uterus may fail to contract, the actual cavity of the uterus may be filled with fresh blood and this hemorrhage may be the direct cause of death. In my two cases this would not appear to be so. The one I immediately delivered the uterus would not contract in spite of extreme counter-irritation and eventual packing of the uterine cavity; the second one, packed to soften the os, and where the membranes were ruptured with the stylet of the catheter, the fluid being allowed to slowly run out, at the same time briskly massageing the uterus from the outside, the uterus contracted well, there was no further hemorrhage, so that I controlled the uterus by holding it for some hours after delivery and deemed it unnecessary to pack the uterine cavity.

Fortunately the condition of the os is such usually that no tamponade is necessary for relaxing purposes.

De Lee states that abruption of the placenta is serious if it occurs before dilatation of the os is present, and the prognosis depends upon the rapidity and safety with which the os can be dilated and the uterus emptied. The treatment is one of action, not expectation. If the cervix is dilated or dilatable the fetus should be delivered at once. If the cervix is effaced but not dilated one may stretch it open by hand, by the Bossi dilator or cut it laterally to the fornices and deliver at once. If it is not effaced and not dilated the case is difficult and treatment not so easily decided on or carried out. If the condition of the patient is grave she must be delivered at all hazards, and abdominal or vaginal Cesarian section come into consideration. If one has some time, dilatation with bags may be attempted, a very tight binder applied and ergot administered. This is the only permissible indication for the doing before the placenta is delivered. He also states these cases are all formidable and the operator will do wisely if he has several assistants and another physician with whom to divide the responsibility.

Continuing with the treatment, the membranes should be preserved intact so that delivery may be expedited. If possible delivery should be decided upon before the strength of the patient is gone. Shock being a concomitant of the complication, it will be exaggerated by a forced delivery. In addition to the shock the anemia and accouchement force predispose to inertia, so post-partum hemorrhage is a likely sequence and all preparations to combat this should be made in advance. Constitutional treatment is of great importance. Foremost is saline infusion, which may be given subcutaneously, intravenously or rectally (the Murphy treatment), and personally I have had excellent results with this form, getting in from two to four quarts in the first twenty-four hours. Salt solution is of inestimable value in replacing lost blood and as a prophylaxis for shock. Two, three or even four quarts may be given within twenty-four hours. Stimulation may be carried out by hypodermics of strychnia, digitalin, whiskey, etc.; also auto transfusion. Ergot combined with morphia is of value. The tight obstetrical binder is of great value, the scultitus being capable of exerting the most compression and is useful after the uterus is empty.

Careful after-treatment is of great importance and they should receive a thorough tonic treatment for some months.

In conclusion, internal concealed hemorrhage is a comparatively rare complication of pregnancy.

Unless diagnosticated early it has a serious prognosis.

It occurs generally in the last two months of pregnancy, although it may occur as early as the seventh month.

The diagnosis is made by careful examination of both the mother and the infant within the uterus.

The importance is urged of an examination of all obstetric cases in the last months of pregnancy and a close watch kept on both the maternal and fetal pulse during the progress of the labor.

Palpation is important in diagnostigating these cases, as the uterus is much increased in size and of a board-like consistency.

The appearance of acute anemia with manifestations of shock in a patient in the later months of pregnancy should always suggest the possibility of internal concealed hemorrhage.

Early diagnosis is essential in offering a favorable prognosis to the mother; that of the infant is bad.

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THE FEEDING OF THE INFANT IN HEALTH.

By DANIEL BOLLINS BROWN, M.D., SALEM, MASS.

In view of the diminished and the diminishing birth-rate, in the older American families at any rate, and of the increasing indisposition and inability of the American mother to nurse her baby, the subject of artificial feeding is becoming more and more important, of vital interest and concern, not only to the family, but to the community. Our "race suicide" is committed after children are born to us, also.

In practice, the mother feeds the baby, whether from the breast or from the bottle; and most bottle babies are badly fed. Nevertheless, the great majority of them live; some of them thrive, apparently, in spite of improper and imperfect food. And so it has come to pass that while these infants furnish almost all the cases of malnutrition and bad development, and by far the greater number of cases of infantile disorders and disease, the difficulties and, the risks of substituting feeding are not recognized, much less appreciated, by the laity, and, as long as the infant is fairly well and in the mother's untrained judgment, sufficiently nourished, we are seldom called upon either to prescribe the food or to direct the feeding. But we all have opportunities for missionary work, at least; and in the whole
wide range of preventive medicine there is no field in which successful effort can accomplish more for the health and vigor of the generations to come. Under the conditions, our scientific methods and the advance in knowledge of food values and food requirements have done but little toward the solution of the main problem—the rational feeding of the infant in health. The sum of our achievement in practice seems to be that the risks of artificial feeding under the immediate direction of the physician have been lessened; that dyspeptics are managed better, and that, mainly by reason of improvement in the character of milk, due to better methods in care and handling, the aid of pasteurization and the services of the trained nurse, the hot-weather mortality of tenement-house infants has been materially lowered.

The pediatrician has looked to the pediatrician for instruction in the preparation and use of substitute food; but the work of the pediatrician in hospital and dispensary and in consultation is so largely concerned with the feeding of the dyspeptic infant that the current literature of the subject tends, it seems to me, rather to confusion than to method. Moreover, we are told that infants cannot be fed successfully by rule. And this is true, of course; but the saying is overworked, for while the requirements differ with individuals, they differ, as men are different in height, within limits that are pretty well defined.

And the feeding of the normal and healthy infant is one thing; the feeding of the abnormal, the disordered and diseased, the dyspeptic, is quite another and a very different thing, with which this paper has nothing to do. But unquestionably the number of “difficult cases” would be much smaller than it is if all infants were fed rationally from the beginning, rather than at haphazard, as most of them are.

Cows’ milk is the best substitute food, because, of available food substances, at any rate, it is most like breast milk. Both cows’ milk and breast milk contain all the food-elements, and to this extent both are perfect foods. In both, too, these elements are the same in kind; but, except that the percentages of fat are equal, their quantities and proportions are quite different, and they are different in character also. The quantitative differences are easily overcome, for the most part; the difficulties in the use of cows’ milk as a substitute food depend almost wholly upon the differences in the character of the food elements. Until within a few years everybody has supposed that the caseinogen of cows’ milk converted into large dense curds of casein in the infant’s stomach is difficult of digestion. It appears, however, that the digestive disturbances commonly attributed to the casein are generally if not always due to the relatively indigestible fat, and, in particular, to the large quantity of the irritant fatty acids, of which cows’ milk contains six or eight times as much as breast milk. The whitish lumps in the stools of bottle babies that have been taken for “curds” of undigested casein are found to be masses of fat and fat derivatives, or clumps of bacteria.

Clinical evidence in support of these statements is not wanting; reference may be made to papers by Dr. Walls1 and by Dr. Townsend,2 both readily accessible.

While these discoveries have simplified the problems of artificial feeding, cows’ milk is by no means equivalent to breast milk as food for the infant, nor is it suitable for this use without modification. That it may meet the most obvious requirements, taking normal breast milk as the standard, it is necessary to reduce the quantity of proteins and to supply the deficiency of sugar. These modifications may be effected by dilution and the subsequent addition of fat and sugar. The materials that have been most generally and most successfully employed for these purposes are, respectively, cereal waters, cream and milk sugar.

Twenty years ago, more or less, Dr. Thomas M. Rotch proposed what is known as percentage modification, by which mixtures of these materials are made to contain definite quantities (percentages) of fat, proteins and sugar by combining them in proper proportions.

Percentage modification is employed in the preparation of the modified milk of the milk laboratories, which has been and is used quite extensively wherever these laboratories are in operation, with excellent results for the most part, although centrifugal cream is less digestible than gravity cream. It should be remembered, too, that while the value of the laboratory product is very constant, it is prescribed and employed with varying degrees of care and skill. The record that has been made, under the conditions, sufficiently attests the merit of the percentage method, which is, or ought to be, beyond question.

It appears, however, that for home modification this method is very generally regarded as “intricate,” “confusing,” “troublesome,” both for the physician and the mother, and, therefore, impracticable. But the practical difficulties of percentage modifications depend altogether upon the use of creams of different strength for combination with fat-free milk; if whole milk is substituted for fat-free milk, or skim milk, a single quart of milk yields cream enough for the preparation of the daily food of the infant at all periods, and a variety of creams is unnecessary.

There is little if any economy in the use of fat-free milk, or of skim milk, because, except for the youngest infants, sufficient materials for a day’s feeding cannot be obtained from a single quart of milk; but two quarts of milk a day will provide for the infant from the beginning to the end of the usual period of substitute feeding, and for the ordinary family as well: after the food has been prepared there will be left from 3½ to 2 pints of milk; except for the loss of a small portion of its fat (from less than 1% to about 1.75%) this residue is even more nutritious than whole milk, and for most domestic purposes quite as useful.

2 BOSTON MED. AND SURG. JOUR., March 19, 1908.
To avoid confusion, but one variety of cream should be employed, and for the preparation of the ordinary mixtures of cream and milk, 10% or 12% cream is most suitable. But occasionally stronger cream may be required, and on this account it is best to make use of 18% cream, which meets every requirement, for all purposes.

Practically all the cream obtainable by gravity from a given quantity of milk separates in eight hours.

A quart of 4% milk contains 1.28 oz. of fat, of which about 75%, or a little less than 1 oz., rises as cream to be contained in the top 6 oz. of a quart bottle of milk that has "set" eight hours. As skim milk always contains from 1% to about 1.20% of fat, it is clear that the top milk in excess of 6 oz. can contribute but a very small amount of fat to the cream, and that the cream cannot increase materially in strength after it has risen. (The thickening of cream on standing is due almost entirely to the growth of bacteria, which rises with the fat in the cream.)

It makes but little difference, therefore, what portion of the top milk (cream), not less than 6 oz., is removed,—it may be 6 oz. or 8 or 10 or 12 oz.,—each will contain about an ounce of fat, the smaller portions (not above 8 oz.) a little less, the larger portions a little more, and the fat percentage in each case may be determined very closely. Thus, the top 6 oz. is 16% cream, approximately:

\[ \frac{-1.00\text{ oz.}}{6} = 16 \]

and the top 8 oz. is 12% cream:

\[ \frac{-1.00\text{ oz.}}{8} = 12 \]

and so on.

Conversely, the number of ounces of the top milk required in order to obtain a particular strength of cream may be found by dividing the total fat by the desired fat percentage. Thus,

\[ \frac{100\text{ oz.}}{10} = 10 + 0; \]

that is, to obtain 10% cream a little more than 10 oz. of the top milk must be taken, and so on.

With standard milk in use, the error in the results obtained by these simple calculations, as indicated by a large number of experiments, is small. If the milk in use is "poor," deficient in fat, the top 5 oz.; if very "poor," containing not more than 3% of fat, the top 4 oz. represents 16% cream. It is, however, a simple matter to obtain 4% milk, and many dairies of the first class are prepared to furnish it. The difficulty presented by variations in the analysis of the milk of different groups of cows is only apparent. And in any case, the quality of milk is not improved by inexact methods of modification.

As the fat value of top milk (cream) is different at different levels, the entire 6 or 8 or 10 oz., as the case may be, must be removed and well mixed in order to obtain cream of the desired strength throughout.

If the ratio of fat to proteins in the different creams is kept in mind, accurate results may be obtained in cream dilutions (the "top milk method"); but mixtures of cream and milk diluted are precisely the same as top milk (cream) diluted (that is, the percentage method is the "top milk method," essentially), with the advantage that they are simpler both to prescribe and to prepare, and are perfectly flexible.

The preparation of mixtures of 10% cream and whole milk is a very simple matter. Two quart bottles of milk should be provided daily; one of them is set aside, on or near ice, or in a mixture of ice water and salt, in order to obtain the necessary cream; from the second quart, after it has been poured into a pitcher (to "mix" it), the required quantity of milk is taken and also set aside in a cold place. At the end of eight hours, earlier if the cream had risen partially when the milk was "set," and preferably within the next two or three hours, the food may be prepared as follows: (1) Remove with a round bottomed cream dipper the top 6 oz. from the quart of milk set for cream and put it into a small pitcher—"to mix" it; from this 6 oz. take the required quantity of cream and pour it into a mixing pitcher. (2) To this add the milk that has been reserved. (3) Measure out and dissolve the milk-sugar in a small quantity of the diluent and add it, together with the rest of the diluent, to the cream and milk. (4) Lime water, if employed, may be mixed with the food at this time, or withheld to be added to each feeding just before it is given. (5) Mix these materials and divide the mixture into as many equal portions as the child requires feedings in twenty-four hours, putting each into a separate nursing-bottle.

Food for the infant in health may be prepared in this way from day to day, week after week, from the beginning to the end of the period of substitute feeding, with no variations save in the quantities of the materials employed.

The daily quantity and the strength of the food should be determined with reference both to the requirements of nutrition and to the needs of the individual.

The use of the calory as the unit of measurement for the nutritive needs of the infant in health is discussed in an interesting paper by Dr. Brennemann, who, incidentally, finds percentage modification completely discredited by the results of the recent studies of infantile digestion.

Briefly stated, Dr. Brennemann's objections to percentage modification are: (1) that it is based upon the idea that the proteins of cows' milk are hard to digest; (2) that it regards the strength rather than the quantity of food as the important thing. He finds "a serious arraignment" of the percentage method in the preference, or the alleged preference, of physicians for "the simple modifications of the 'baby-food men.'"

Whatever the theory upon which percentage modification was established, the meaning of the term "percentages" is not changed by its application to fat, proteins and sugar in mixtures of cream and milk. If it has been assumed that the casein of cows' milk is difficult to digest, the assumption was not peculiar to the percentage method, nor is the integrity of the method affected in the

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least because the assumption was wrong; low fat and high proteins are computed as readily as high fat and low proteins. The objection that the percentage method considers the strength of the food to the neglect of the quantity fails to recognize the somewhat intimate relationship between them.

When it comes to scientific starvation, nothing could be more capable than the calory. And a system that permits the infant to be perfectly well nourished, in theory, on carbohydrates alone is likely to meet the views of the baby-food men much better than percentages, which are rather awkward unless the aid of fresh cows' milk is called in. Doubtless, also, those who have preferred their simple modifications will find it simpler to employ foods of which the caloric value is computed than to compute it for themselves in mixtures of cream and milk, or in milk dilutions. Under the same indictment the calory is equally guilty with percentages.

In the consideration of the subject of the daily quantity, number of ounces, of food required by the infant in health, cows' milk, which yields almost precisely the same number of calories as breast milk (21 per ounce, breast milk yielding 21.6 per ounce) is employed as the standard of nutritive value.

The chart appended to this paper is copied from one that was drawn some years ago, with no thought of calorimetric standards, which had not been established — for the infant. I have added to it a statement of the number of calories represented by each of the tabulated mixtures; it may be observed that all but the first have about the same nutritive value as cows' milk (or breast milk).

According to Heubner, the daily quantity of food up to the age of six months should be sufficient to yield an energy quotient of about 90; that is, it should furnish 90 calories for each kilogram of the child's weight, or about 41 calories for each pound. Above this age the energy quotient should be decreased gradually up to the end of the year, when it should be about 80. Seventy is regarded as the minimum quotient of energy for maintenance of the weight.

A daily allowance of 1 oz. of cows' milk for each pound of the weight yields an energy quotient of 46; to obtain a quotient of 90, therefore, a daily quantity of food equal to 2 oz. (nearly) of cows' milk for each pound of the weight is required. A daily allowance of 1\(\frac{1}{2}\) oz. for each pound of the weight yields an energy quotient of 69.

Budin's practice, by which the infant above the age of five or six months has a daily quantity of cows' milk equal to one tenth the body weight, is substantially equivalent to the allowance of 1 \(\frac{1}{2}\) oz. of milk for each pound of the weight, and provides for an energy quotient of 75.

As fat has 2.27 times the caloric value of sugar, it is obvious that sufficient quantities of energy cannot be obtained in dilutions of whole milk unless very large daily quantities of food, or very large percentages of sugar, or other carbohydrates, are employed.

It appears, therefore, that in early infancy when, normally, the gain in weight is most rapid, a daily allowance of a little less than 2 oz. of milk for each pound of the weight should be made; later, or after the age of six months, an allowance of 1 oz. for each pound of the weight is sufficient, but a daily quantity below 1 oz. to the pound of weight does not sufficiently provide for the normal gain in weight, usually. Of course, many infants thrive on much smaller quantities of food, which, in these cases, should not be increased to meet indications of age or of weight.

But nutrition requires not only that the food shall yield a certain number of calories; it must, also, contain enough, and should not contain more than enough, of each of the food elements. To determine what these sufficient quantities are, it is necessary in the first place to consider the special nutritive office of each; that proteins and proteins only provide material for the growth and the repair of the tissues; fat and carbohydrates yield heat and energy and are stored up to meet future needs. While to some extent fat may do duty for carbohydrate and carbohydrate for fat, and proteins, taken largely in excess, for both, neither fat nor carbohydrates can fill the place of proteins as builders of tissue. Deficiency of proteins, therefore, cannot be made up by increasing the quantities of fat and sugar; an excess of fat, indeed, is worse than useless; if appropriated, it only provides for the production of an excess of heat, incidentally using up oxygen that is needed for other purposes, or is stored up as useless adipose tissue. And, as we have seen, it is very likely to disorder digestion.

That fat is an essential element of food is shown, for example, in the development of rickets as a result of fat starvation, but we also know from experience that fat may be practically eliminated from the food for a time, as in certain gastrointestinal disorders, without appreciable impairment of nutrition, which suffers at once if proteins are withdrawn, or given in insufficient quantity, even if both fat and sugar are largely increased at the same time. Under these conditions the child may take much more than the usual daily quantities of food and yet be ravenously hungry.

On the other hand, we are not warranted in the use of large quantities of proteins simply because they seem to be well borne. It cannot be said that they do no harm, and the presumption is to the contrary. We know, at least, that nitrogenous waste, whether from broken-down tissues, or from excess of nitrogen in the food, is excreted, mainly, by the kidneys; it certainly is not well to burden these organs needlessly. Moreover, to substitute proteins for fat which has more than twice their value in terms of heat and energy involves a waste of oxygen that the infant can ill afford.

But the percentage method does not, of itself, assume to determine the quantities of the food elements that are required; it merely enables us to obtain these quantities, with, probably, the nearest possible approach to accuracy, after they
have been determined. To this end there are certain "general principles" by which one should be guided in the prescription and in the use of substitute food (modified milk):

1. The infant does best upon the minimum quantity and strength of food essential for nutrition.

2. More than four per cent of fat is not required. Few, I think, dissent from these propositions. To them I venture to add:

3. The ratio of fat to proteins should not exceed 3 to 1; that is, with an appropriate percentage of proteins, more than three times as much fat should not be given and, of course, conversely.

4. The ratio of fat to proteins should decrease gradually with increase of age and weight from the maximum 3 to 1 to 1½ to 1 at or near the end of the usual period of substitute feeding.

5. A percentage of proteins below 1.50 is underfeeding after the age of two or three months; or, in terms of quantity, less than about seven ounces of cream and milk combined in each pint of food. And, in general, the rapidly growing infant needs more food and, in particular, more protein than one that grows less rapidly; the more active require more food, and, in particular, larger quantities of the carbohydrates than the less active, while in the case of the phlegmatic infant, especially if there is a tendency to accumulate fat, less food and, in particular, less fat is required.

In the use of substitute food (cows' milk), especial care should be taken to limit the quantity of food at a feeding to the capacity of the stomach; in the case of the nursingl, slight distention of the stomach does not matter so much, but the breaking up of the large curds of the casein of cows' milk depends upon the "churning" to which they are subjected by the movements of the stomach; if the walls of the stomach are stretched, the action of the muscles is interfered with, or suspended, and the casein is not broken up; in this case some of it is likely to be rejected in the form of the familiar "large, dense curds," or it passes into the intestines undigested, or imperfectly digested.

It is impossible, of course, to prescribe modified milk of definite nutritive value, however expressed, just as it is impossible to prescribe drug mixtures of definite dosage, without computation; but in combinations of weak cream and whole milk a little computation goes a long way, for with a few mixtures as bases a very large number of modifications may be made merely by changing the proportions of the cream and milk therein. (This depends upon the fact that the cream and milk have about the same protein and sugar values.)

In practice, these combinations have been found simple to prescribe and simple for the mother to prepare.

The calculation of percentage mixtures depends upon the proposition that the combined cream and milk required is always precisely in quantity and in strength to the appropriate cream; that is, the particular variety of cream, or top milk, —7% or 8% or 9%— that yields the desired percentages when diluted with water in proper proportions. Thus, the ratio of fat to proteins in 9% cream is 2½ to 1. Accordingly, any mixture in which the ratio of fat to proteins is 2½ to 1 may be obtained by diluting a sufficient quantity of 9% cream with water. For example, 8 oz. of 9% cream diluted with 10 oz. of water yields a "mixture" of 18 oz. containing 4% fat and 1.50% proteins \( \frac{4}{1.50} = \frac{24}{1} \).

But 3½ oz. of 16% cream combined with 4½ oz. of whole (4%) milk is precisely equal to 8 oz. of 9% cream, and, diluted with 10 oz. of water, yields precisely the same "mixture," of course.

In the calculation of percentage mixtures, it is necessary to determine, in the first place, the number of ounces of appropriate cream that are required; this may be found by dividing the total quantity of proteins desired by its protein percentage. Appropriate cream for the mixtures that are commonly to be employed ranges from about 5.50% to 10%; the average protein percentage is about 3.40; accordingly, the total proteins desired divided by 3.40 gives, approximately, the number of ounces of the cream, or of its equivalent mixture of cream and milk, required.

Applying this principle, the following working formula for combinations of 16% cream and whole milk has been derived. The equations yield results that are substantially accurate.

**Working Formula.**

(16% Cream and Whole Milk.)

Symbols and Equivalents.

\[
Q = \text{Desired quantity of food.} \\
P = \text{percentage of fat.} \\
P = \text{percentage of proteins.} \\
S = \text{percentage of sugar.} \\
C = \text{Cream.} \\
M = \text{Milk.} \\
X = \text{Combined cream and milk (C+M).} \\
\]

1. \[
\frac{Q}{P} = X \text{ (C+M).} \\
3.40
\]

2. \[
\frac{Q \cdot \text{F}}{4X} = C \text{ (Cream).} \\
12
\]

3. \[
X - C = M \text{ (Milk).} \\
\]

4. \[
\frac{Q \cdot S}{4.40X} = S \text{ (Sugar).} \\
\]

Equation No. 2 of the formula depends upon the obvious fact that the fat in the cream plus the fat in the milk is equal to the whole quantity of fat; that is, \( 16C + 4M = Q \cdot F \); but, since cream and milk \( (C + M) = X, X - C = M \). Substituting this value for \( M \), the equation becomes \( 16C + 4 \cdot (X - C) = Q \cdot F \), or

\[
\frac{Q \cdot P}{X} = C; \text{ if } 16\% \text{ cream, } \frac{Q \cdot P}{4} = C.
\]
CONGENITAL NEUROGLIA TISSUE NESTS IN THE MENINGES OF THE SPINAL CORD. REPORT OF A CASE ASSOCIATED WITH OTHER CONGENITAL DEFECTS.

BY CHARLES T. RYDER.

(From the Pathological Laboratory of the Harvard Medical School.)

As this case has already been reported with special reference to another peculiarity which it presented, a congenital rhabdomyoma of the heart,1 we shall quote from the former paper the general review of the case, together with everything which bears directly upon the subject of the neuroglia nests.

"Theresa Moran, age ten months, born May 15, 1906. There was lumber-sacral rachischisis, hydrocephalus, paralysis of lower half of trunk.


Sphincters and legs from time of birth. A successful operation was done for the spina bifida when twelve days old. No improvement in paralyses followed; very slow increase of hydrocephalus. Nine days before death entered the Massachusetts Infants' Asylum with symptoms of scorbutor, for which she was treated. Died suddenly March 15, 1907.

"Autopsy three hours post-mortem. Harvard Medical School Series 3477."

"Body of a fat, hydrocephalic, female infant, 85 cm. long. Rigor mortis present in jaws and arms; body heat present. The head is markedly enlarged. The frontal eminences are very prominent. The crown of the head flares outwards from above the level of the ears. Circumference about frontal eminences, 49 cm.; from glabella to superior occipital protuberance, 35 cm.; between external auditory meati, 33 cm. The anterior fontanelle is tense and bulges very slightly. The