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Some effects of phosphates parenterally administered.

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Embden, Griesback and Schmitz,[1] Witzemann,[2] Winter and Smith[3] and others seem to have demonstrated that phosphates, both organically and inorganically bound, play an important rôle in carbohydrate metabolism. It thus becomes of interest to know whether inorganic phosphates parenterally administered influence this metabolism as mirrored by blood sugar changes.

Our experiments show that when ortho-phosphoric acid (0.2-2.0 cc. U. S. P. acid in 10 cc. water), mono basic sodium phosphate (1.0-4.0 grams dissolved in the least amount of water), dibasic sodium phosphate (0.5-2.0 grams) and the tribasic sodium phosphate (1.0-3.0 grams) are injected subcutaneously in rabbits (weight 1000-1300 grams) the blood sugar practically always shows a very marked rise. The increased sugar is apparent within twenty minutes, and lasts as a rule for two hours or more. Acid sodium phosphate tends to produce the highest blood sugars when compared with the dibasic and tribasic salt on a weight of salt per kilogram body weight basis; the tribasic is least effective in this respect. The blood sugar rise does not appear to parallel the appearance of the convulsions or tetany to be discussed below, inasmuch as many of the animals showed high blood sugar with no nerve symptoms, and vice versa. Furthermore, a given dose of phosphate in two animals of the same weight does not necessarily produce comparable blood sugar elevations.

Binger[4] has demonstrated that Na_2HPO_4, and Na_3PO_4, given intravenously, produce tetany, but NaH_2PO_4 is inactive in this respect. Tisdall[5] and Kobert[6] found H_3PO_4 equally ineffective.

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[1] Embden, Griesback and Schmitz, *Zeit. f. Physiol. chem.*, 1914-15, xciii, i.

[2] Witzemann, *J. Biol. Chem.*, 1920, xlv, i.

[3] Winter and Smith, *Brit. Med. J.*, 1923, i, 12.

[4] Binger, *J. Pharm. Exp. Ther.*, 1917-18, x, 105.

[5] Tisdall, *J. Biol. Chem.*, 1922, liv, 35.

[6] Kobert, *Schmidt's Jahrb. d. Ges. Med.*, 1878, clxxix, 225.

Our results confirm these data and further show that NaH_2PO_4 produces marked opisthotonic convulsions. The orthophosphoric acid does not produce convulsions or tetany within the limits in which we have worked—death by respiratory paralysis ordinarily ends the experiment before symptoms become manifest. It would thus appear that either by a change in the $[H^+]$ or by the addition of the Na^+ or by both we can obtain a wide variation in symptoms (1) sudden death with very few nervous manifestations (H_3PO_4); (2) violent convulsions (NaH_2PO_4); (3) tetany (Na_2HPO_4) and (Na_3PO_4).

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Reflex association of feeding and defecation in young birds. (Troglodytes Aedon).

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In connection with the problem of visceral reflexes, it is of interest to record an observation on young house wrens (*Troglodytes aedon*). A brood of six nestlings ranging in age from three to six days was orphaned, and for several hours were fed insects and worms by means of small forceps.

When disturbed, the young bird, if hungry, extended the head and opened its beak. As soon as a morsel of food was swallowed, the bird became very active, scrambling and jostling until it had pushed its head down toward the center of the nest and elevated the anus just over the edge of the nest, in which position defecation always occurred. At once the bird became quiet and could not be induced to take food again for a period of from one and one-half to three minutes. Defecation in this position *always* followed the taking of food.

Ornithologists have long known that in many species the parent birds carried away excreta after every trip to a nest with food. A parent wren was observed to repeat this operation on an average of 25 times an hour, carrying away the excreta *every time* food was carried to the nest.