THE PHYSIOLOGY OF SALT METABOLISM

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Sodium Chloride is an essential constituent in the body fluids. We cannot eliminate water by osmotic transfers – we cannot perspire, our kidneys cannot eliminate waste materials and poisons without the help of salt – so it seems queer that occasions should arise where salt intake is restricted, as in some cardiovascular disease.

The answer to this question seems to be in the fact that there must be a normal balance between sodium and potassium salts in the body fluids. In fact, in testing the mineral requirements of living cells, it was found that if a deficiency of potassium was present, too much sodium caused a limitation in growth, and increasing the potassium permitted the tolerance of this sodium. The potassium salt seemed to be the essential one, (potassium being necessary to plant life, but not sodium), so that sodium was only detrimental by reason of a deficiency of potassium. (1)

In human nutrition potassium is more critical than sodium by reason of the radioactivity of potassium, which appears to have the function of supplying the electronic energy to activate the timing mechanism of the heart. In potassium deficiency the heart becomes erratic in its pulsations, and the administration of other salts with equivalent radioactivity relieves the situation (rubidium is one element that can substitute for potassium). (2)

We tend to have potassium deficiency by reason of the depletion of our soils in this element, and by reason of the fact that the cheaper price of sodium salts has caused its substitution in many foods and drugs where potassium was formerly used. (3)

Sodium becomes important for the person who lives on a low protein or vegetarian diet, since the urea (carbamide) formed in the tissues from the metabolism of protein can take the place of sodium chloride in promoting the osmotic transfers in the kidney and sweat glands that otherwise require salt. The Eskimo has been cited to demonstrate the case of human nutritional patterns in which salt is not commonly included. The Eskimo has no need for salt, and does not crave salt. Neither can he tolerate hot weather. His thyroid gland cannot adapt itself to a hot climate, and he dies if he is taken to places where the weather remains long at levels near blood heat. (4)

Those of us, however, who eat less meat than the Eskimo will find that we must have some sodium chloride, and often may find that some carbamide too is beneficial, especially in hot weather to promote toxic elimination. Nightmare type of dreams is one indication of poor elimination of the toxins that require carbamide, so is any irritating influence in the bladder or urinary tract. A concentration of toxic materials in the urine, by reason of carbamide lack will of necessity cause irritation in the bladder and urethra. Morphine and most pain-relieving drugs inhibit the formation of carbamide in the tissues, and aggravate the mental reactions to the point of delirium, and inhibit the elimination of toxic products by the kidney. Carbamide should always be administered with such drugs.

The present custom of restricting salt for patients with cardiovascular disease seems to be an ill-advised substitute for balancing up their potassium-sodium intake. A deficiency of potassium may be a primary cause of the very condition in which salt is being restricted, and potassium be the real needed remedy.

In potassium deficiency there is a more or less complete inhibition of adrenal function. (5) No doubt every disease for which Cortisone or ACTH is being used is basically a deficiency disease stemming from potassium lack in some degree. To now restrict the intake of salt to treat the disease is obviously the wrong approach. Where the adrenal glands have been damaged by infection, extra sodium chloride is necessary to save the life of the patient. He will soon die without a lot of salt, and he craves the salt. "The administration of salt will frequently alleviate acute adrenal insufficiency....." (6)

Potassium (as bicarbonate) often acts as if it specifically caused a release of adrenal hormones. One authority says it is, "more nearly specific than any other remedy", in influenza. (7) So it is apparent that sodium and potassium are partners, and must not be permitted to get out of balance in our nutritional schedule.

1. Nutrition Reviews, May 1951, p. 135.
2. "Protomorphology", page 86 (Lee & Hanson – 1947 – Lee Foundation, Milwaukee 3, Wis.)
3. "The compounds of sodium and potassium ... are similar in therapeutic action ... owing to the smaller equivalent weight of sodium it is only to be expected that sodium compounds will as a rule be more therapeutically active than the corresponding potassium compounds ... the relatively wide use of the expensive potassium salts in medicine, must be attributed, in part, to tradition."
"Text Book of Pharmaceutical Chemistry" Driver, Oxford Press. Refers too, to AMA Jol. 1918 70,1001 and White, Pharmaceutical Jol. 1914 (4) 39, 286.
4. "Das wirksame Prinzip der oxydationshemmenden Schilddrusentatigkeit" von G. Mansfeld, Arch. fur Experimentelle Pathologie 196, 1940.
5. "Potassium stimulates the secretion of adrenaline ... The mechanism seems to be similar to that involved in the action of potassium on the heart ..." "Autonomic Regulations" Gellhorn. 1943. p. 146. (Interscience Press).
6. "Role of Sodium in adrenal insufficiency. Loeb, Atchely & Stahl J.A.M.A. 104: 2149, 1935.
7. Potter, "Therapeutics, Materia Medica & Pharmacy", 12th Ed. p. 714 (Blakiston)

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