some infants and children who are allergically predisposed or inclined. (4)

VII

ALLERGIC REACTIONS DUE TO PHYSICAL ENVIRONMENT

Urbach (6) states that, before a child of allergic parents is born, arrangements should be made to prepare the infant's future environment in such a manner that there will be a minimum of exposure to inhalants such as feathers, hair, kapok, and dust. Carpets and drapes are to be removed from the room. The floor should be covered with tile or linoleum. Fuzzy toys should not be permitted and dogs and cats kept away. The mother or nurse and others should wear simple white cotton clothes and not garments of silk or wool. The child should be kept in his room and not be taken elsewhere in the house.

Glaser (2) also states that the environment of the potentially allergic child deserves careful consideration.

The bedroom should be as free from dust as possible, and also free from cooking odors, tobacco smoke, cleaning fluid, mothballs, gasoline, and other strong irritating odors.

The word epidermoid means the dust or dander from the fur or feathers of an animal. Allergic individuals possess the property of becoming sensitized with relative ease to these substances, which should be avoided as a prophylactic measure, regardless of the result of skin tests. There should be no animal pets with fur or feathers in the household of an allergic individual.

Patients sensitive to epidermoids should avoid places where animals are congregated, as in zoos, barns, and dog shows. If the patient does not own an animal pet he should refrain from acquiring one and if he does own one he should get rid of it.

The patient should avoid feather pillows, using an air foam pillow or a plastic one. The pillow should be enclosed in a dust-proof cover. There should also be no feather or down comforters in the bedroom. When the patient grows older he should even avoid picking feathers from fowl and should not enter chicken coops. The best mattress for the allergic patient to use is one made from sponge rubber enclosed in a dust-proof cover. Coarse woolens are to be avoided. It is better to use cotton or

synthetic fiber blankets. Also avoid using wool socks, coarse wool sweaters and sheepskin lined coats. Ordinarily finely woven wool cloth does not cause trouble except in cases of extreme sensitivity, but even then is best avoided if possible. Kapok and furniture and pillows stuffed with cottonseed should also be avoided.(2)

No insect sprays or pyrethrum compounds which is closely related to ragweed pollen should be used in the nursery. No wooly stuffed toys should be introduced for the allergic child to play with since these are often filled with cotton lint, feathers, or kapok, all of which are potent allergens.

A non-allergic dusting powder should be used for infants, and highly scented baby oil should be avoided. Shampoo lotions as allergens are well recognized, and a simple castile soap will serve very adequately.(3)

It is very important, according to Glaser, to make the allergic child's bedroom as free from dust as possible. The following are a number of methods of reducing the dust in the child's room. First of all, steam heat is preferred to hot air heat, because it helps settle the dust in the room by making a more humid atmosphere possible. The woodwork and floors in the room should be thoroughly cleaned, and holes and cracks must be sealed with tape. The floor or linoleum must be oiled or waxed, and if

linoleum is used it must be cemented to the floor to prevent dust from gathering beneath it. The room should contain only one bed, preferably an iron one. If box springs are used, they must be covered with dust-proof covering, as should the mattress. No kind of mattress pad should be used, and no fuzzy wool blankets or feather or wool filled comforters should be used. The sheets and blankets used should be laundered frequently to avoid dust accumulating on them.

A wooden or metal chair which has been scrubbed may be used in the bedroom. Rag rugs washed once a week may be used on the floors. Plain, light curtains, if used in the room at all, should also be washed once a week. The room should contain a minimum amount of furniture and furnishings, and no upholstered furniture should be used in the room. The room must be cleaned daily and given a thorough and complete cleaning once a week. The furniture and woodwork should be cleaned with a damp cloth or oil. The room should be mopped and aired thoroughly, and then the doors and windows should be closed, until the patient is ready to occupy the room.

The doors and windows of the room should be kept closed as much as possible, especially when the room is not in use. This room should be used for sleeping only, as the child can dress and undress and keep his clothing

in another room.

If the patient is a child, do not keep toys which will accumulate dust in the room; use only washable toys of rubber, iron, or wood. Also care must be taken to keep down the dust in the entire house, and the best way this can be done is by the use of air conditioning which would allow the windows and doors to remain closed most of the time.

No fabric other than previously washed white cotton should come into contact with the patient's skin. The cotton clothing should be washed by itself, and all soap should be carefully rinsed out of it, as the patient could also be allergic to the soap used for washing the clothes. It should be carefully watched that no wool blankets or clothing touch the patient's body.(2)

According to Kern (20), the choice of an occupation is an important one for the potentially allergic individual. Those that are sensitizable should avoid occupations that would expose them to considerable amounts of organic dusts. Yet patients are constantly making unwise selections, as did a patient with allergic rhinitis who took up chicken farming and got a feather sensitization and asthma for his pains.

VIII

ALLERGIC REACTIONS PRECIPITATED BY VARIOUS FACTORS

Injected Foreign Proteins

As a general rule, injections with foreign serums should be undertaken only when absolutely necessary, since they very frequently tend to allergize the patient. Toxoids should be employed in preference to the antitoxins in all cases where this is at all feasible.(6)

Several cases have come to light in which the injection of diphtheroid, tetanus, or scarlet fever antitoxin were responsible for initiating the onset of asthma associated with varying degrees of anaphylactic shock.(4)

Medications

Preventive measures in the use of medications should be used in all members of allergic families. All such individuals should be urged to get tetanus toxoid in order to avoid the need of exposure to antitoxins.

In general, it is safer to use oral medications than injectable ones in allergic families whenever possible. Injectable vitamins, penicillin, liver, hormones, etc. are a frequent cause of allergic reactions, and in most cases could be replaced by oral products.(10)

Glaser (2) states that the incidence of penicillin

reactions and the greater frequency of their occurrence in the allergic child makes it good medical practice not to use penicillin, but some other antibiotic or a sulfonamide drug whenever possible. The oral route also produces less sensitization than does the parenteral route, so should be used whenever practical. In this regard it is a good idea to rotate the various antibiotics used in allergic children for successive illnesses, thus diminishing the chances of sensitivity to any one antibiotic drug. It is also important that the allergic child be protected from other members of the family who have acute or chronic respiratory infections.

It is good pediatric practice to try to prevent bacterial complications of measles, as with Benzathacil and aqueous procaine penicillin G. Of 61 cases of measles who received a single injection of Benzathacil, 600,000 Units, in children less than five years of age, and 1,200,000 Units in children five years or older, only two developed bacterial complications.

No complications were observed in 67 patients, subsequent to four daily injections of 300,000 Units of aqueous procaine penicillin, or in 47 cases after treatment with 600,000 Units of aqueous procaine penicillin on alternate days. The results following treatment with both the Benzathacil and aqueous procaine penicillin were in striking

contrast to the controls of whom 27.6 per cent developed bacterial complications, mainly being pneumonia. The fever of the treated groups was also of shorter duration than in the control cases of measles who received no antibiotics.(21)

Surgery

Surgery in allergic families can be a "double-edged sword." Poorly timed surgery can lead to the actual initiation of allergic symptoms. Elective ear, nose, and throat surgical procedures should be postponed in allergic families during high pollen seasons or in the presence of mild allergic symptoms. Surgery done at this time has led to the onset of asthma or hay fever too often to be mere chance. When we realize that the open surgical field allows far more rapid absorption of allergens, one can rapidly understand the problem.(10)

Glaser (2) also believes that it is inadvisable to remove tonsils and adenoids, or doing intranasal operations on children with pollinosis during the pollen season, for such operations are "known to predispose the child to asthma."

Infectious Diseases

Peshkin (4) studied the role played by intercurrent infectious and other diseases peculiar to childhood in

initiating the onset of asthma. He had a series of 100 cases of asthma in children aged six months to 14 years. Pertussis was responsible for initiating the onset of asthma in 15 per cent of the cases, measles in 4 per cent, and scarlet fever in 2 per cent, a total incidence of 21 per cent which is sufficient incidence to command attention, especially from the standpoint of prophylaxis.

Likewise, infection of the upper respiratory tract superimposed on an allergic rhinitis or bronchitis adds greatly toward precipitating the onset of asthma. A history of recurrent rhinitis or bronchitis or both, occurring in any season of the year, preceded the onset of asthma in 33 per cent of the cases. Acute pneumonia was responsible for initiating the onset of asthma in 14 per cent of the children. In most of the children, asthma commenced directly after pneumonia, and in a few cases recurrent bronchitis followed pneumonia and persisted for six months to one year before asthma appeared.

Ratner (8) also states that it is well known that certain diseases such as pertussis, pneumonia, measles, and scarlet fever, often antedate the asthma. Therefore, all available methods of immunization against the infectious diseases should be employed.

Glaser (2) believes that potentially allergic or allergic children exposed to measles should be treated with

immune globulin for the purpose of modifying the disease, because of the tendency of pulmonary complications in such children to pave the way for asthma. Even mild cases of measles should be vigorously treated with antibacterial drugs so as to reduce the incidence of pulmonary complications which in a child with a respiratory allergic disease has a marked tendency to hasten the onset of asthma.

It was pointed out by Schloss (22) that following acute gastrointestinal episodes, probably due to the increased permeability of the bowels at such a time, infants and children may become sensitized to foods which they previously tolerated. In acute gastrointestinal disturbances and in their convalescence, therefore, a large variety of cooked foods of low antigenicity should be eaten, especially in children with allergic tendencies.

The experiments done by Schloss on the intestinal absorption of antigenic protein is summarized as follows: Normal infants were observed whose foods contained proteins which they had not ingested previously in order to determine whether sufficient antigenic protein was absorbed from the intestinal tract to cause the appearance of specific precipitins. Normal infants were used who received egg white, sheep serum, and almond in their food.

The proteins were fed in the following fashion: 6-12 gms. of powdered egg white, 30-60 cc. of sheep serum,

or 15-30 gms. of almond meal were added to the day's food. The infants received, therefore, a relatively low concentration of the added protein. Precipitin tests on the blood of each patient were made before the special proteins were added and afterwards at approximately 72-hour intervals.

Thirteen normal infants were fed egg white in the quantities mentioned. In 10 infants the precipitin appeared 9-14 days after the addition of the egg to the food. In the other three cases it appeared at 28, 30, and 40 days later.

The results from feeding sheep serum were practically identical. The three infants in this group showed precipitin to sheep serum at 8, 13, and 19 days after sheep serum had first been ingested.

Twelve infants or young children were fed almond meal. Nine developed precipitin from 9-15 days after the special feeding began.

Of special interest was a group of nine infants who were observed when they began to ingest cow's milk. They had previously received human milk exclusively and were either abruptly weaned or were given one or more feedings of cow's milk in addition to human milk. All of these infants developed precipitin for cow's milk at intervals of 17,12,16,13,25,15,10,8, and 12 days respectively, after

the ingestion of cow's milk was commenced.

It is significant that in most of these observations the precipitin appeared promptly, usually in about two weeks, but the degree of precipitin formation was relatively slight, and the precipitin could be demonstrated in the blood for a comparatively short period of time only. This demonstrates that when normal infants ingest cow's milk, egg albumin, sheep serum, or almond meal for the first time, sufficient protein is absorbed in antigenic form to provoke the production of specific precipitin in the blood. The early disappearance of the precipitin would seem to indicate that such absorption is of relatively short duration. A consideration of the exact mechanics involved in the absorption of antigenic protein and the cessation of such absorption would be largely speculative and therefore out of place at this time.(22)

Miscellaneous

In the child predisposed to allergy, various non-specific factors may be responsible for hastening the onset of asthma. Physical over-exertion is probably one of the most important of these non-specific factors that predispose to asthma.(4)

IX

SUMMARY

When one realizes that one out of every eight children in the United States is an allergic child, and that at least 10 per cent of our entire population suffers from allergic disease, one readily sees the magnitude of this problem and the benefit that would be derived from the prophylaxis of allergy in childhood.

It is firmly believed that there is a strong hereditary basis for the development of allergy in children whose parents are affected by allergy. The heavier the allergic inheritance, the earlier will be the ages at which the symptoms of allergy will appear in the offspring, and the greater will be the number of different allergic manifestations in each of the offspring.

Glaser defines a potentially allergic child as one who has one or more allergic parents or siblings. In his practice an astonishing 60 per cent of such children developed major allergic disorders before they reached six years of age.

It is also advised that pregnant mothers of potentially allergic infants should avoid certain foods so as not to sensitize the infant even prior to his birth. Especially it is important for the mothers to avoid eggs as

such and foods consisting largely of eggs. They should also drink no more than a pint of milk a day, and should eat no cheese. They are instructed to eat meat in a variety of forms. This same diet is given to mothers who plan to nurse their babies as it is believed that the infants can be sensitized to protein antigens through the breast milk.

Grulee and Sanford studied 20,061 infants over a five-year period, from birth to five years of age, to establish the influence of breast and artificial feeding on infantile eczema. In the total number of cases recorded, there were twice as many babies with infantile eczema in the partially breast-fed group as in the breast-fed group, and seven times as many cases in the artificially-fed group as in the breast-fed group. Seltzer states that in allergic families, if the baby must be bottle fed, we should be aware that about one out of every fifteen of these babies will be allergic to cow's milk.

Because of the high incidence of allergy to cow's milk in infancy, Glaser started feeding newborn potentially allergic infants on soy bean milk as the sole source of protein. This was kept up from time of birth to six months of age. Only eight per cent of their experimental group developed eczema, as compared with 30 per cent of the control group. In the majority of the cases no trouble with

eczema was encountered when the babies were switched to cow's milk at six months of age. Glaser confirmed his idea that once the allergic state is established it tends to be followed by the development of other allergic diseases. For this reason the infants who were started at birth on soy bean milk, and the control group, were kept track of until they were ten years of age. They discovered that only about 15 per cent of their experimental group developed major allergies before the age of ten, as compared with 60 per cent of their control group.

The consensus of opinion is that as the baby grows older the new foods should be added slowly one at a time, and a careful watch made for food reactions, and that elimination of these foods be made quickly. The problem is not merely that of food allergy alone, since many of these food allergies are outgrown, but rather that one allergic reaction lowers the tolerance to other allergens and may set up a chain of other allergic reactions. Most of the symptoms from an allergic reaction to a food will appear in 14-21 days after the food has been ingested, or sooner.

It appears to make very little difference as to the time solid foods are introduced into the infant's diet, but a great deal of difference as to which foods are first introduced. Eggs create so many allergic reactions that

they should not be given to the infant until he is one year of age, and then first start on egg yolks instead of egg white, as the latter is more allergenic.

It is also unwise to start infants on wheat for their first cereal, but instead they should be started on barley, oats, rice, and corn first, using these successively so as to give the infant as great a variety as possible. At about the age of six months vegetables may be introduced into the infant's diet, but these should be individual vegetables, not mixtures. Sensitivity to meats, fruits, and vegetables occurs much less readily than to the cereal grains, but the same general principles apply: that one should use as much variety as possible to avoid sensitization to any one of the foods.

Orange seed protein and orange peel oil are quite irritative locally, but seldom produce systemic allergic reactions, such as asthma or eczema, but orange juice is still best not added until six months of age or later, as the infant can be given ascorbic acid in the form of vitamin C early in infancy, which is completely non-allergenic.

The physical environment of a potentially allergic child must not be overlooked either. The infant's room should be prepared so that there will be only a minimum of exposure to inhalants such as feathers, hair, wool, kapok, and dust. All animal pets should be gotten rid of or at

least kept outdoors. No fabric other than previously washed cotton should come into contact with the patient's skin.

As a general rule, injections with foreign serums should be undertaken only when absolutely necessary, since they very frequently tend to allergize the patient. In general it is safer to use oral medications than injectable ones in allergic families, whenever possible. Surgery in allergic families can be a "double-edged sword," if poorly timed. Elective nose, ear, and throat surgical procedures should be postponed during the pollen season or in the presence of mild allergic symptoms, because surgery done at this time has led to the onset of asthma or hay fever too often to be mere chance.

It is believed that certain diseases, such as pertussis, measles, and scarlet fever, may initiate the onset of asthma in these infants. Likewise, infection of the upper respiratory tract superimposed on an allergic rhinitis or bronchitis adds greatly toward precipitating the onset of asthma. This is where the prophylaxis against these diseases and upper respiratory infections is extremely important, so as to help prevent the onset of asthma. Many pediatricians now believe that even mild cases of measles should be vigorously treated with antibacterial drugs in infants who are potentially allergic or allergic already.

This is mainly to reduce the incidence of pulmonary complications, which in a child with respiratory allergic disease has a marked tendency to hasten the onset of asthma.

There are numerous non-specific factors which may be responsible for hastening the onset of asthma in a child. A good example is physical over-exertion which weakens the body defenses and thus is thought to predispose to asthma.

X

CONCLUSIONS

1. One out of every eight children in the United States is an allergic child, which shows the magnitude of the problem and the great benefit that would be derived from the prophylaxis of this allergy in childhood.

2. Pregnant women of potentially allergic infants should avoid fad diets, eggs as such, and foods consisting largely of eggs. They should also eat no cheese, and no more than a pint of milk a day, with a variety of forms of meat, so as to avoid intrauterine sensitization of the infant. Mothers who are to breast feed should remain on the above diet, to avoid sensitizing the infant through her breast milk.

3. Twice as many babies have eczema who are only partially breast-fed as do those who are breast fed entirely.

There is seven times as much eczema in the artificially fed babies as the entirely breast fed babies.

4. It appears that in potentially allergic infants who cannot be breast fed for one reason or another, there is a much lower incidence of eczema if the infants are fed soy bean milk for the first six months of life, instead of cow's milk. These infants had a much lower incidence of allergy during their entire first ten years of life than did those infants started on cow's milk. Thus, it would seem that if we can prevent early allergy from occurring there will be a decreased rate of allergy occurring later in life as well.

5. Eggs should not be introduced into the infant's diet until one year of age because of their allergenicity. It is also best to start the infants on rice, oats, barley, or corn cereals instead of wheat, which is very allergenic. Other foods should be introduced slowly, but as separate foods, not mixtures, and a good variety of them should be given so as to avoid sensitization to any one.

6. The bedroom of the potentially allergic child should be designed so as to offer only a minimum exposure to feathers, hair, fur, wool, kapok, and dust, to avoid the early sensitization to these articles.

7. Serum injections should be used only in dire circumstances, because of the strong possibility of allergic

reactions to these foreign substances.

8. It is also much safer to use oral antibiotics and medications than parenteral ones, as there is much less chance of sensitization via the oral route.

9. Elective ear, nose, and throat surgery should be postponed until after the pollen season or until all signs of any allergic symptoms disappear in the child, as the surgery may otherwise lead to the onset of asthma or hay fever.

10. Pertussis, scarlet fever, measles, pneumonia, and upper respiratory infections in the potentially allergic child may lead to the onset of asthma. This gives us an excellent chance to thus practice preventive medicine by treating these diseases early with antibiotics, thus avoiding their complications, which are what usually lead to asthma.

11. The basic idea in the prophylaxis of allergy in childhood is not only to prevent the immediate allergy from occurring in the infant but to protect the patient from future allergic manifestations which are much more common later on in life, if the infant has been previously sensitized as an infant.

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