This food is not adapted to infants under 3 months. I have been successful in a few instances, but usually the results are disappointing. The bowels become loose and sour-smelling and the infant grows very restless; symptoms due to the carbohydrate content of the food. Albumin milk is much more likely to be of service for these babies.

In diarrheas this food is frequently of inestimable value; without any other medication the stools frequently become formed and the weight is rapidly brought back to normal. It may be prescribed as early as the third or fourth day, even in the presence of a marked diarrhea. I believe that the chief explanation for the favorable results⁵ in this condition is the fact that the maltose, unlike the lactose, shows little tendency to ferment in the bowels. Lactase, the ferment which converts the lactose into its monosaccharid, is found exclusively in the intestinal tract; while maltase, which acts on the maltose, occurs not only in the intestine, but in other parts of the body, particularly the blood. Thus any of the maltose which may possibly pass through the intestinal wall may still be converted into its monosaccharid. This is thought to be the reason for the fact that the power of assimilation of the body is much greater for maltose than for the other sugars.

It must be distinctly borne in mind that some infants after malt soup administration develop dangerous symptoms of intoxication, owing to the high percentage of soluble carbohydrates. That high fever and convulsions may follow the use of this food is illustrated by the following case:

Patient.—Baby M., 6 months old, fed artificially from birth as mother had no milk. Top milk mixtures were employed for several weeks; infant did not thrive. Condensed milk and various proprietary foods tried with unsatisfactory results. When I first saw the baby, diarrhea had existed for three weeks. The general condition was very poor; continuation of the downward progress meant that the typical picture of marasmus was but a short time off.

Treatment and Course.—Malt soup was prescribed, made up with 10 ounces of skim-milk, 1 ounce flour, and 1 ounce malt-extract. There was an immediate and rapid improvement, which extended over a period of four weeks. The stools became formed, restlessness ceased and the body-weight started upward, amounting during this period to 20 ounces. In the fifth and sixth week after the commencement of the malt-soup diet the weight was stationary; the malt-extract was increased to 1½ ounces. The baby responded with a fever of 105 F. and convulsions which continued three hours, necessitating the use of morphin hypodermatically. Physical examination excluded organic lesion of any of the internal organs. The presence of rapid, deep, pauseless respiration, with the history, pointed to the diagnosis of alimentary intoxication (Finkelstein).⁶ All food was withheld for eighteen hours and water administered freely. Breast-milk feeding was begun first in very small amounts, gradually increased with improvement of the baby. The further course toward recovery was uneventful.

Such babies should have a rectal temperature taken regularly twice a day. Any rise of temperature should call for an immediate examination of the urine for sugar so as to forestall the development of severe symptoms. The phenylhydrazin test is the best.⁷ These

symptoms, even if of the severest grade, immediately subside on withdrawing the carbohydrates. The great danger is that the clinician will misinterpret the symptoms and continue with the sugars in the diet.

CONCLUSIONS

1. Milk nutritional disorder (Keller-Czerny) is a definite clinical condition occurring subsequently to the administration of fat of cow's milk.

2. It is frequently cured, particularly after the third month, by Keller's malt soup.

3. Even if the metabolic disturbance has persisted so long that marasmus has developed, malt soup is often of signal service.

4. For these babies to recover on malt soup they must have a high carbohydrate tolerance.

5. Malt soup is frequently a good diet in diarrhea.

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A NEW TEST-MEAL*

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The information to be obtained from an extracted Ewald test-breakfast is necessarily very limited. It is obvious that little is gained as to the motility of the stomach. The actual acidity of the gastric juice, as secreted, cannot be found. No estimate can be made of the total amount of gastric juice produced.

In the hope of obviating some of these deficiencies, Mathieu proposed the addition of a definite quantity of water to the residue in the stomach after the expression of a small sample. After an interval of an hour, he showed that the total residue could be calculated by using a formula based on the difference in acidity of the two abstracted samples before and after the addition of the water. While from this method it is possible to determine the residue of test-meal and gastric secretion it is impossible to say how much of each makes up this residue.

To give further information on these facts, Sahli proposed his butyrometric test-meal. This, it will be recalled, is a fat emulsion made by roasting 45 gm. of flour thoroughly intermixed with 15 gm. of butter. To this mixture 350 c.c. of water are added, and the whole boiled two minutes. Fifty c.c. of this soup are retained for fat determination and 300 c.c. given to the patient. After one hour the stomach contents are aspirated and a definite amount of water is poured into the stomach as in the method of Mathieu. Fat determinations are then made of the soup as given and of the first aspiration of stomach contents.

It soon became apparent to clinicians working with this test-meal that, apart from the time consumed by its preparation, it was unsatisfactory because such a large amount of fat inhibited gastric secretion, and because the instability of the emulsion led to erroneous results.

Friedman,¹ after working with this meal and finding the objections justified, came to the conclusion that a satisfactory modification was to be found in a meal made by diluting condensed milk with water in the proportion

* Read at the annual meeting of the American Gastro-Enterological Association, Philadelphia, April 19, 1911.

1. Friedman: Arch. of Int. Med., 1909, iv, 69.

5. Leopold: Arch. Pediat., 1911, xxviii, 345.

6. Jahrb. f. Kinderh., January, 1907, p. 1.

7. In a test-tube put 1 gm. of phenylhydrazin hydrochlorid, an equal quantity of powdered sodium acetate and enough of the suspected fluid to half fill the tube. The acetate dissolves as the tube is heated. Boil for two minutes and after twenty minutes examine, under the microscope, for the characteristic osazone crystals. (Holland: Medical Chemistry and Toxicology, 1911.)

of one to three. He sums up his excellent presentation of the entire subject as follows:

The method does, however, fail occasionally, probably for the reason that the emulsion is destroyed. Failure is particularly liable to occur under the following circumstances:

1. In cases in which there is low acidity and hypermotility. In such cases there will be so little fluid in the stomach in fifty minutes that no accurate fat determination can be made. When such a condition is suspected, it is best to aspirate in thirty minutes.

2. In cases of gastritis in which there are very large amounts of mucus which destroys the emulsion and by rising to the surface of the Babcock bottles obscures the readings.

3. In cases of greatly impaired motility owing to the difficulty of completely emptying the stomach preliminary to lavage.

Even where it fails it still, however, offers as much information as the ordinary Ewald test-breakfast.

In the hope of finding a test-meal which would afford the desired knowledge, without these possibilities of error or complete failure, I have experimented with various substances to discover one which, when added to the test-meal in definite quantity, would indicate, on its passage from the stomach, at the lapse of an hour, the amount of test-meal which remained. It was finally concluded that lactose had many advantages for this purpose, and during the past few months seventy test-meals of this character have been given. In detail the test-meal is made as follows:

To 300 c.c. of freshly made weak tea 30 gm. of lactose are added. This fills two ordinary tea-cups. It has been found of practical advantage to give at the same time one pilot biscuit or two soda biscuits. Crackers containing salt, sugar or dextrin should not be used. After this test-meal has remained in the patient's stomach for an hour a liberal portion is extracted, and, preferably with the bulb, water, about 200 c.c., but necessarily a definite amount, is forced into the stomach through the tube. The mixing in the stomach is effected by partly withdrawing the contents and forcing them back again several times before the extraction of the second sample. These two samples are then ready for analysis. The free acidity of the first is determined and has been found to be comparable to the free acidity resulting from the Ewald test-breakfast. The total acidity of both specimens is then estimated with great care, using phenolphthalein as an indicator. The residue, after the extraction of the first portion, is determined by means of the Mathieu formula as follows: Let A equal the acidity of the first portion, and B the acidity of the second portion; then $B \times 200 \div (A-B) = X$, i. e., the residue. To find the total stomach contents after the lapse of one hour it is necessary, of course, to add the quantity of the first specimen to the residue as found by the above formula.

The next step is the determination of lactose in the first specimen. Before satisfactory results were obtained many methods of lactose determination were experimented with until, finally, trials were made with the method of Gerard and Allen as modified by Rüdich and Cellar.² This modification of Fehling's solution is made by adding one part, by volume, of the mixed copper and Rochelle salt solution to four parts, by volume, of 50 per cent. aqueous solution of chemically pure potassium sulphocyanate. Twenty-five c.c. of this solution, the equivalent of 5 c.c. of mixed Fehling's solution, are gently boiled in a porcelain dish, and the sugar solution

is added drop by drop, preferably from a burette. The end reaction is a quick and sharp loss of color, and when the experiment is done with care many trials with the same specimen give results which show less than 0.1 per cent. variation. In determining the lactose percentage in this solution, the end reaction has been found even more sharp than is the case with a complex fluid such as urine. The presence of acids in the stomach contents has not seemed to alter the results in any way.

It must be remembered in making these estimations that the oxidation of copper by lactose is somewhat slower than with glucose and care must be exercised to add the drops slowly and to titrate during the dropping. It is more convenient to work with filtered chyme that has been diluted three or four times. The number of cubic centimeters of the undiluted chyme necessary to decolorize 50 c.c. of the Rüdich-Cellar solution having been found, to find the percentage of lactose it is necessary to divide, not 0.05 gm., as is the case for glucose, but 0.06 gm., as lactose has a different power of reduction. Reduced to simple terms it may be said that six divided by the number of cubic centimeters of undiluted chyme necessary to decolorize 50 c.c. of the Rüdich-Cellar solution gives the percentage of lactose.

Having previously determined the stomach contents at the end of one hour by the Mathieu formula, it is now determined just what portion of this is test-meal and what portion gastric secretion. If 30 gm. of lactose were given to the patient the amount of fluid test-meal remaining would be proportionate to the amount of lactose remaining. The actual amount of lactose is easily determined by multiplying the determined total residue by the determined percentage. Let L equal the number of grams of lactose in the stomach contents, and A the number of cubic centimeters of contents; then the following formula needs no explanation: $300 : A :: 30 : L$, 300 being the amount of fluid test-meal ingested. Simplified, this formula will read $10 \times L = X$. The amount of gastric juice in the stomach contents is found by subtracting the discovered test-meal residue from the total residue found by Mathieu's formula.

The following is an example of the result on a normal stomach. First extract 40 c.c. in amount; free acidity was 20, total acidity, 40. One hundred and fifty c.c. of water were injected into the stomach and the second sample showed a total acidity of 8. $B \times 150 \div (A-B) = X$ here became $8 \times 150 \div 32 = 37.5$. The total residue was then $37.5 + 40$ or 77.5. The percentage of lactose in this total residue was 0.641 per cent. The total residue, $77.5 \times 0.641 = 3$ gm. of lactose; $300 : 30 :: X : 3$, or $X = 10 \times 3$, or 30, the test-meal residue. Then $77.5 - 30 = 47$ c.c., the actual amount of gastric juice.

From these calculations we now have the total stomach contents one hour after the ingestion of a definite test-meal. We know how much of this is test-meal residue and how much is gastric secretion. Working with these figures secured by the Sahli test-meal and its modifications a number of formulas have been suggested designed to give us quotients which could be used as bases of comparison. Thus, for example, G. J., the gastric juice residue, divided by T. M., the test-meal residue, is said normally to be as .7 is to 1; if the figure deduced in any case is more than 1 we have hypersecretion, and if less than 0.7 we have a quotient of hyposecretion. The motility again is found by dividing 300, less the test-meal residue, by 300. Practically, I doubt that these quotients will be much used, but I am inclined to think that the estimate of the actual acidity

2. Rüdich and Cellar: THE JOURNAL A. M. A., Jan. 20, 1907, p. 324.

of the undiluted gastric juice is a matter of clinical interest. This is determined as follows: Let A equal the acidity of the aspirated stomach contents; let T equal the total stomach contents at the time of aspiration and G. J. equal the amount of gastric juice discovered. Then X, the calculated acidity of the gastric juice not diluted by the test-meal residue, would be as follows: $X=A \times T \div G. J.$ Taking as an example the previous case we have:

A=40, T=77.5, G. J.=47. Then X=66.

The advantage of this test-meal over the butyrometric test-meals, previously suggested, are the ease of preparation, the palatability of the meal and the simplicity of the lactose determination. I cannot see that the objections which, Friedman admits, are inherent in the test-meal he proposes are applicable to the test-meal here described; separation of the sugar from the liquid could

but little, if any, absorption from the stomach could have taken place. Even though it may be shown that a certain small proportion of sugar is absorbed from the stomach the method would still be of value in a comparative way.

It is not intended in this preliminary communication to establish figures showing the normal limits of motility and secretion. The comparatively small number of cases studied, seventy in all, is insufficient for conclusive deductions, and only tentative conclusions have thus far been reached.

In the accompanying series of cases the diagnosis of conditions present in the stomach was established by considerable clinical study or shown by surgical exploration.

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TABLE SHOWING RESULTS FROM THE USE OF A NEW TEST-MEAL

Case.	Free Acidity.	Total Acidity.	Test-Meal Residue.	Gastric Juice, Residue.	Gastric Condition.
1	22	40	138	92	Ptois and asthenia.
2	14	31	120	84	Ptois and asthenia.
3	8	28	216	150	Ptois and asthenia.
4	16	44	90	60	Ptois and asthenia.
5	0	8	170	30	Ptois, asthenia, achylia.
6	0	12	205	95	Ptois, asthenia, achylia.
7	0	8	63	70	Achylia gastrica.
8	0	20	31	50	Achylia gastrica.
9	44	68	55	224	Pepitic ulcer.
10	80	120	15	138	Pepitic ulcer.
11	44	65	20	150	Pepitic ulcer.
12	36	50	39	131	Pepitic ulcer.
13	20	40	18	104	Pepitic ulcer.
14	40	63	32	110	Pepitic ulcer.
15	20	46	40	70	Normal.
16	19	40	30	47	Normal.
17	26	42	68	84	Marked ptosis, motility good.
18	10	45	65	40	Marked ptosis proved by x-ray. Motility good proved by x-ray.
19	40	60	28	48	Moderate ptosis.
20	20	40	60	46	Chronic appendicitis; appendix removed. Attacks of pylorospasm. Constant dyspeptic complaints.
21	16	56	51	122	Cholelithiasis, occasional colics with constant gastric complaints.
22	30	50	80	95	Cholelithiasis, constant complaints, operation.

not conceivably take place. The presence of mucus would have no particular influence on the estimates. In no case have I found the quantity at the end of an hour insufficient for several confirmatory readings.

Every practitioner should be familiar with quantitative sugar determinations, and the method I have recommended requires no extraordinary equipment nor considerable experience with laboratory technic.

The question suggests itself whether sugar may not be directly absorbed by the stomach and thus lead to erroneous conclusions in using this test-meal. It has been established that the sugar in strong solutions may be directly absorbed from the stomach, and, although at the present time I am not able to say that within the hour none of the lactose is absorbed by the stomach, thus leading to faulty inferences, I am of the opinion, from practical experience, that any such absorption is inconsiderable. I hope to be able to settle this question definitely, but at present can only say that, in the cases in which motility has been obviously affected, the lactose readings have been so high as to justify the belief that

THE FREQUENCY OF SURGICAL LESIONS OF THE KIDNEY AND URETER AS ESTIMATED FROM AUTOPSY AND HOSPITAL RECORDS *

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In no special field of surgery has more substantial progress been made during the past ten years than in the surgery of the kidney and ureter. The diagnosis of the surgical lesions of the kidney and ureter by the aid of the cystoscope, the ureteral catheter and the x-ray has now become almost an exact science; and with the development of accurate means of diagnosis the operative mortality has fallen and the end-results have at the same time improved until the results obtained compare favorably with those in any other branch of major surgery.

Further progress in this field must come, in part, through a clear conception as to the actual frequency and importance of the several pathologic conditions which go to make up the surgical group of diseases of the kidney and ureter, and the study on which this paper is based was undertaken with the idea of throwing some light on this phase of the subject.

The data which has been collected in this study may be grouped under three headings as follows:

1. Autopsy statistics (Tables 1, 2 and 3).
 2. The recognized frequency as found in hospital practice (Table 4).
 3. The relative frequency of the different lesions as they are found at operation (Tables 5 and 6).
- Surgical diseases affecting the kidney and ureter may be conveniently considered under the following heads:
1. Calculous disease with the stones situated either in the kidneys, ureters or both.
 2. Obstructions interfering with the free flow of urine from the kidney to the bladder.
 3. Pyogenic infections involving the kidney and ureter.
 4. Tuberculosis.
 5. Tumor growths.
 6. Traumatism.

The frequency of these conditions as found at autopsy is shown in Tables 1, 2 and 3. In the Bender Laboratory series, comprising 1,652 consecutive autopsies performed by the members of the staff of this institution

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