3698

## The Effect of a Meal upon the Titratable Alkalinity of Blood.

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The effect of a meal upon the titratable alkalinity of the blood was studied in 47 subjects by the method of Sumner and Hubbard.[1] Specimen's were obtained after a night's fast and two hours after a meal by which the carbohydate tolerance was tested.[2] The meal consists of 100 gm. carbohydrate, 24 gm. protein, and 25 gm. of fat, fed as oatmeal, milk, sugar, dates, bread, butter, orange, and an egg. The subjects were patients in the sanitarium, in whom it was thought that some abnormality of carbohydrate metabolism might be present. The average blood sugar content, determined by Benedict's copper method,[3] was 93 mg. per 100 cc. before, and 115 mg. after the meal was fed. Of the cases studied 14 showed increases in blood sugar after the meal, greater than 25 mg. per 100 cc.; 5 of these were greater than 100 mg. per 100 cc.

The average values obtained before the meal were 44.7 cc. N/10 alkali per 100 cc. of blood when methyl red was used as an indicator, and 28.4 cc. when thymolphthalein was used. After the meal these values were 46.0 and 30.9 respectively. The distribution of the increases and decreases by the two methods is given in the table. In 6 cases the variation in the titration values by the two methods were of opposite sign, but in 4 of these, one of the methods showed variations of 1.0 cc. N/10 alkali or less. There were 2 cases in which no variation in one titration value was accompanied by a more or less significant variation in the other one. In the remaining 39 cases both titrations showed differences which were parallel.

It is evident from the average values and from the table that the majority of the cases showed an increased amount of titratable alkali after the meal with both indicators, but that the average difference was slight. Variations were more pronounced when thymolphthalein was used as an indicator. It seems probable that these differences represent part of the process of the adjustment of the organism to the secretion of hydrochloric acid by the stomach. Two hours after the ingestion of such the meal, gastric digestion is well advanced, and absorption from the intestine progressing actively, so that marked increases in titratable alkali should not be expected. Besides this, variations in gastric secretion are so great that marked differences in the response of any blood factor would almost certainly occur in such experiments.

TABLE 1.

| Indicator | cc. N/10 alkali per 100 cc. blood. | | | | | | |
|---|---|---|---|---|---|---|---|
| | over −5 no. | to −5 no. | to −2 no. | −1 to +1 no. | to +2 no. | to +5 no. | over +5 no. |
| Methyl red | 1 | 7 | 2 | 15 | 3 | 15 | 4 |
| Thymolphthalein | 3 | 4 | 5 | 8 | 2 | 9 | 16 |

Negative values have been used where the concentration of alkali was lower in the specimen collected after the meal than it was in the first one.

The titration to the thymolphthalein endpoint is distinctly less accurate than is that to methyl red, but the author feels that in such experiments as are reported here, where the two analyses are run almost simultaneously under comparable conditions, a fair degree of confidence can be placed in the results. Whether the figures obtained at the more strongly alkaline reaction should be regarded as more than simply confirmatory of those obtained with methyl red, is a point which should probably be regarded as open to question. The decrease in difference between the two values implies a decrease in the soluble acid buffers active in the blood, but whether this really occurs, and represents a part of the accommodation of the organism, cannot be considered as definitely established by the figures given.

[1] Sumner, J. B., and Hubbard, R. S., *J. Biol. Chem.*, 1923, lvi, 701.
[2] Brill, I. C., *J. Lab. Clin. Med.*, 1925, viii, 727.
[3] Benedict, S. R., *J. Biol. Chem.*, 1925, civ, 207.

## 3699

## Chemical Analysis of Incubated Non-Fertile Eggs.

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Fresh eggs, procured from White Leghorn chickens, were analyzed to obtain data on the chemical changes occurring before incubation. Then eggs from the same source were incubated, and the non-fertile ones analyzed at various periods of time, up to 20 days, for carbohydrate, and non-protein nitrogen constituents, using a protein free filtrate prepared by the Folin-Wu method. Table I presents a summary of the data obtained.