

DIARRHEA CAUSED BY FOOD ALLERGY

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FOOD allergy as a cause of colic and diarrhea, with or without other gastrointestinal symptoms, in infants and young children has long been recorded by Talbot,²⁸ Shannon,²⁷ Laroche, Richet, and Saint-Girons,¹⁰ Schloss,²⁶ Ratner,¹³ Greer,⁷ Rowe,^{14, 15} Vaughan and Black,²⁹ and others. Rubin,²⁵ in 1940, reported loose stools with traces of blood, small clots, and mucus, along with colic, three weeks after starting canned cow's milk; this was relieved in forty-eight hours by the elimination of milk. Clein,³ in 1951, stressed diarrhea along with other allergic manifestations due to milk allergy. Most recently, in 1955, Collins-Williams⁴ reported diarrhea, vomiting, and severe shock from forced ingestion of evaporated milk. Fewer discussions have been published regarding this condition in adults. Andresen,¹ since 1923, has reported uncomplicated diarrhea along with that in chronic ulcerative colitis due to food allergy in adults. Eyermann, in 1927, studied five cases of allergic diarrhea along with other gastrointestinal symptoms arising from allergy. One of us (A. H. R.),^{14, 15} in books published in 1930 and 1936, reported cases of this diarrhea and its occurrence in 15 per cent of 150 cases of gastrointestinal allergy. One man with diarrhea due to milk had taken one teaspoonful of milk as a laxative for a number of years. In another, a few drops of milk produced five to fifteen watery movements in two to three hours. Piness and Miller¹² recorded diarrhea, incontinence, melena, emaciation, and chronic invalidism due to food allergy in one patient who previously had had a cecostomy for possible relief. Friedenwald and Morrison⁶ reported allergic diarrhea in adults. In one woman the diarrhea had continued steadily for six months. All studies had been negative except for achylia. Hydrochloric acid was ineffectual. Milk allergy was the sole cause. Browning² also found diarrhea arising from food allergy. Alvarez emphasized milk allergy as being responsible for diarrhea and other abdominal symptoms in 20 per cent of 500 cases. Cardon, in 1944, wrote an interesting report on five adults with diarrhea, cramping, abdominal soreness, and tenesmus due to milk allergy. Spastic colons were seen by x-ray in some cases. Literature on allergy to cow's milk, and especially on resultant shock and even death therefrom, is reviewed.

Milk allergy, thus, is by far the most frequent cause of allergic diarrhea. Although most reports deal with the condition in infants and children, this article will stress allergic diarrhea due to foods in adults, even after the age of 50 years. Thus, all physicians (especially internists, gastroenterologists, and

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pediatricians) must keep it in mind. Moreover, our experience indicates that allergy to milk is more common than to any other food as a cause of the many manifestations of food allergy. Reviews of the literature on milk allergy, with special discussion of many interesting cases and observations, including those of the senior writer, were included in his books^{14, 15} published in the 1930's.

This is a study of twenty-six adults and four children relieved of chronic, troublesome diarrhea by the elimination of certain foods. The frequency of such diarrhea is indicated by its occurrence in approximately 220 patients with probable gastrointestinal allergy studied in the last seven years. No cases of chronic ulcerative colitis or regional enteritis, usually due in our opinion to food allergy^{19, 23} and at times to pollen allergy,²⁴ were included in this group.

The ages of onset and at our first conference are shown in Table I. Diarrhea had continued for an average of 7.7 years. The infrequency of infants and children in this series is due to the small number of children referred by pediatricians because of diarrhea. The number of patients past the age of 40 years and of female patients is noteworthy.

TABLE I

AGE (YEARS)		NUMBER OF CASES	NUMBER OF WATERY OR SOFT STOOLS IN 24 HOURS	
			NUMBER OF STOOLS	NUMBER OF CASES
<i>Age at Onset</i>			1-3	4
0-6	5	(4, 4, 6 and 12 months, 6 years)	3-6	12
20-40	9		6-10	10
40-50	10		10 up	4
50-60	6			
<i>Age When First Seen by Writers</i>			Duration of diarrhea	7.7 years ($\frac{1}{4}$ to 50 years)
0-5	4		Intermittent relief	16 cases
20-40	7		Cramping (abdominal)	20 cases
40-50	7		Constipation (intermittent)	6 cases
50 up	12		Constipation with mucus	4 cases (2 severe)

That the diarrhea was definite or severe is shown by the fact that no patient had less than three stools and most had three to ten stools a day (Table I). During severe attacks, some passed up to twenty stools. Stools were usually liquid and at times mushy, associated with urgency and varying amounts of bloating, gas, and tenesmus. In a few cases, incontinence occurred, keeping patients at home or in proximity to a rest room. The anal canal at times was raw and tender. Diarrhea occurred for one to four days every one to three weeks or only when known allergenic foods were taken, or in some cases continuously for weeks or longer periods. Cramping in different parts or in all of the abdomen varied in degree and frequency. In some cases, it doubled the patient up for minutes or longer periods. In one child, crying continued throughout the night, associated with weakness and sweating. The diarrhea occurred often on arising or for one to three hours after breakfast or it developed after meals or through the afternoon. In one patient it never occurred at night. Intermittent constipation and diarrhea occurred in six

patients. In four of these, mucus was present, being marked in two cases. As in many cases of mucous colitis^{14, 15, 18} without watery stools, relief occurred with elimination of allergenic foods. Blood in stools was absent in this series. In one child of 18 months, however, with diarrhea since birth, blood and mucus were constantly present. X-ray and proctoscopy ruled out ulcerative colitis and regional enteritis. With our minimal fruit-free elimination diet, the diarrhea, cramping, and blood and mucus gradually decreased over a period of four months, but it was necessary to continue the diet for eight more months until traces of blood and other symptoms disappeared. This case is not included in this series because pollen therapy and Piromen injections were given, although in our opinion the diet was entirely responsible for relief. In the last three years, symptoms have been perfectly controlled with the elimination of milk, wheat, chocolate, and fruits.

OTHER GASTROINTESTINAL SYMPTOMS

Diarrhea was the only evidence of gastrointestinal allergy in fourteen cases (Table II). In the sixteen others, one or more of the following symptoms occurred: The allergic epigastric syndrome,²² evidenced by distention, burning, and pressure in the epigastrium and in some cases under the sternum or in the left chest, was present and relieved by the diet in six cases. Belching, sour stomach, nausea, and vomiting were present along with the allergic diarrhea. Canker sores,^{15, 18} due nearly always to food allergy, in our opinion, were present in only one patient. All this emphasizes the presence of the shock tissues in the small bowel and especially in the large bowel in these cases.

TABLE II

SYMPTOMS	NUMBER OF CASES
<i>Other Gastrointestinal Symptoms</i>	
Allergic epigastric syndrome (pressure, distention, burning, etc.)	6
Nausea	6
Vomiting	2
Belching	6
Sour stomach	4
Canker sores	1
<i>Additional Symptoms</i>	
Fatigue	6
Body aching	4
Toxemia (allergic)	7 (2 severe)
Nervousness	7
Depression	5

TOXEMIA, FATIGUE, NERVOUSNESS, AND DEPRESSION

Fatigue, at times very severe, often with so-called toxemia, characterized by dopiness, confusion, and lack of concentration, occurred in seven patients. In several patients, especially in one child, weakness was very severe, associated with palpitation and even sweating. Relief of these symptoms with the elimination of allergenic foods illustrates the necessity of considering food allergy

as a possible cause of fatigue and toxemia,²⁰ which too often are ascribed to psychogenic causes. Nervousness, depression, and irritability in this group were controlled with the diet alone in about one-half of the cases. Sex hormones were given in the older women, when indicated.

OTHER MANIFESTATIONS OF ALLERGY

Their frequency^{14, 15} in these cases of allergic diarrhea is shown in Table III. Their absence in fourteen cases illustrates the well-recognized fact that clinical allergy may be evident in only one shock organ or tissue, as the colon and/or small bowel. The family history for allergy and especially skin tests with foods may be negative also.

TABLE III. PERSONAL AND FAMILY HISTORIES OF ALLERGY

HISTORY	NUMBER OF CASES
<i>Personal</i>	
Bronchial	8
Nasal	7
Dermatitis	6
Hives	2
Headaches	6
(Negative in 10 cases)	
<i>Family</i>	
Gastrointestinal symptoms	3 (Duodenal ulcer in 1)
Diarrhea due to milk in mother, grandmother, and patient	1
Bronchial	9
Nasal	7
Cutaneous	6
(Negative in 11 cases)	

DIET HISTORY SUGGESTING FOOD ALLERGY

Milk was the food most frequently suspected as the cause of allergic diarrhea. It disagreed with or was disliked by eighteen of our patients. It was especially disliked by seven of the eighteen. It had always been vomited by two, and it was known to cause diarrhea in three. Egg disagreed with and was disliked by eight patients, being the sole cause of diarrhea in Case 2. Fruits, including tomatoes, seemed to cause diarrhea or gastrointestinal symptoms in fourteen; fish, in two; chocolate, in three; tomato, especially in one; wheat, in one; all cereals, in one; and soy, in one of the children. Cottonseed allergy receives discussion in Case 1. It must be recalled that such positive diet histories are not always indicative of specific allergy.

Drug allergy to barbiturates in two cases and to aspirin in one was evidenced.

POSITIVE SKIN TESTS

Although food allergy was the cause of the diarrhea in all these cases, scratch skin test reactions were negative in twenty-five cases, as is usual in chronic food allergy.¹⁸ The reactions in four cases were slight. Large reactions

to foods were obtained in one child (Case 2). The few reactions to inhalants, moreover, were slight except for large reactions in three cases to pollens, which were responsible for seasonal hay fever and/or asthma.

	NUMBER OF CASES
Foods	4 (1- plus)—1 (3- to 8- plus)
Pollens	9 (3 gave large reactions)
Other inhalants	3 (1- plus)
House dust	4 (1- plus)
Fungi	1 (2- plus)

OTHER LABORATORY TESTS

Free hydrochloric acid was demonstrated in the stomach in sixteen cases. It was absent in two, although elimination diets controlled the diarrhea without the use of dilute hydrochloric acid. The test was not done in other patients because of the relatively rapid and excellent control of the diarrhea with the elimination diet. In eleven cases, the Diagnex test for hydrochloric acid was used, obviating intubation. Eosinophils, as reported by Nance,¹¹ were found in the stools of two children. Studies for them in stools of adults unfortunately were not done.

Stools were negative for parasites in twenty, and in ten cases stool analyses were omitted. *Amoebae histolytica* had been reported in two cases. Antiamebic therapy had failed to produce relief, and food allergy was the confirmed cause of the diarrhea.

Gastrointestinal roentgen-ray studies were negative in sixteen cases. A small-bowel study with a cold saline-barium mixture was negative in five cases. Colon roentgen-ray studies were negative in twenty-two cases, except for an ahaustic descending colon in one case and spastic colons in five cases. Such studies were omitted in the other cases because of obvious or early confirmed food allergy. Gall bladder roentgen-ray studies were negative in fifteen cases.

Proctoscopy was done in twenty patients. In five some erythema and edema were found and in one a few punctate probable ulcerations were seen. No blood or pus was present in these thirty cases.

Abdominal operations were remarkably infrequent. One hysterectomy for a fibroid had been done. Gall stones had been removed without relief of diarrhea and gastrointestinal symptoms in one patient; these symptoms were relieved, however, with the elimination diet. One patient had ten inches of the descending colon and upper sigmoid removed because of diverticula to relieve diarrhea and cramping for two previous years. Diarrhea continued, however, from the colostomy opening. Edema and erythema, but no ulcers or blood were present in the colon distal to the stoma. Colon roentgen-ray examination was negative. The diarrhea was entirely controlled with the elimination of all fruits, spices, and milk. The descending colon and the sigmoid have been rejoined and normal stools have continued for two years unless allergenic foods are eaten.

Psychogenic diarrhea had been suspected or diagnosed in twelve cases. In one case entirely controlled by the elimination of allergenic foods, hostility

to the patient's husband had been blamed! Thus, careful and adequate consideration of food allergy, in some cases pollen or other inhalant, or rarely drug allergy is important before diarrhea or other gastrointestinal symptoms are attributed to psychosomatic causes. In the other cases, either no cause had been found or previous study had not occurred. In four cases the allergenic foods had been self-determined.

DIAGNOSIS AND TREATMENT

Allergic diarrhea must be considered if parasites, infection, nutritional deficiencies, sprue, achylia, new growths, certain chronic diseases, and other recognized less common causes of diarrhea have been carefully excluded. Seasonal diarrhea, with or without other abdominal symptoms, due to pollen allergy³¹ must also be remembered. When history, physical examination, laboratory and x-ray studies, and even empiric treatment apparently have ruled out all the above causes, psychogenic diarrhea too frequently is being blamed, as had occurred in twelve of our cases. This is not justified until adequate and experienced study of food allergy has been done.

Food allergy is probable if the diarrhea is nonseasonal. It is also suggested by dislikes for or symptoms from specific foods. The occurrence of other perennial manifestations of allergy or activation or occurrence of diarrhea or other possible allergic symptoms during the fall to late spring¹⁶ favor food allergy. Colic and difficulties with feeding in childhood also suggest this cause. Skin reactions by the scratch or puncture methods are rarely positive to allergenic foods responsible for chronic allergic symptoms. Slight or even moderate skin reactions, especially by the intracutaneous method, frequently are nonspecific or do not reveal actual clinical food allergy. Thus, intracutaneous tests with food allergens are not routine in our work.

Diarrhea also occurs less frequently from pollen allergy.³¹ Both food and pollen allergy, moreover, can concur.

When large skin reactions occur with the scratch or puncture method, total elimination of reacting foods may give complete relief. That all large positive reactions are not indicative of clinical food allergy is shown in Case 2. Thus, large as well as slight and negative reactions are fallible in the diagnosis of specific food allergy. In some patients, the elimination of foods that are disliked or avoided or which definitely disagree will relieve diarrhea and other allergic symptoms.

In most patients, however, scratch reactions are negative and dietary histories are of no help. In our thirty cases, the slight skin reactions to foods were of little or no help. In Case 2, only one of the several large reactions to foods indicated an allergenic food.

Thus, as in practically all patients with suspected food allergy, diet trial with our elimination diets^{18, 29} is desirable, utilizing our standardized fruit- and cereal-free elimination diet. This eliminates practically all foods which we have found to be frequent causes of allergic diarrhea. This diet is also used to study possible food allergy in chronic ulcerative colitis,^{19, 23} regional enteritis,²¹ mucous colitis, the irritable or unstable colon, and other mani-

festations of gastrointestinal allergy. If some relief is not evident in ten to fourteen days, foods in the diet must be suspected. Then one of our minimal fruit-free elimination diets, such as rice, tapioca, white potato, lamb, chicken, soy, cottonseed oil, sugar, salt, and water, is justified.^{22, 23} The inclusion of all or most of these foods in the three meals, with interval feedings of tapioca cooked with sugar and water and flavored with caramelized sugar or rice with plenty of sugar eaten on these foods and additional cube sugar eaten through the day, will furnish enough protein and calories to maintain weight. With synthetic vitamins and 2 to 3 grams of calcium carbonate daily, nutrition is maintained. Directions for the use of elimination diets, with required recipes for bakery products, emphasis on strict adherence to the diet, the time necessary for their use, addition of individual foods after relief is obtained, and other minimal elimination diets, will be found in our other publications.^{15, 18}

All these patients have been carefully studied, of course, to rule out all possible diseases other than allergy.

FOODS CAUSING DIARRHEA

Milk allergy was most common, occurring in twenty-four cases. It was the sole cause in three patients. Milk and watermelon caused diarrhea in another patient. It is also so frequently the sole cause or an important cause of chronic ulcerative colitis^{19, 23} due to food allergy that we have advised the total exclusion of milk for months and often for years in such patients. This frequency probably also occurs in regional enteritis,²¹ in our opinion.

Fruits, including berries, melons, and tomatoes, were of next importance. After control of the diarrhea, ingestion of individual fruits has frequently shown allergy to all or individual fruits. Some patients tolerated some cooked but no fresh fruits.

Spices caused varying degrees of diarrhea, especially when allergy to fruits existed. Even minute amounts of these, as of any allergenic food, including inhalation thereof, may produce symptoms. Careful ingestion tests have indicated allergy to all vegetables in a few of our patients and to individual ones in others. Cooked and not raw vegetables at times were tolerated. Thus, peas, carrots, and string beans caused allergy in one case, and squash, celery, and artichokes caused allergy in another. White potato caused diarrhea in only two of these patients. Onions and, to a slight degree, garlic were the sole causes in one patient. They were incriminated with other foods in several other patients. Soybean intolerance occurred in one child. This intolerance prompted the senior writer, twenty years ago, to encourage the manufacture of strained liquid meats and to suggest the strained meat formula.³⁰ This formula is tolerated by practically all infants. Had many more infants been included in this series, other examples of soybean allergy or intolerance probably would have been encountered.

Allergy to egg is less common than to the above foods. It was the sole cause in Case 2; and, with milk and fruit allergy, it caused diarrhea in one

other case. Our experience also indicates that egg is a less common cause of manifestations in the gastrointestinal tract than in the respiratory or cutaneous tissues.

Wheat allergy was responsible, with other foods, in one patient and, with all other cereals and additional foods, in four other patients. Rice, corn, and oats were causative in a few cases.

Lamb was responsible, with other foods, in two patients. Pork, beef, and turkey were incriminated in a few patients. Gelatin was tolerated in fourteen patients in whose diets it was included.

Cottonseed oil caused diarrhea in one patient, corroborated by the resultant diarrhea when it was incorporated in bakery products and other foods without the patient's knowledge.

Peanuts and other nuts were suspected or not tolerated by several patients.

Foods eliminated in the following cases illustrate the similarities and variations in the final diets: *Case 1*—milk, egg, rye, corn, wheat, string beans, pit fruits; *Case 2*—milk, egg, fruits, spices, nuts, avocado; *Case 3*—milk, some fruits, spices; *Case 4*—milk, wheat, tomato, chocolate, coffee; *Case 5*—milk, fruits, rice, coffee, spices; *Case 6*—rice, corn, wheat, rye, potato, beef, lamb, pork, string beans, Lima beans; *Case 7*—milk, some fruits, spices; *Case 8*—milk, all vegetables, wheat, corn, pork, spices, soy; *Case 9*—egg, milk, wheat, chocolate, lettuce, and other leafy vegetables; *Case 10*—milk alone; *Case 11*—onion, garlic, coffee; *Case 12*—egg and probably chicken and peanuts.

TREATMENT AND CONTROL

The control of allergic diarrhea depends on the continued strict elimination of allergenic foods. Since canned milk and amino acids derived from casein have produced symptoms in many of our milk-sensitive patients, they have not been used in our diet trials.

As this diet is continued, tolerance for foods may increase in months or years. However, we have patients in whom milk, certain or all fruits, spices, and even vegetables and less frequently other determined allergenic foods have perforce been eliminated for years to prevent recurrence of diarrhea. In our practice, the disappearance of old and the appearance of new food allergies have occurred but this has not been the rule.

Desensitization by the oral method or with antigens containing allergenic foods has been disappointing.^{15, 18} Reports of good results may have been in patients in whom the diagnosis of food allergy was made by positive skin reactions, especially by the intracutaneous method, without confirmation by the production of symptoms in the symptom-free patient. Thus, in *Case 2* if desensitization had been done to beef, lamb, potato, and wheat, which our ingestion tests have proved were not responsible for the allergic diarrhea, success from such therapy might have been assumed. Desensitization to demonstrated allergenic foods, however, offers a continued future challenge which, because of the mass amounts, may never be possible.

Antihistamines have ameliorated gastrointestinal allergy in a few patients. Corticosteroids and corticotropin should benefit or control allergic diarrhea as

they often do in chronic ulcerative colitis, which is, in our opinion, an allergic disease. Relief of allergic diarrhea with these medicaments, however, would be unwise, as it is in chronic ulcerative colitis, unless adequate, persistent, and experienced antiallergic study and control are conducted, with the discontinuance of the corticosteroids as rapidly as possible. The control of diarrhea in these thirty cases has resulted from the elimination of foods alone, without any antihistamines or corticosteroids, antispasmodics, antidiarrheals, or other drugs. In the initial stages of study, small doses of phenobarbital have been given briefly to a few patients. Absence of anemia necessitated no iron, B₁₂, or transfusions.

CASE REPORTS

CASE 1.—A woman of 56 years had had diarrhea for seven years, recurring for one to three days every ten to fourteen days, with two to five movements in each twenty-four hours. Much lower abdominal cramping, gas, and bloating, with at times embarrassing incontinence but no mucus or blood, had occurred. One normal daily movement was passed between attacks.

There was no history of previous gastrointestinal symptoms or possible clinical allergy, except for intermittent nasal blocking.

Diet history revealed suspicion of milk and its products, ginger, corn, nuts, pears, berries, and melons as activators of the diarrhea. The patient's drug and environmental histories suggested no allergy.

Family history showed eczema and hay fever in the son and hay fever and chronic gastrointestinal symptoms in the mother.

Physical examination, laboratory tests (including stool analysis for parasites), gastric analysis, and x-rays of the gastrointestinal tract (including the colon) and of the gall bladder had been done by two internists and also in a large diagnostic clinic, with negative results. Our diagnostic survey also was negative. The diarrhea had been attributed to "pressure of living" and emotional strain, due in part to a mother-in-law in the house.

Skin testing revealed slight or questionable reactions to wheat, egg, milk, tomato, and cocoa and a 2-plus reaction to mustard. She gave 2- and 3-plus reactions to grass pollens.

To study possible food allergy, our standardized fruit- and cereal-free elimination diet plus rice was ordered. In three weeks, no diarrhea had occurred. Then oats and cooked celery were added. Diarrhea remained absent. Her tongue no longer was coated, and she "felt better than in seven years." In the last year individual foods gradually have been added. The incriminated foods, with time of appearance of diarrhea, follow: milk, two to eight hours; onion, one-half hour; walnuts and almonds, one hour; cottonseed oil, two hours; coffee, one hour; bay leaf, three hours; mustard, one-half hour; Worcestershire sauce, one-half hour. Symptoms have lasted and decreased in two to twenty-four hours. Masked ingestion tests with milk and, because of the existing controversy, equivalent tests with cottonseed oil have confirmed them as causes of her diarrhea. Decision about other foods depended on two to several ingestions.

Comment.—This diarrhea, due especially to milk, had occurred intermittently for seven years, even though milk and its products had been ingested in only moderate amounts. Attacks developed suddenly, with constant fear of possible incontinence. Diet and family histories were negative for allergy. Slight reactions to foods did not correlate with the finally determined allergenic foods. Positive reactions to pollens were not indicative of clinical allergy.

There was much frustration because of lack of relief and the fact that there was no explanation except psychosomatic causes after surveys by excellent internists. This illustrates the too frequent ignoring of food allergy in differential diagnosis and the value of our fruit- and cereal-free elimination diet¹⁸ in the study and control of food allergy.

CASE 2.—A 1-year-old child was seen two and one-half years ago because of loose, odorous stools which had begun when the patient was 4 months old; there had been a moderate fever for one day. The diarrhea had persisted for five to eight days every ten to twenty days for eight months, occurring daily for the last two and one-half months. Paratyphoid bacilli had been cultured from a commercial dried egg yolk fed to the child and also from one stool specimen, but the diarrhea continued in spite of drug therapy. Fever had never recurred. Weight gain, nutrition, and health (except for the diarrhea) were normal. Additional studies, including hemograms, cultures of the urine and the stools, and stool analyses for parasites, were made with negative results in a teaching hospital and at a large Midwestern clinic.

Since food allergy had not been studied and since the family history revealed hives in the mother, death of an uncle from asthma in childhood, eczema in the father, and hay fever in a grandmother, the senior writer studied such possible allergy. Puncture tests revealed the following positive reactions when first seen. One year after rapid initial and continued relief from the elimination diet, they were repeated.

May 29, 1953

Egg	8-plus
Beef	2-plus
Codfish	2-plus
Potato	2-plus
Peanut	2-plus
Chicken	3-plus

March 15, 1954

Egg	8-plus
Beef	2-plus
Lamb	4-plus
Potato	3-plus
Chicken	4-plus
Wheat	2-plus
Peanut	6-plus

Physical examination was negative. Hemogram was normal except for 87 per cent lymphocytes in 1953, with a reduction to 73 per cent in 1954.

In the initial study of possible food allergy, a minimal fruit-free elimination diet was ordered, containing our strained beef formula (Gerber's),³⁰ rice, oats, strained lamb, puréed carrots, peas, string beans, white and sweet potato, sugar, salt, synthetic multiple vitamins, and water. Diarrhea disappeared in two days, recurring with fewer stools in twelve days. Thereafter, one daily formed stool was passed for four months in spite of the addition of wheat, bacon, beef, squash, beets, practically all cooked fruits, raw banana, and finally milk. Then ½ teaspoonful of egg produced diarrhea in one-half hour, reaffirmed on two other occasions in the next four months. During the last two years no diarrhea has occurred except when a baby sitter gave the patient cookies containing egg.

Comment.—It is probable that the diarrhea which occurred when the patient was 4 months old was due to allergy to the egg protein first given in the canned yolk. Paratyphoid infection seems unlikely because the slight fever on the first day did not recur and because of the absence of malaise or any symptoms except diarrhea thereafter. Food allergy has caused foul stools in other patients in our series and in those recorded in the literature. Egg had been given as such or in cooking for the eight months before we saw this patient.

Skin testing by the puncture method gave the recorded skin reactions. Because of the very large skin reaction to egg, it was, of course, eliminated from the diet and also eliminated from the home. The mother was advised to guard the child against the smell of egg in other homes and eating places. Potato and beef were included in the initial diet in spite of the 2-plus reactions. Tolerance to them and also to lamb and wheat, which gave additional reactions at the end of one year, has been amply confirmed. Because of the frequency of clinical allergy to peanuts, to which a large skin reaction was obtained, and because of the demonstrated allergy to egg, peanuts and chicken have not been included in the diet to date. Thus, our long emphasis on the fallibility of the skin test,^{14, 15, 18} even when large reactions are obtained, is illustrated. The necessity of diet or ingestion trial to prove clinical allergy to foods giving both negative and positive reactions is demonstrated.

In our experience, clinical allergy to egg giving large reactions may disappear along with the skin reaction in four to seven years. Too often clinical allergy continues much

longer. Desensitization by ingestion, as already discussed, usually fails and may produce severe and even shock reactions.

This case illustrates the all-too-common failure to remember the many manifestations of food allergy and to study it with the recognized fallibility of the skin test in mind. Of interest is the incrimination of egg instead of milk, the latter being the most common food to cause allergic diarrhea. Even though the family history and the skin reactions had not indicated allergy, the study of food allergy would have been necessary.

CASE 3.—A woman of 53 years had passed six to ten watery stools for two to seven days with varying intervening constipation every ten to twenty days for eight years. In addition, burning, distention, and pressure in the epigastrium, with pressure under the sternum and moderate belching and occasional nausea, had occurred. She had been fatigued all her life. For several years, aching in the extremities and moderate depression had been present.

Diet history revealed increased diarrhea from milk and fruits, neither of which, however, had been entirely eliminated.

Lifelong recurrent headaches associated with nausea and at times with vomiting had occurred. Family history showed no predisposition to allergy except to eczema.

Blood count, urinalysis, stool examinations for parasites, and x-ray examinations of the gastrointestinal tract, including the colon, had been negative on three different occasions. Achylia had been found, but hydrochloric acid was ineffectual.

Much medical therapy had failed, and psychoneurosis had been blamed by three physicians. Our duplication of the laboratory and x-ray studies revealed similar findings.

Skin testing gave 1-plus reactions to several pollens, other inhalants, and dust.

To study food allergy, our minimal fruit-free elimination diet was given. In two weeks the diarrhea, epigastric distress, and fatigue were less, and in four weeks they were absent. During the next four months all foods were gradually added, and only milk, all fruits, all condiments, and coffee reproduced the diarrhea. During the last two years the diarrhea, constipation, headaches, fatigue, and depression have been controlled except with increasingly rare breaks in the diet. She has resumed work as a practical nurse and is "enjoying life again."

Comment.—Milk, fruits, and spices were responsible for the diarrhea and other invalidating symptoms, thus disproving the former diagnosis of psychoneurosis. Dilute hydrochloric acid was not given.

CASE 4.—A man of 25 years suddenly developed assumed intestinal flu in March, 1950. Eight to ten daily watery movements, with much cramping and no blood or mucus, continued until we saw him in September. Physical examination and laboratory studies, including stomach analysis and examination of the stools for parasites, were negative in two hospitals. Stools occurred three to four times in the morning and two to three times in the evening; none occurred at night. Fatigue and weakness had occurred almost daily. Empiric antiamebic therapy had been ineffectual.

There was no history of personal or family allergy or chronic disease.

Diet history revealed a lifelong dislike for milk. Various foods, such as lettuce, spinach, chard, and corn, appeared undigested at times in the stools.

Skin testing with all important inhalants and foods gave negative results. Hemogram was normal except for 16,000 leukocytes, which fell to 9,300 in three weeks after the diarrhea had ceased with the elimination diet.

To study possible food allergy, we ordered our fruit- and cereal-free elimination diet plus rice. In three days diarrhea decreased, and in five days there was one formed stool daily. Cereals, fish, fruits, other vegetables, egg, milk, tea, and coffee were gradually added in the next two and one-half months. Milk especially and more than one cup of coffee daily reproduced diarrhea. After five years, these still have to be eliminated.

Comment.—Milk, which had been distasteful for years, was the major cause of this diarrhea. Empiric antiamebic therapy had been given, as is the case in many of these

so-called idiopathic diarrheas. The personal and family histories were negative for allergy. No one of the seven physicians he had consulted previously had suggested allergy as a cause.

SUMMARY

1. Diarrhea from food allergy in twenty-six adults and four infants and children is reported. Diarrhea and other gastrointestinal symptoms due to pollen allergy and diarrhea resulting from chronic ulcerative colitis and regional enteritis due to allergy are not included.

2. The literature containing many reports of colic and diarrhea due to food allergy in infants and children and in relatively few adults is reviewed.

3. Because of the usual negative laboratory tests, including stool analyses for parasites and x-ray studies of the stomach, small intestine, and colon, and the failure of various drugs and diets, functional diarrhea due to psychoneurosis is a common and unfortunate diagnosis in cases due to food allergy.

4. A personal or family history of clinical allergy may be absent. The gastrointestinal tract, especially the colon, in these patients may be the sole shock organ of allergy.

5. Although many patients give a diet history indicating dislikes and definite or suspected disagreements and resultant symptoms from specific foods, such foods often are not responsible for the diarrhea or other associated symptoms due to allergy.

6. Skin testing by the scratch or puncture method infrequently reveals positive reactions to any or all causative allergenic foods. Large reactions need careful consideration. The ingestion tests on the symptom-free patient may reveal allergy to none or to one or more reacting foods, as illustrated in Case 2.

7. When a diet excluding foods causing large skin reactions or foods suspected through diet history fails to relieve the diarrhea, then our standardized fruit-free elimination diet or our minimal fruit-free elimination diet is advised.

8. Milk, fruits, and spices have been most frequently responsible for allergic diarrhea in our patients. Allergy to many other foods, as determined by individual ingestion tests in the symptom-free patient, also occurs, as discussed in this article.

9. This allergic diarrhea, including tenesmus and even incontinence, may be so persistent and chronic and at times associated with other symptoms of gastrointestinal allergy, headaches, allergic fatigue, and toxemia, that semi- and even complete invalidism may result for months or even years.

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