

unfavorable effects of larger quantities of almond appear to be due to some harmful substance which is not in the integument but in the kernel itself. Since the results with press cake were almost identical with those from feeding the whole nut, it seems unlikely that the sole difficulty was the large amount of fat, though undoubtedly young animals will not thrive with a high amount of fat in the diet. We have repeatedly seen the coats of young rats look as if they had been dipped in water twelve to twenty-four hours after feeding almonds or peanuts. Unfavorable influences in the case of the peanut are also recorded by Daniels and Loughlin<sup>1</sup> and attributed to high fat.

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**A note on the use of ammonium chloride in gastric tetany.**

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Studies of the experimental tetany produced by pyloric obstruction made by MacCallum<sup>2</sup> showed clearly a reduction in plasma chloride and a coincident increase in the CO<sub>2</sub> combining power of the blood plasma. A publication of a similar nature<sup>3</sup> called attention to this latter feature, but not to the reduction of plasma chloride content. The priority in experiments clearly belongs to MacCallum. Both reports agree in the interpretation that the primary disturbance is due to a loss of chloride through the gastric secretions. The therapeutic results obtained in experimental animals by replacing chloride ions either by injection of NaCl intravenously,<sup>2</sup> or HCl into the duodenum,<sup>3</sup> were good.

More recently attention has been called by Haldane<sup>4</sup> to the effects of administration of ammonium chloride by mouth. This substance when ingested produces an acidosis resulting in lowered CO<sub>2</sub> combining power of plasma, and an increased excretion of acid. The most probable explanation is that the ammonia is

<sup>1</sup> Daniels and Loughlin, *Jour. Biol. Chem.*, 1918, xxxiii, 295-301.

<sup>2</sup> MacCallum, Lintz, Vermilye, Leggett and Boas, *Bull. Johns Hopkins Hosp.*, 1920, xxxi, I.

<sup>3</sup> McCann, Wm. S., *Journ. Biol. Chem.*, 1918, xxxv, 553.

<sup>4</sup> Haldane, J. B. S., *Journ. Physiol.*, 1921, lv, 265.

rapidly converted into urea leaving HCl to combine with other bases.

In view of these facts it was determined to apply ammonium chloride to the treatment of gastric tetany. The opportunity presented itself in the case of Mrs. Helen G., aged 59 years, who had entered the hospital with a history of vomiting frequently for two years, and especially frequently during the preceding three months. An annular filling defect was noted in roentgenograms which was thought to be the result of carcinoma. A laparotomy performed revealed no evidence of carcinoma. Cholecystectomy was done for cholelithiasis. After operation vomiting continued. Five days later the typical carpopedal spasms of tetany were noted. A positive Trousseau's sign was obtained. Blood was taken for examination at this time. The patient was given an intravenous injection of 500 c.c. of an 0.822 per cent. solution of ammonium chloride,  $P_H$  7.0, which has been tested against the patient's blood and found to cause no hemolysis. Carpopedal spasms ceased during the injection and no return of tetany was noted up to the time of death twelve days later. The table shows the resulting changes in blood constituents.

| Date.                                  | CO <sub>2</sub> C.P.<br>Volume<br>Per Cent. | Chlorides<br>Whole Blood<br>Mgs.<br>per 100 c.c. | Non-Prot.<br>Nitrogen<br>Mgs.<br>per 100 c.c. | Serum<br>Calcium<br>Mgs.<br>per 100 c.c. |
|----------------------------------------|---------------------------------------------|--------------------------------------------------|-----------------------------------------------|------------------------------------------|
| 4-13 before treatment . . .            | 75.7                                        | 386                                              | 30.6                                          | 8.8                                      |
| 4-13 $\frac{1}{2}$ hr. after treatment | 53.0                                        |                                                  |                                               |                                          |
| 4-14 . . . . .                         | 63.5                                        | 455                                              | 34.9                                          |                                          |
| 4-21 . . . . .                         | 58.2                                        | 484                                              |                                               |                                          |
| 4-23 . . . . .                         |                                             | 478                                              | 36.4                                          |                                          |

Saline infusions were started after the second blood specimen was withdrawn, and continued daily until the 20th.

At autopsy there was found to be a diaphragmatic hernia containing the fundus of the stomach and producing a marked constriction. The esophagus entered so that practically only the fundus filled with food or bismuth.

Mention should be made of the recent successful use of ammonium chloride in the treatment of tetany in children.<sup>1</sup>

<sup>1</sup> Freudenberg and György, *Klin. Wochenschr.*, 1922, 1, 411.