exercise a slow and progressive correction with the aid of a compression pad, to achieve the desired result in a more or less lengthy space of time. (2) Correction in horizontal recumbency and a hyperextended position. A cast of the shape described by the attached figure can be used, or—and I prefer this procedure—the plaster bed. Whichever procedure is adopted the position of the recumbent patient is such that the lumbar lordosis is completely suppressed, and in the segment of the upper vertebral column, at the apex of the kyphotic deformity, a permanent and progressive straightening force is exercised under the influence of the weight of the upper part of the trunk and head. The action thus taking place can be compared to a permanent pressure on the shoulders.

FIG. 6.—First procedure. The Minerva plaster jacket with window at the level of the kyphosis. Progressive correction with the aid of compression pad (cotton or felt). Impossibility of cervical or lumbar lordosis.

FIG. 7.—Second procedure (the better). Correction in horizontal recumbency and in a hyperextended position. No cervical and no lumbar lordosis. At the same time, and in this position, massages and exercises are carried out.

In my opinion the second method only should be used in an adolescent kyphosis. It permits a number of orthopaedic measures which are indispensable for these patients—that is, in the recumbent position many gymnastic and massage movements can be carried out which develop the muscular system of the young patient, and little by little endow him with a solid muscular corset, which will allow him to maintain the correction when it is obtained. In horizontal recumbency the action of the kyphotic forces is destroyed, and the principal one—weight—becomes, on the contrary, a valuable help.

M. TSURUMI (*Bull. Off. Internat. d'Hyg. Publique*, October, 1934) states that in June, 1933, antityphoid inoculation by mouth was carried out on 32,130 persons in the prefecture of Saitama, near Tokyo, while 45,790 persons in ten other towns served as controls. Up to the end of December, 1933, six cases of typhoid fever occurred among the inoculated as compared with thirty-nine among the controls. One of the six persons fell ill six days after inoculation, which therefore took place during the incubation stage, so that there were really only five cases among the inoculated and forty among the controls.

ALLERGY, METABOLISM, AND THE AUTONOMIC NERVOUS SYSTEM

BY

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My object here is to give you what I consider should be a clinical conception of allergy. In previous papers^{1 2 3} I have led up to this conception. First of all allergy should be distinguished from infection and its reactions. One big difference clinically is that allergic manifestations tend to be afebrile and evanescent, and infectious illnesses febrile and of slower subsidence. Allergy arises from processes which, though initiated by foreign proteins, are primarily metabolic, internal, and autonomic in nature. Infectious illnesses arise from reactions to the foreign invading toxins of bacteria. Allergy must not be confused with immunity. Clinically the first is an irritative and the second a protective phenomenon. Rich⁴ has shown experimentally and quite clearly that hypersensitiveness to bacterial allergens and immunity to the same bacteria can be separated: when the serum of allergic immune animals is injected into normal ones the immunity is transferred, but not the hypersensitiveness.

Bacterial allergy may be connected with infection in that individuals may be infected and become sensitive to the proteins from the bacteria in some septic focus in their own bodies, but this reaction is an irritation phenomenon, and is not necessarily related to immunity. An infant *in utero* may conceivably be sensitized, and is often prepared for sensitization by irritating body fluids from the mother. It can also be given a temporary immunity by the stimulating effect of body fluids from the same source. In the first case, however, the infant inherits the peculiar type of internal metabolism that can be irritated into sensitization, while in the second it receives a transferred acquirement which is only temporary and which depends on the chance of the mother's illnesses and their effect on her body fluids. Allergy, then, is internal and due to peculiarities in the individual endowment; infection and acquired immunity are foreign and fortuitous.

Inheritance

That heredity plays an important part in relation to allergy is shown by family histories and by the early age at which the symptoms become evident.

Case 1.—A baby of 8 months had curd dyspepsia with chronic diarrhoea, urticaria, and seborrhoeic eczema. The mother and the grandmother had had asthma, and there was also a history of eczema in the same branch of the family.

Case 2.—In another family the mother has eczema and a tendency to rashes with cineraria flowers. Of eight children one has hay fever, another urticaria, and a third asthma. The last baby has eczema, and was allergic to the mother's milk, and the penultimate child had eczema and developed asthma as the eczema disappeared.

Case 3.—In one family of ten children one had milk dyspepsia, two eczema, one croup, one asthma, and one serum sickness. Of the children of the last individual one had asthma, eczema, and urticaria, and the other angioneurotic oedema. One of the children of the asthmatic had asthma.

The following three histories show that in addition to inheriting a tendency to allergic manifestations a child may inherit a sensitive metabolism.

Case 4.—A baby aged 8 months had eczema, and had had acidosis three months before. There had been milk dyspepsia, and the child had decided digestive disturbances if given cod-liver oil or orange juice.

Case 5.—Another child, aged 7 years, had mucous colitis, urticaria, acidosis, and a tendency to catarrh and sneezing. Oatmeal, malt, and milk all very definitely upset her digestion, causing furred tongue and loss of appetite. Her father had asthma, her mother eczema, and her sister eczema.

Case 6.—In another family the father has eczema and asthma. Three older children have asthma. The penultimate baby had eczema, asthmatic wheezing, milk dyspepsia, and intolerance to cod-liver oil. The last baby was, I believe, saved from eczema because we kept the mother largely off milk fats during pregnancy, and also during lactation, which was successfully carried out for nine months.

Relation of Allergy to Metabolism and the Autonomic Nervous System

The above histories, which could easily be multiplied, show that individuals may inherit a metabolism that may become overloaded and insecure, and thus irritate another endowment—a sensitive, autonomic nervous system.

The composition of body fluids is dependent upon efficient metabolism. Disturbed metabolism may give deficiencies or cause the presence of irritating bodies; hereditary tendencies may assist in producing such conditions. Hypochlorhydria, deficiencies of liver action,⁵ chronic maldigestion of fat with excess of fatty acids, abnormalities in water absorption and retention, and defects in protein metabolism may all occur. The breaking down of absorbed protein and its rebuilding into the special protein of the individual may be upset in allergic persons. Colloidoclasia occurs, and histamine is liberated, giving rise to allergic reactions, the skin and the mucous membranes being the areas in which histamine is most likely to be set free. The nervous tissues, especially the more sensitive ones, may be undernourished or irritated by abnormal body fluids: we have the examples of calcium deficiency and spasmophilia. Amino-acids and other toxic bodies circulating in tissue fluids can irritate nerve cells—including those of the autonomic nervous system. This system is closely related to the ebb and flow of tissue fluids, to changes of blood pressure, to secretory activity of glands—especially the endocrine—to contraction of tubes as found in asthma and peristalsis, to skin alterations such as flushing, paling, sweating, and oedema, and to expression of the emotions such as laughing, crying, elation, and depression.

I have previously said² that we ought to distinguish allergic disturbances from infections because they are chemical, metabolic, and internal rather than external and fortuitous. If we make this distinction, and if we realize the importance of the part played by the autonomic nervous system, we can understand the reasons for the following happenings, which so often puzzle our infection-educated minds.

Allergic symptoms come and go suddenly. Only an autonomic nervous system disturbance can explain the sudden appearance of a localized collection of fluid, as there is in angioneurotic oedema, or the sudden advent of spasm and distress, as in asthma. The disappearance of symptoms may be equally rapid. The remarkably quick action of some of the remedies used for the treatment of allergic symptoms can be explained by their effect on the autonomic nervous system. Allergic symptoms are interchangeable. Eczema may be relieved by the appearance of asthma, or vice versa, or asthma may be relieved by the appearance of another allergic symptom such as colitis.

Purely allergic symptoms are usually afebrile, in striking contrast to the high temperature reactions of infective illnesses. This comparative absence of temperature reactions indicates metabolic changes of a different nature from those produced in infections, and the greater part played by nervous influences in the production of allergy.

If an acute infection takes place metabolism is disturbed and allergic symptoms usually disappear temporarily; they may also disappear when a depletory condition such as diarrhoea arises. If a child is taken into a hospital or nursing home where physical and mental stress are lessened, and also the likelihood of unsuitable diet, the allergic symptoms tend to disappear because the autonomic nervous system is soothed and is not likely to be irritated by faulty products of metabolism.

When there has been constant repetition of allergic symptoms it is found that very little provocation, sometimes only psychological, is needed to produce the manifestations. This shows that there is a tendency to the development of a system habit, and one which undoubtedly can be referred to the autonomic nervous system and to metabolism.

Autophiliac and Autopathic Individuals

These reasonings, showing as they do the internal and autonomic origin of allergic manifestations, have led me to suggest a new name³ for the individuals who inherit a tendency to allergic manifestation. I call them "autophils," because they have an insecure internal metabolism and a sensitive autonomic nervous system; if they have developed allergic symptoms I call them "autopaths." We have parallel words in spasmophil and hydrophil, and in neuropath and psychopath. Such words may not be strictly philological, but they are useful.

The following description of autophils is based on an experience limited to children and incidentally to their parents. Autophils are pallid but not necessarily anaemic; they flush and pale easily, and may have motion sickness. They faint on little provocation, such as the sight of blood. They have intense emotional reactions, and the mental stress so produced reacts on their physical well-being; after periods of stress and strain they show dark circles under the eyes. They are generally of the lean schizoid type, though this may not be evident in infancy. In metabolism they are katabolic rather than anabolic in that they tend to eat largely and to use up what they eat rather than to store it. Their appetites are good at first, but in adverse mental and physical conditions the tendency is to overload metabolism, thus producing furred tongue, loss of appetite, constipation, rough patches on the skin, and intermittent deposits of urates.

It is a striking point that in many of these cases milk, fats, rich vitamin preparations, cod-liver oil, bananas, and citrus fruits may not agree, and, if forced upon them, may help materially to overload the internal metabolism. Bracing climates and east winds may have a similar adverse effect. It is probable also that the overloading of metabolism produces a lowered resistance to infections and a proneness to catarrh and glandular enlargements. A vicious circle is thus caused, because catarrh once established in nasal, bronchial, or intestinal areas may encourage defective metabolism. Further, if sensitization to the special proteins produced by the bacteria has arisen, sensitization phenomena may follow any exacerbation of chronic infection.

Mentally, autophils are emotional, sensitive, excitable, and keenly interested. Mental stress may lead to irritability, moodiness, worrying, meticulousness, or other similar signs of nervous overstrain. They are inclined to be introspective and of the type of person who, in later life, develops neurasthenia.

Autopaths

Sensitization occurs either from the shock of one large dose or from a more prolonged provocation by small doses, and I wish to point out that overloading metabolism has a distinct contributory effect in the production

of sensitization. An autophil who has been overloaded by defective metabolism is likely to develop allergy, but one who has not been so overloaded will probably remain healthy. Once overloaded or sensitized, autophaths are liable to recurring attacks of seborrhoea, erythema, urticaria, angioneurotic oedema, eczema, ulcers in the mouth, milk dyspepsia in infancy, geographical tongue, bilious attacks, cyclical vomiting, colitis, spastic colon, croup in infancy, hay fever, asthma, migraine, convulsions, orthostatic albuminuria, haemoglobinuria, and arthritic signs.

Management of Autophils

Autophils to avoid becoming autophaths should always live within their limits of physical and mental endurance, and should avoid sensitization. Overloading of metabolism from faults of assimilation or from waste products may be brought about by faults in diet, injudicious exercise, too much excitement, and chronic sepsis.

Diet is chosen to avoid excess of foods which may irritate metabolism and prepare the way for sensitization allergens. Rich creams and oils when combined with other factors in diet seem to do this, and to cause fatty acids to circulate in the tissue fluids. Milk, and especially creamy milk, eggs, cod-liver oil, milk chocolate, and rich proprietary tonics are examples. If vitamin medication is indicated the concentrated drop preparations may be the best. There is some chemical property in sour fruits, and especially in citrus fruits and bananas, which irritates the metabolism of allergically inclined individuals, especially when in combination with the rich fatty foods. The ripening of fruit is very important, and may be incomplete or only finished after the fruit has been gathered and packed. Proteins and carbohydrates, especially sugar, usually suit, and fresh salads should be eaten if liked. Sensitization is a more particular phenomenon than general irritation and overloading of metabolism. Numerous foods may contain irritant allergens, including whey, egg (white), fish, fowl, and some meats. Removal of the allergens by the elimination diet plan of Rowe⁶ is possible.

Elimination from the skin is also important. Autophils tend to sweat, and a sweat is a wholesome relief to them. Controlled exercise is therefore good, but exercise taken immoderately or jarringly to the neuro-muscular co-ordination may produce waste products and overloading of metabolism, and irritate the autonomic nervous system. Autophils are very likely to be driven to excessive or jarring exercise by their keen mental activity. On the other hand, the relief of orderly activity to a sensitive autonomic nervous system is great. One can understand the value of massage and of rhythm and music in exercises, bringing as they do relief of tension and added interest.

Excitement and emotional stress may disturb the metabolism of autophils and upset an excitable autonomic nervous system. Disorders of blood pressure, pulse rate, and even acidosis may ensue. Erythema in conversation may indicate the strain that emotion puts on the autonomic nervous system of an autophil.

Toxins can interfere with metabolism or have adverse effects in nervous tissues. In autophaths there may be sensitization to bacterial allergens; local irritation may determine the site of the allergic manifestation.

Sensitization is brought about by overdose, sudden and massive, or repeated and fractional, of an irritative allergen. It is difficult to avoid because it usually appears without warning, but when family histories indicate that a child may be an autophil, and perhaps also indicate a likely sensitization allergen, preventive measures can be taken.

Treatment of Autophaths

An ordered control of metabolism and autonomic nervous system may prevent many autophils from becoming autophaths, but an overloaded metabolism or an irritated autonomic nervous system may result in some of the symptoms of allergy enumerated above. Sensitization may be very decided and the offending allergen obvious and localized. Desensitization may then be successful, and the removal of that one allergen may effect a cure. In most cases, however, the problem is not so simple. An autopath is probably liable to further sensitization to other allergens if the metabolic condition which produced the first persists. Again, sensitizing allergens may not be readily picked out, nor be limited in number. Specific desensitization is consequently not always possible or effective.

Treatment consists, therefore, not only in attempts at desensitization but also in breaking any vicious circle of infection and lowered general health, in raising the general health and well-being, in improving metabolism and elimination from the bowels, kidney, and skin, in avoidance of mental and physical stress, and in careful control of diet.

Medical remedies are divided into four classes: (1) those directed to the relief of allergic symptoms, such as adrenaline, ephedrine, and anaesthesin; (2) those directed to improving metabolism and tone of nervous tissues by alteratives or tonics, change of air, or by removing chronic sepsis; (3) those directed to aiding metabolism by supplying deficiencies in digestive juices or aiding elimination; and (4) surgical measures for relief of spasm, including sympathectomy.

Summary

Allergy is a state of sensitization in which the system shows habit reactions to certain foreign metabolic irritants, usually protein in nature. These reactions are dermal, vascular, haemic, respiratory, digestive, renal, arthritic, cerebral, or cardiac, according to the individual and to the local irritation, whether traumatic or infective or chemical, the last being usually the production of histamine-like bodies. Allergy tends to develop in autophils who have usually inherited an excitable autonomic nervous system and irritated an unstable metabolism. Autophils may remain unsensitized, unirritated, and in good health, or may become sensitized and irritated into being autophaths.

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J. C. Saunders (*Irish Journ. Med. Sci.*, September, 1934, p. 520) states that the average decennial mortality from diphtheria in the Irish Free State has increased from 4.7 per 100,000 in 1864-70 to 9.4 per 100,000 in 1921-30, whereas during the same period it has decreased from 78 to 3 per 100,000 in Denmark and from 11.4 to 2.9 per 10,000 at ages under 15 in England and Wales. A steady increase in mortality has taken place in the urban areas of Dublin, Cork, and Limerick, as compared with a corresponding decrease in the urban areas of Belfast, Birmingham, and Ipswich. The causes for the relatively high diphtheria mortality in the Irish Free State appear to be inadequate dosage of antitoxin, delay in its administration, and inadequate arrangements for its distribution to practitioners. It is probable that a vigorous scheme for diphtheria immunization would reduce the mortality as it has done in New York.