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Gastro-intestinal studies XI. Studies on the relative digestibility and utilization by the human body of lard and hydrogenated vegetable oil.

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Two normal men were the subjects of the experiment, which was conducted in two periods of eight days each, separated by an interval of three days. The diets were so arranged that the fat, ingested during the first period, was mostly lard, while that of the second period was mostly hydrogenated vegetable oil. The daily feces were analyzed for total fat, fatty acid, and neutral fat by the Saxon method. The average percentage of digestion of lard was 96.75, and of the hydrogenated vegetable oil, 96.3, while the average utilization percentages were 94.7 and 93.35 respectively. It is thus apparent that the hydrogenated vegetable oil used in this experiment was as satisfactorily digested and utilized by normal men as was lard.

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The ammonia of the gastric juice. (Preliminary communication.)

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Recently Carlson[1] reported some observations on the occurrence of NH_3 in the gastric juice of man and of dogs. Further observations have been made and a few of the results are given below.

Three series of experiments were conducted: (*a*) On dogs with Pawlow stomachs; (*b*) on normal human individuals, and (*c*) on human individuals with gastric disturbances.

The NH_3-content of the gastric juice of normal dogs varied

[1] Carlson, *Am. Journal of Physiology*, 1915, XXXVIII, p. 248.

in different dogs between 0.5–3.5 mg. NH_3 per 100 c.c. of juice, there being some variation from day to day, and at different times during the same day in the same dog. The juice was collected for a period before feeding and one-hour periods after feeding. The addition of NH_4Cl to the dogs' food caused in each instance an increase in the NH_3-content of the gastric juice collected from the Pawlow pouch. Three dogs, in which gastric ulcers had been produced experimentally showed an increase in the NH_3-content at irregular intervals. After a time two of these dogs refused to eat and the juice collected during this time showed a progressively increasing content of NH_3. At autopsy these dogs showed either active or healed ulcers, usually located in the Pawlow pouch.

b. The experiments on normal healthy individuals were conducted on men who were connected with the laboratory. The juice was collected by means of the Rhefus stomach tube before and after feeding on Ewald meal. With three exceptions the NH_3-content of the juices from these men ranged between 0.5–3.5 mg. of NH_3 per 100 c.c. of juice. In these three men the NH_3-content ranged between 10–15 mg. NH_3 per 100 c.c. of juice.

A series of experiments was then conducted on one of these men with high NH_3-content. The diet was so arranged that there were periods of low protein and of high protein ingestion, and the NH_3 content of the gastric juice and the total NH_3 of each day's urine were noted. During low-protein ingestion the NH_3 content of the gastric juice fell in five days from 12–3.5 mg. and the NH_3 of the urine also showed a marked decrease. During the high-protein ingestion the NH_3-content of the gastric juice rose in 3 days from 12–28 mg. NH_3 and the NH_3 of the urine also showed a marked increase. In both cases the NH_3 in the gastric juice and in the urine came back to the original level within two days after resuming the usual diet.

In the second experiment the diet was kept uniform throughout the period and during certain periods an excess of alkalis or of acids was added. During the period of excess alkali ingestion the NH_3 of the gastric juice remained the same while the total NH_3 of the urine fell to 1/10 its former level. During the ingestion of acid the NH_3 of the gastric juice again remained the same while

the total NH_3 of the urine was increased. When the alkali and the acid were left out of the diet the normal level for the NH_3 of the urine was reached in a short time.

c. Estimation of the NH_3-content of Ewald meal juice from 26 individuals with gastric disturbances, supposedly ulcers, was made and in only five of these was the NH-content markedly increased. In two of these cases the diagnosis of carcinoma of the stomach was made with certainty; in another case a diagnosis of ulcer with obstruction was made and in the remaining 2 cases a diagnosis of gastric ulcer was made. Further work is being conducted along this line with the view of determining the source and the significance of the gastric juice ammonia.

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The action of heavy metals on the isolated intestine.

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In experiments with zinc which was used in the form of the malate and carried out on isolated segments of the intestines of cats and rabbits by the method of Magnus it was found that even low concentrations may produce depression of muscular activity. A solution *N*/20,000 zinc malate, proved to be quite active in some experiments. *N*/10,000 and *N*/5,000 zinc malate produced, after a brief preliminary stimulation, considerable decrease and sometimes irregularity of the force of rhythmic contractions. Occasionally decrease of frequency and tonus were also observed.

When the segments of the intestine were suspended in pure Locke solution again, some improvement occurred, although it had been acted upon by zinc 45–70 minutes. In experiments with concentrations of *N*/1,000 and *N*/500 and sometimes even with *N*/2,000 permanent injury to the tissues may be caused by the metal as no recovery could be observed when pure Locke solution was substituted for one containing zinc.

The action of nickel employed in the form of the acetate was also tested. Dilute solutions, *N*/10,000 and *N*/5,000 produced