

## SODIUM CHLORIDE.\*

BY H. L. HARRIS.

Sodium chloride has been used for ages for preserving meat, fish and as a condiment for foods. Many persons believe that the consumption of sodium chloride is essential to maintain health. The medical fraternity, however, is continually finding the deleterious effect of sodium chloride on the human system.

I have been accumulating matter on the value of a salt free diet for a number of years.

The death rate from nephritis and Bright's disease, heart disease and kidney diseases has increased enormously during the last fifteen or twenty years; and it is a noticeable fact that this increase has been much larger in the United States than in England. The reason for this may, no doubt, be that England objects to heavily salted foods; thus, her hams and bacon are preserved with borax and her butter with one-half of one per cent. of boric acid instead of salt.

The following quotations will show the value of a salt-free diet.

Moras (1), in the "Avoid the Over-use of Table Salt," says:

"Call this my no-salt theory, if you like, but with me it is a fact or conviction, born of experience and confirmed by practice and results.

"Salt ages people. Salt favors deposits in blood-vessels and joints. Salt robs the hearts of marrow of the tissue-cells. Salt is an enemy to good digestion and assimilation. Salt is the most prolific cause of stomach, bowel, kidney, nerve, vital and sexual impairments. It aggravates catarrh and rheumatism. In any but the 'normal' amount found in foods, table salt is slightly or decidedly injurious in proportion to the excess taken, though the system becomes accustomed to it as it does to tea, coffee, tobacco, vinegar, and sweets.

"The average eater consumes at least ten to twenty times more than the system requires in each twenty-four hours. This necessarily keeps the tissues and fluids over-salt, as butter is. Salt "draws" water and creates thirst, but the water that it draws from your blood and flesh takes some essential living proteid (albuminoid) constituents along; whereas the water which you drink to substitute that which salt abstracts is 'dead water.'

"Another reason still why salt is bad is that its habit so perverts your taste that you swallow soup and meats and vegetables only because they are salty and, therefore, you hurriedly swallow the mouthful or morsel in your rush for the next, with never a care of your bolting foods and 'gulping soups.' Use practically no table salt, except a very little in the cooking, and see how instinctively your tongue will search each little bite for its own distinctive taste, which it will re-discover and relish after a week's attention to proper eating as later explained."

Salted butter is vile stuff and should never be used for eating or cooking.

Dr. Piersol (2) says:

"In this way the phosphates in the blood are rendered available for neutralizing acids in the plasma, even when the normal carbonates of the plasma are exhausted. A similar reaction goes on with many other cells of the body, so that actually the blood plasma can avail itself, when the necessity arises, of the alkalis contained in all the body cells.

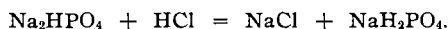
"The method by which proteins act as a buffer substance is not clearly understood. They probably play a subsidiary rôle. They are amphoteric and are capable of combining with either acids or alkalis.

"The ability of the kidneys to eliminate acid urine from alkaline blood is another important factor in maintaining the acid base equilibrium. Were it not for this, neutral salts would be eliminated through the kidney, and to quote Howland, 'every molecule of acid would rob the body of a molecule of bicarbonate.' Instead, when an acid is introduced into the body and is neutral-

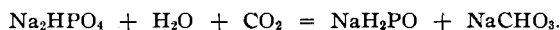
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\* Scientific Section, A. Ph. A., Cleveland meeting, 1922.

ized, sodium chloride and acid sodium phosphate are eliminated by the kidneys as is shown by the following equation:



"Acid sodium phosphate is removed, but some base is saved. Another reaction which may occur is as follows:



"Under these conditions the bicarbonate reserve of the blood is actually increased. Although some alkali is lost in the urine, enough is retained by reason of this ability of the kidneys to conserve the bases, so that the difference under normal circumstances can be made up by the food. It has been shown that the alkalies saved by this function of the kidneys, *i. e.*, to free the body of acid and acid phosphate while alkalies are held back, amounts to from two hundred to eight hundred cc of one tenth normal sodium hydroxide a day."

Dr. H. O. Beeson (3) says:

"Prescott, in his history of Mexico, relates instances of the tribe of Tlascalans, with whom he had made an alliance, and by their aid was enabled to establish himself in that country, in which he states that they had been imprisoned on a high mountain plateau for fifty years by the allied tribes about them, during which time they had not been allowed to visit the low lands to procure salt, and that after fifty years of salt deprivation, he found them strong, courageous and enduring."

"Human blood contains four-tenths to five-tenths of one per cent. The same is true of the tissue serum. The cells contain no sodium chloride. They will not take it. They will give up some of their water to dilute a pabulum of greater saline density than their own. This shrinkage becomes fatal when the osmotic density exceeds nine-tenths of one per cent.

"The amount of salt that can be used without producing harm cannot be determined by the sense of taste alone. It must conform to the physiological needs and must not exceed the limits of cell integrity. A cell cannot exist in a solution of greater osmotic density than nine parts per thousand, for beyond that it will give up some of its water and shrink, and thereby becomes incapable of performing its functions."

What is our consumption of salt per capita per diem? I have been unable to find in medical literature any statement of the average amount used by the American people. Charles Archard states that the average consumption of the French people is 20 grams. That makes 300 grains. Our War Office gives the daily ration to the United States soldier as 16-25 of an ounce. If I am not mistaken, that makes 307 grains. The soldier's ration of food is 35 ounces. This is a proportion of 1 to 55 or 18 to 1000. We may take it as the best criterion of the amount used by the American people from which the American soldier is derived. 300 grains weighed out fills a tablespoon heaped up. That is what we use daily. This is the result of being guided by the taste alone, giving no consideration to the physiological needs of the body or of the evil effects of the increased osmotic tension upon digestion and nutrition.

All physiologists agree that 95 per cent. of the salt ingested is eliminated unchanged within twenty-four hours. Then, of the 300 grains eaten daily by the average American, 285 grains are cast out of the body as foreign material as rapidly as the emunctories can accomplish the work. And who is there to say that this can be carried on for years without harm?

The use of an excessive amount of salt with food causes:

- "1. Inhibition of the production of digestive secretions.
- "2. Consequent retardation of digestion.
- "3. Favors the growth of saphrophites by reason of delay in digestion, with consequent slight but persistent ptomaine toxemia.

"4. Retards absorption, hence interferes with the prompt removal of the products of digestion. "Saline solutions are absorbed in a ratio inverse to their density."

"5. Being eliminated in large part by the mucous membranes, the exosmosis produced causes exhaustion and final infection, and the foundation of chronic catarrh is laid.

"6. The daily extra work put upon the emunctories in eliminating the surplus and the evil effects of the hypertonic osmotic tension on the cells results in general glandular insufficiencies and final degeneration.

"7. The hypertonic osmotic tension of the blood serum exhausts the red cells of their water and makes them poorer oxygen carriers, thereby inhibiting metabolic processes and the oxidation and elimination of bodily waste.

"8. The bodily distresses caused by these disturbances of metabolism and elimination, and the demand for diluent due to the presence of an undue amount of this highly osmotic agent, together with the mucous membrane excitation caused by the excess of sodium chloride in the mucus bathing them, are the foundation of the drink evil and the sexual perversions. If not the chief cause they are certainly important ones.

"9. A sufficient amount of salt to be used is 15 to 30 grains to meet all the demands of nutrition and any in excess of this is not only useless but distinctly detrimental."

Dr. Leva (4) says:

"We are in the habit of taking daily with our food 10 to 15 Gm. of common salt, and this quantity is often considerably exceeded. There is, however, in reality no physiological necessity for this, for on the one hand we know that carnivorous animals, in order to thrive, require no addition of salt whatever to their foods, and meat, we know, does not contain more than 0.1-0.2 NaCl, and on the other hand we are acquainted with nations living in a state of Nature who live only on animal food (flesh and milk) and either do not know common salt at all or else together disdain it. But with civilized man the amount of salt supplied depends more on training and habit than on any real need for it, and, as a large number of observations on health and diseased individuals have taught us, may be greatly reduced without harm."

*Deutsche Medizinische Wochenschrift* (5) says:

"Salt is not the only factor in hydrops, but is such an important one that removal of this link in the chain is one of the main points in treatment of nephritis with a tendency to dropsy. The food is best prepared entirely without salt, and the modicum of salt permitted is given the patient to season the food as he likes. The amount should not be over 2.5 Gm. a day in severe cases of parenchymatous nephritis with much dropsy or when it is feared that dropsy is impending."

Gasteira (6) discusses the causes, forms and consequences of renal congestion and emphasizes the necessity for measures to restore the balance in the cardiovascular system with restriction to a milk diet, or better still, to a salt-free diet, supplemented by diuretics according to individual indications.

Barlow (7) in an editorial on "Poisoning from Common Salt" (*Journal A. M. A.*, Oct. 5, 1912, p. 1297), speaks of the condition as a rare one.

"I wish to give my experience with several cases of fatal salt poisoning in China.

"Throughout Chekiang Province, and probably in other provinces of China, the drinking of saturated solution of salt is a common mode of committing suicide, and there is none more difficult to treat. In only one case did I succeed in securing recovery. Salt is taken for suicidal purposes sometimes in a common saturated solution made with water as the solvent, and some times in the brine from salted kraut."

Pitres (8) remarks:

"The consensus of opinion is now that the seizures of epilepsy are brought on by some perversion in the metabolism of proteins, and consequently the diet should be regulated with this in view, keeping the unstable gastro-intestinal tract under constant supervision. De Fleury even

forbids the use of milk and keeps his patients on a strictly vegetable diet, with as little salt as possible."

*Pennsylvania Farmer* (9):

"Salt is just as necessary to poultry as to other animals. The only safe kind to use for poultry is very fine salt such as table or dairy salt. Salt should be supplied to the poultry in their mash, using a tablespoonful to every large bucket of meal. Fowls cannot be trusted with a free supply of salt such as rock salt grit since they will indulge to excess, resulting in death by salt poisoning."

"The dietetic treatment (10) is of the greatest importance in cases of hyperchlorhydria. In the first place, extremes of temperature should be avoided in both food and drink. Food should be eaten slowly and thoroughly masticated, not only to facilitate salivary digestion, but to avoid irritating the stomach mechanically. All substances that are likely to irritate the gastric mucosa must be eliminated from the dietary. All kinds of acids, including the organic, such as citric, tartaric, and acetic must be forbidden; also spices of all kinds—pepper, mustard, horse radish, etc."

"The salt-free diet should be instituted in every case of persistent hyperchlorhydria."

Dr. J. N. Hurty (11) says:

"Salt, too, in the large quantities in which we generally use it, lays an unusual burden upon the kidneys and injures them. All embalmed meats, ham, bacon, corned beef, dried beef, and smoked sausages, etc., very slowly but surely damage the kidneys, liver and other vital organs. All this is not new, for it is told over and over by the authorities....."

"It is my belief that more harm, if any, would result from the rich ice cream and fruit cake, as they almost always are eaten when the body does not need food and purely to indulge the sense of taste, than from the benzoate of soda as a preservative of foods; and I am also strongly opposed to embalmed meats with their kidney-destroying saltpeter, their creosote and excessive amount of salt. As for spices—they are an abomination as articles of diet. They are constipating, stimulating and irritating."

"In what I have said there is nothing new. The same has been taught by physiology and dietetics for years."

It is evident from the above that sodium chloride is not the innocent condiment it is supposed to be, and that it is not an essential substance for the welfare of the human system.

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