THE DIET IN ALBUMINURIA.*

A CLINICAL-EXPERIMENTAL STUDY.

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Albuminuria is nothing but a symptom of disease. The cause of the symptom may be anterenal, renal or postrenal, and may be due to structural change or to pathologic function. Postrenal albuminuria, an admixture of various adventitious proteid substances with the urine after this has left the renal tubules, does not come within the scope of the subject under consideration. In the case of anterenal or renal causes, it is the albumin of the serum, or rather albumin having passed through the circulation which has found its way into the urine. We are perfectly justified in accepting anterenal factors of albuminuria when we are confronted with a large albumin output without corresponding kidney lesion as shown by the presence of goodly amounts of tubular epithelium. We may yet go a step further and maintain that native serum albumin occurring in normal amounts can not be eliminated, even by a structurally altered kidney, and that the serum albumin we meet in the urine has undergone physical and chemical transformation prior to its passage through the renal organs.

Hence, the real factors of albuminuria may antedate any renal anomaly. At any rate, it seems dubious whether or not the kidney alone can ever be the starting place of albuminuria. If the kidney itself is not the primary or true cause of the albuminuric symptom, what is the use of applying renal therapy for the elimination or suppression of the albumin? How little that plan of treatment avails in this respect is a matter of every day experience. Again, another question looms up: Shall we endeavor to combat the albuminuria at all? Is its reduction or cessation a signal of bodily improvement or is the albuminuria a compensatory phenomenon, a friend in disguise?

These few words may suffice as introductory remarks to the following recapitulation of my first series of clinical-experimental studies concerning the influence of diet on the degree of intensity of albuminuria. This series of observations was made on 82 patients, affected with various diseases, of which the phenomenon in common was continued excretion of serum-albumin, so-called, with the urine. In this series of observations my sole object was to determine the influence of certain types of nutritives and ingesta, not on the underlying disease, but on the accompanying chronic albuminuria. I may add that, according to the clinical conception of to-day, every one, or nearly every one, of these underlying diseases would have been classified as belonging to those of the kidney.

The albumin determinations were made in all instances with the 24 hours' urine, and were started 48 hours after instituting the diet, and by means of Esbach's albuminometer, which, although inexact, is accurate enough to point out the fluctuations of the degree of the albuminuria.

PROTEIDS.

Prior to the addition of the various other proteid-containing ingesta to the nutriment of the albuminuric, the latter was kept on an exclusive milk regimen for two weeks. According to the weight, the daily consumption of milk amounted to from three to four liters, which

represents an intake of from about 100 to 140 grams of albumin. In a few instances the milk was abruptly withdrawn, to be at once replaced by other nutritives yielding, besides the necessary carbohydrates and fats, from 70 to 100 grams of proteid material. In the great majority of cases, meats, fish and eggs were gradually substituted for the milk, the replacing process taking on the average about two weeks. Individuals weighing from 100 to 115 pounds ultimately received 70 grams of albumin a day, those weighing from 115 to 130 pounds, 80 grams, those from 130 to 145 pounds, 90 grams, and all whose body weight exceeded 150 pounds received 100 grams. The daily amount of proteid was then usually obtained from two or three eggs (never in the raw state), from mutton or chicken, and principally from beef. The eggs, as a rule, were partaken of at breakfast, the meats, in about equal portions, at the midday meal and at supper. To prevent renal irritation meats of young animals and organs yielding large amounts of nucleins, as veal, lamb, liver, kidneys, sweetbreads, etc., were omitted.

The following observations were made:

1. In 21 individuals a two-weeks' exclusive milk regimen and bed-rest were followed by diminution of the albuminuria in 16 instances, by its complete cessation in 2 instances, and led to no material changes in the remaining 3 instances.

2. In 36 individuals a two-weeks' exclusive milk regimen and moderate bodily exercise were followed by diminution of the albuminuria in 5 instances, by its complete cessation in no instance, by no material changes in 29 instances, and by distinct augmentation in 2 instances.

3. In 25 individuals a two-weeks' exclusive milk regimen, without any restraint as to exercise and work, was followed by diminution of the albuminuria on one occasion, but for a very brief period only, by no pronounced changes in 18 (respectively 19) instances, and by more or less increase in the remaining 6 instances.

4. In two individuals at bed-rest the sudden withdrawal of milk and the substitution therefor of meats, fish, and eggs (and carbohydrates and fats) remained without noticeable influence on one patient, but caused a marked augmentation of the albuminuria, subsiding after about 36 hours in the other.

5. In 16 individuals at bed-rest the gradual withdrawal of milk and the corresponding addition of meats, fish and eggs (also carbohydrates, etc.), was followed by transitory augmentation of the albuminuria in one instance, by no pronounced changes in 12 instances, and by a more or less permanent decrease in 3 instances.

6. In 4 individuals performing moderate bodily exercise the sudden (unauthorized) replacement of the milk regimen by proteids, mainly derived from meats (and carbohydrates, etc.), remained without noticeable influence in any case. (Seen from 2 to 8 days after institution of meat diet.)

7. In 29 individuals performing moderate bodily exercise the gradual replacement of the milk by other proteid nourishment (and carbohydrates, etc.), was followed by transitory augmentation of the albuminuria in 5 instances, by permanent augmentation in no instance, by no distinct alteration in 20 instances, and by a more or less permanent diminution in 4 instances.

8. In 1 individual attending to his usual vocation the sudden replacement of the milk by other proteid ingesta remained without any influence on the degree of intensity of the albuminuria.

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9. In 30 individuals who devoted approximately the usual amount of bodily and mental energy to their occupations, the gradual withdrawal of milk and the corresponding addition of other proteid ingesta, were followed by transitory augmentation in 1 instance, by no distinct alteration in 23 instances and by a slight diminution in 2 instances.

10. The only individual in whom supervened a permanent augmentation of the albuminuric symptom on changing from milk to other proteid food was affected with atheromasia, chronic parenchymatous nephritis and diabetes mellitus.

CARBOHYDRATES AND FATS.

From three to four liters of milk contain on the average from 135 to 180 grams of lactose and from 120 to 160 grams of fat. The albuminurics subsisting for two weeks on an exclusive milk regimen obtained every day, therefore, from about 550 to 750 calories, which were elaborated from the carbohydrate, and from about 1,100 to 1,500 calories which were yielded by the fat. Exclusive of the proteid, they ingested therefore enough nutriment to yield from 1,650 to 2,250 calories a day.

When the milk was replaced by other food stuffs, not the proteids alone were reduced, but the supply of the carbohydrates and fats were curtailed from 10 to 25 per cent. This was done, first, so as not to overtax the patient's digestive powers, second, to reduce the intake of water which runs parallel to that of carbohydrates and fats, and, third, because the energy evolved from the nutriment was deemed sufficient not only for those at bed-rest and moderately occupied, but also for those who attended to their routine work. Of course, the greater carbohydrate and fat reduction (from 15 to 25 per cent.) was made for the individuals at bed-rest and those performing little work, the smaller reduction (10 per cent.) for those who had not discontinued their usual mode of occupation. Gradually the carbohydrates and fats, like the meats, fish and eggs, were made to replace the exclusive milk regimen. The instances in which the change from the one to the other regimen occurred abruptly have already been mentioned. In a number of instances from 200 c.c. to 600 c.c. (and in a few cases even larger amounts) of milk were continued to be ingested after the exclusive milk regimen had been discarded; this fact, however, was taken into due consideration in every instance. The carbohydrates made use of were mostly wheaten bread, cereals, potatoes and sugar, the fats, yolks of eggs, olive oil and suets.

The following observations were made:

1. The commonly employed carbohydrates and fats, consumed in amounts which do not overtax the functional capacity of the various digestive organs and which, at the same time, yield sufficient energy to prevent disintegration of the body substance, do not exert any other influence on the degree of intensity of the albuminuria than the carbohydrates and fats contained in milk.

2. There is no evidence whatsoever that the commonly employed carbohydrates and fats exert any participating influence on the production or on the rise and fall of the albuminuria.

3. In the albuminuric the carbohydrate-fat-proteid ratio may be practically the same as in the healthy individual but that it appears to be advantageous to reduce the *entire intake* from 10 to 25 per cent.

WATER.

The patients who ingested from three to four liters of milk a day imbibed thereby in the neighborhood of from 2,580 to 3,440 c.c. water. This is rather a large amount, larger than it probably ought to have been in certain instances, especially in those of contracted kidney. However, if milk is to be the sole or the main nutriment in albuminuria, as has been the dictum of nephritis therapy, this surplus of water can not be averted. Some years ago, v. Noorden advocated a decided reduction of the water intake in nephritides. His own pupils, Mohr and Dapper, however, have shown that if but 1,250 c.c. of water are taken daily, the degree of the albuminuria would become perceptibly increased and that practically the amount of water to be imbibed each day should not fall short of 1,500 c.c. In this series of dietary experiments 35 c.c. of water a day for each kilogram of body weight were allowed the patient. A further reduction of liquid would have resulted in a disturbance of the intrasystemic equilibrium. A patient weighing 60 kilograms (132 pounds) received therefore 2,100 c.c. of water daily.

The ingestion of water, or weak unsweetened tea, was begun when some of the milk had already been withdrawn, generally three or four days after starting the gradual admission of the other food stuffs.

The following observations were made:

1. Water, in large amounts, as imbibed with an exclusive milk regimen, enhances diuresis and intestinal peristalsis and that it is often productive of, or is keeping up, various gastrointestinal disorders.

2. The larger water intake, that is, up to 3,500 c.c. a day, neither increases the degree of intensity of the albuminuria, nor augments the absolute output of the urinary albumin in the vast majority of instances.

3. If smaller amounts of water, that is, 35 c.c. a day per kilogram of body weight, are taken, the intensity degree of the albuminuria may become temporarily augmented, and after one or two days the absolute amount of urinary albumin is approximately alike to that when larger amounts of water are imbibed.

4. In the treatment of albuminuria *per se* the maximum amount of water which may be taken is of little practical importance unless an advanced heart or kidney disease or some gastrointestinal disorder, demands an adjustment; and the minimum amount of water must never be less for any length of time, than that which is essential for the performance of the intrasystemic osmotic processes.

DISCUSSION.

DR. ALFRED C. CROFTAN, Chicago, stated that in discussing the subject of albuminuria it is important to realize that albumin is determinable in every urine. In other words, albuminuria is a physiologic phenomenon. An increase of the normal urinary albumin occurs in so many conditions that are more or less independent of renal disease, that it is important to study the manifold origin of this symptom before undertaking to treat it. In many cases albuminuria is a symptom more of cardiovascular disorder than of renal disorder. In other cases metabolic disturbances, which lead to the flooding of the blood and tissue juices with abnormal products of intermediary metabolism, lead to renal irritation and albuminuria. In still other cases the albuminuria is due to digestive disorders, pure and simple. In none of these forms can one speak of a nephritis.

That there is really an alimentary albuminuria is made clear by the following facts: It can be demonstrated that certain albumins given by mouth promptly reappear in the urine. It is a well-known fact that the injection into the

peritoneal cavity of a guinea-pig or of a rabbit of a certain amount of egg albumin, bestows on the serum of the animal the property, after a number of weeks or months of these injections, of forming specific precipitins in the test tube when mixed with egg albumin. If, now, a serum prepared in this way is added to the urine of an individual who has been given from ten to twenty eggs to eat in twenty-four hours, especially if the individual is suffering from a dilated stomach, then a specific precipitin reaction will promptly appear. This is positive proof that the egg albumin as such was absorbed, passed through the blood and reappeared in the urine. From the life-insurance standpoint this test is very important. As far as the circulatory element in many forms of albuminuria is concerned, Dr. Croftan stated that it will frequently be found that the excretion of albumin proceeds *pari passu* with changes in the blood pressure. The albuminuria due to metabolic derangements is renal in the sense that some irritation of the renal parenchyma by abnormal chemical products must be incriminated with producing the albumin excretion.

In interpreting albuminuria and in attempting to treat it rationally, physicians should depart from the purely renal standpoint, unless there is distinct morphologic evidence in the urinary sediment of renal disease, and bestow more attention on the treatment of the individual.

Dr. Croftan said that for a time he was an enthusiastic disciple of von Noorden's teachings in regard to drink restriction in nephritis. However valuable this method of treatment may be in that type of true nephritis in which the renal affection is only a part phenomenon of a general cardiovascular disturbance, the restriction of the liquids is, of course, eminently rational, for here the heart should be treated rather than the kidneys. In many other forms of nephritis, and especially in the forms of albuminuria without nephritis, drink restriction may, however, be quite useless, if not detrimental; for in the latter category of cases it is quite important that the circulating toxins should be diluted properly and that they should reach the kidneys in as low a concentration as possible. Inasmuch as the disturbances about the cardiovascular apparatus in this type, especially stenocardiac attacks, and other consequences of high blood pressure, are frequently produced by the circulation of toxic bodies that fail of proper elimination through the kidneys, it is especially important, in order to prevent serious cardiovascular complications, to administer plenty of water. The advantages accruing from this practice, he said, fully overbalance any theoretical disadvantages that one might imagine to accrue to the heart and arteries when they are forced to pump large quantities of liquid; in fact, sometimes, paradox as it may seem, the blood pressure will be found to go down when large quantities of water are given.

Dr. A. L. BENEDICT, Buffalo, asked whether, in obesity, there is an analogue to the hyperglycemia not directly due to alimentation. In regard to the use of water, whether trying to make the body take up a dropsical effusion or extrude toxins, he has been struck by the impossibility of forcing any endeavor by drastic measures. He has found it a good plan, in cases of chronic Bright's, to have the patient occasionally spend an afternoon or evening drinking two or three liters of water, as hot as can be tolerated, flavored with salt, lemon or whatever the patient likes. He asked Dr. Stern whether his statements of the amount of albumin are in parts per thousand or are they quantitative for twenty-four hours. Dr. Benedict uses the centrifuge method, after simple boiling, for estimating albumin in urine. There often is more toxemia in cases showing only 1 per cent. of albumin by bulk (about one-sixth as much by weight) than in those with more albumin. The highest reading he has gotten has been 6 per cent. albumin by bulk, or about 1 per cent. by weight.

Dr. H. C. Wood, Jr., Philadelphia, thought that water plays more than one rôle in cases of renal disease. Acute cases of nephritis are usually due to the presence of some irritating substance circulating in the blood. It is only reasonable that these irritating substances will become less irritating the more they are diluted. This is a well-known pharmacologic fact about which there can be no doubt. As regards the

effect of the water which enters the blood, it is commonly believed that any excess of water which comes into the blood must escape through the kidneys, and yet the evidence of this is not at all convincing. A year or two ago he repeated some experiments which had been done many years ago by Magnus concerning the effects of large amounts of physiologic salt solution on the blood and the excretory apparatus. It is possible to inject into the animal the amount of salt solution equal to the body weight of the animal, without very markedly increasing the blood pressure. This excess of fluid does not escape in any great part from the kidneys. Four-fifths of the salt solution escaped from the body through some other channel, probably the intestinal tract. In every case in which he used the salt solution he found the intestine filled with fluid. Two things are evident: First, that the large amounts of water ingested do not increase the blood pressure, and that the vessels are capable of taking care of an enormous amount of fluid. In the conditions he described the percentage of hemoglobin fell to 60 per cent., that is, the blood was diluted to one-half its concentration—the albumins and other organic constituents of the blood were equally diluted, showing that there is a true dilution of the blood, and presumably a dilution of any toxic substance in the blood. The effect of this large amount of water, he said, seems to be a double one: It dilutes any irritant substance circulating in the blood so that there will be a lesser irritation of the kidney; second, it encourages elimination through the intestinal tract, which thereby spares the kidney a large amount of work and permits an attempt at recovery from irritation.

Dr. H. STERN, New York City, recalled two or three articles detailing certain work, giving positive proof that egg albumin passes through the blood and is excreted again as such. Whether there is an increased amount of serum demonstrable in the blood serum, he said, can be determined only by the electric measure. There is no ionic movement. In uremia there is a hyperosmosis. Hyperglycemia can be spoken of. As to the examination of the urine, Dr. Stern said the simplest test is the best. He has used the acid tests and Esmarch's, which is no good, excepting for fluctuations. It is the absolute amount of albumin which is thus measured in twenty-four hours. In this way simple experiments have been undertaken to find out whether the excretion of albumin has been increased by certain diet, and the result of these studies has been to show that proteid materials have very little aggravating influence on the intensive degree of the albuminuria.

NOSTRUMS AND FRAUDULENT METHODS OF EXPLOITATION.

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(Concluded from page 1550.)

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