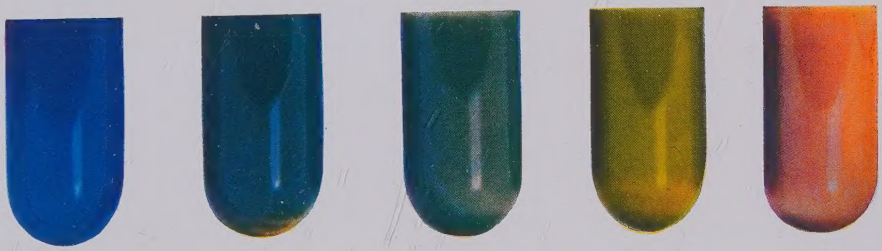
A Primer for Diabetic Patients

WILDER

Eighth Edition

PLATE I

Benedict's Qualitative Test for Sugar in the Urine



Test Grade 0 | Test Grade 1 | Test Grade 2 | Test Grade 3 | Test Grade 4

The colored photographs above represent the appearance of solutions in test tubes containing 8 drops (0.4 c.c.) of urine added to 1 teaspoonful (5 c.c.) of Benedict's Qualitative Solution, the mixture being boiled for one minute over a free flame. The urine added to the first tube on the left (test grade 0) contained no sugar (dextrose). That added to the other tubes contained sugar (dextrose) in increasing concentrations from left to right. Test grade 1, and test grade 2 represent traces of sugar (0.2 and 0.8 per cent, respectively). Test grade 3, and test grade 4 represent urine containing more than 1 per cent of sugar (1.5 and 4 per cent, respectively).

A Primer
for
Diabetic Patients

An Outline of Treatment for Diabetes
with Diet, Insulin
and
Protamine-Zinc Insulin

Including Directions and Charts for
the Use of Physicians in Planning
Diet Prescriptions

By

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EIGHTH EDITION, RESET

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PREFACE TO THE EIGHTH EDITION

ALTHOUGH no major changes have been made in our method of treatment of diabetes, minor alterations in procedure, developed over the years since the publication of the seventh edition of this book in 1941, warrant the present revision.

The objectives of treatment remain as they were. The aim is at the highest possible degree of vigor of mind and body, so that adults may pursue their usual occupations with customary energy and children may develop normally, attend their schools and enjoy their play. Also, resistance to infection must be maintained at the highest possible level. To effect these objectives adequate food energy (calories), adequate protein and liberal amounts of the several indispensable vitamins and salts must be provided, while aggravation of the disease is prevented by using insulin when necessary, but always with due care to avoid overdoses and consequent disturbing complications. Satisfactory results can be insured only by planning the diet with care and measuring the foods. When the intake varies too widely from day to day, accurate treatment with insulin is impossible.

Insulin has brought health and happiness to patients with the severest diabetes, making helpless invalids strong men and women, fit to work at their usual occupations and able to support their families. However, in return, insulin exacts a certain discipline and yields its blessings sparingly except to those who are willing and able to conform to this discipline. The diabetic patient should be fully instructed in the management of his disease. Without a thorough schooling in the testing of his urine, the adjustment of his insulin and the selection of his diet his well being is endangered.

The Primer contains the substance of the instruction given in the Diabetic School at the Mayo Clinic. Brief sections are addressed to physicians, but otherwise medical terms have been avoided in an effort to tell what is important for the patient to know in language which he can understand. This is not to encourage self-treatment—no diabetic patient can afford to be without the supervision of a physician. The book is addressed, not to the solitary patient, but to the patient who is working out a life complicated by diabetes under the guidance of his family doctor.

Again indebtedness to associates is gratefully acknowledged. Those in the Mayo Clinic now engaged in the instruction and treatment of diabetic patients include Dr. Samuel F. Haines, Dr. Edwin J. Kepler, Dr. Edward H. Rynearson, Dr. Randall G. Sprague, Dr. F. Ray Keating and the devoted dietitians under their direction—Miss Margaret Pewters, Miss Lucille Herr-

mann, Mrs. Alice Irmisch and Miss Virginia Wildung. Earlier contributors have been named in the prefaces of former editions. The Primer, as has been acknowledged before, represents a distillate of the experience of these co-operators. The royalty rights are deeded to trustees with the understanding that any funds received will be used for the benefit of patients who have diabetes.

R. M. W.

Mayo Clinic,
Rochester, Minnesota
May, 1946

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A Primer for Diabetic Patients

CHAPTER I

WHAT IS DIABETES, WHAT CAUSES IT, WHAT CAN BE EXPECTED FROM TREATMENT?

What Is Diabetes?—The glib answer "too much sugar" is not satisfactory. To understand what is wrong in diabetes, it is first necessary to learn a few simple facts about some of the chemical changes that occur normally in the body.

Food as eaten is digested, partly in the stomach, partly in the intestine. By this means the starches, such as those in bread, potatoes, rice, macaroni, and many other familiar foods, are converted into sugar. Thus sugar is added to the body not only when sugar as such is eaten, but also by ingesting starches.

There are other sources of sugar. In digestion, the albumin of meat, eggs and cheese (called protein) and the fats in meat, cream and butter are altered so that they can be dissolved or emulsified in the fluids in the bowel and thus pass through the wall of the bowel and enter the blood. They reach blood which is coursing in the direction of the liver. This large organ, located be-

neath the lower ribs on the right side of the trunk, is like a chemical laboratory, and in it some of the products of the digestion of protein and fat are changed to sugar. This sugar, as well as that derived from the sugar and starch of the foods, is, in part, reformed into starch—not the kind of starch found in bread and potatoes but an animal starch known as glycogen. This glycogen is deposited in storage in the liver. The liver thus serves both as a warehouse for sugar, and as a factory where sugar can be made from glycogen, from protein, and to some extent at least from fat. The amount obtainable from fat is in dispute.

The remainder of the tissues of the body, especially the brain and the muscles, require sugar for their nutrition, and their supply must be continuous. The liver provides what is needed. Sugar is carried to the brain, muscles and other distant parts by way of blood from the liver.

The activity of the liver in supplying sugar in the amounts required, and also the ability of the distant parts to use the sugar, is regulated by a set of chemical stimulators and inhibitors, called hormones. They are manufactured in various glands and circulate in the blood. The thyroid gland, for instance, located in the neck, produces a hormone which accelerates chemical reactions releasing heat. People with toxic goiters (large, overactive thyroid glands) produce more heat than normal. The adrenal glands, paired and placed like caps over each kidney, provide multiple hormones; one of

them is epinephrine, and one effect of epinephrine is to release sugar from the liver by stimulating the conversion into sugar of the glycogen in deposit there. Another hormone from the adrenal glands also is involved in the delivery of sugar by the liver. Its action seems to be to cause a more rapid breakdown of protein—including protein derived from the body—and thereby to provide a larger supply of material from which sugar can be manufactured. It also seems to act as a brake on the rate at which the tissues remove sugar from the blood.

The pituitary gland, centrally located in the head beneath the brain, provides multiple hormones. One of these has to do with accelerating the manufacture of sugar by the liver. This effect in part is by way of stimulation of the adrenal glands. Another pituitary hormone seems to retard the rate of utilization of sugar by the tissues.

A very large gland, the pancreas, placed in the abdomen near the liver, provides digestive juices for the intestine. With them at present we are not concerned; but incorporated in this gland and scattered through its substance are groups of cells, known as the islands of Langerhans, where *insulin*, also a hormone, is manufactured. Insulin enters the blood as needed, and from the evidence at hand, is the most important regulator of those processes whereby sugar is either stored or released by the liver and utilized by the tissues. Insulin seems to act in opposition to the products of the adrenal and the pituitary glands; it inhibits manufacture and

secretion of sugar by the liver and apparently stimulates utilization of sugar by the tissues.

The glands that have been named are under the control of nerves originating in the brain whereby the activity of any of them may be either accelerated or retarded by the brain.

It is by these mechanisms and adjustments that the blood is made to carry a more or less constant amount of sugar. The veins before breakfast contain about 1 part for each 1,000 parts of blood. In health, after meals they contain more, but not much more; after a prolonged period of fasting they contain less, but not much less. Very high blood sugar is abnormal; so is very low blood sugar. High blood sugar characterizes diabetes. Usually it results from lack of insulin, although overactivity of the pituitary, the adrenals or the thyroid may play a part. Excess of insulin leads to abnormal lowering of the level of the blood sugar.

We are now ready for a definition. *Diabetes, we can say, is an abnormality commonly dependent for the most part on an insufficient supply of insulin, whereby the storage of sugar in the liver is inhibited, the formation of sugar by the liver is accelerated, and the utilization of sugar by the tissues is depressed.* The consequences of these derangements are: (1) an exceptionally high level of sugar in the blood; (2) loss of sugar from the blood to the urine through the kidneys; (3) excessive loss of water and salt from the body through the kidneys, a result of the loss of sugar; (4) excessive utilization of

protein and fat as sources of heat energy no longer obtainable from sugar; and (5) poisoning by the products of incomplete combustion of protein and fat. These products in part are acid. They account for diabetic acidosis.

What Causes Diabetes?—Severe injury to the pancreas may interfere with the production of insulin. Such injury may result from infections, such as mumps or scarlet fever, or follow chronic infection of the pancreas, such as is found not infrequently in patients who have gallstones; or stones may form in the substance or in the ducts of the pancreas itself, or tumors or cysts may develop in the pancreas and largely destroy its substance. In many cases of diabetes examination after death reveals that the islands of Langerhans are fewer and smaller than normal. Sometimes hardening and thickening of the walls of the pancreatic arteries account for this. In other cases the faulty appearance cannot be accounted for. Sometimes the islands appear normal in every way, even on examination with the microscope. Possibly in some of these cases the islands fail to function because of inhibitory nervous influences originating in the brain. In others possibly the supply of insulin is not diminished, and diabetes depends on excessive activity of the adrenal or pituitary glands. At present this seems unlikely. Diabetes, once developed, undoubtedly is intensified, in some cases, by overactivity of other glands, but thus far no instance of undisputed clinical diabetes originating from overactive adrenal or pitui-

tary glands has been reported. One fact is established for all cases of diabetes: giving insulin promptly corrects every disturbance characteristic of diabetes.

Obesity is recognized everywhere as a cause of diabetes. At least it is a provocation. Fat people are ten times more likely to develop the disease than thin people. The reasons for this are: (1) that fat people eat excessively; if they didn't they wouldn't be fat; (2) that being fat increases the need of the body for insulin. In either case a strain is placed on the islands of Langerhans and if this organ has been injured by disease or is weaker than normal because of heredity it fails and diabetes results.

Heredity is important in the causation of diabetes. The tendency to develop the disease is passed from generation to generation. This does not mean that everybody who has a diabetic parent will develop diabetes, but it is an argument against the marriage of one diabetic with another, and ought to deter any two persons from begetting children if both have a diabetic parentage. Also, it is an emphatic reason why individuals who are members of diabetic families ought to guard themselves against the disease. If gallstones are present it will be well to remove them. If such persons are obese it is wise for them to reduce. Overindulgence in foods of all kinds is dangerous; probably, but not certainly, sweets are particularly harmful. Physical exercise is protective and nervous strain injurious. Diabetes occurs less frequently among those who do hard physical labor

and more frequently among those in the higher income groups. The death rate from it is lower in the country and higher in the cities.

The incidence of diabetes is highest in persons past middle life, but young adults and children also are affected. The presence of diabetes in a family should prompt every member to have urine examined for sugar at periodic intervals. The treatment of diabetes frequently is more satisfactory if started early and neglect of severe cases may lead to disaster from diabetic acidosis. If the test of the urine discloses sugar, diabetes should be suspected and a physician consulted. Studies of the blood will then reveal whether the sugar means true diabetes or another, less serious, abnormality.

What Can Be Expected from Treatment?—Diabetes is treated by diet, exercise and insulin. If the case is mild, diet and exercise suffice; if severe, insulin is required in amounts sufficient to replace the insulin the diabetic is unable to make for himself. Commercial insulin is not a drug. It represents an extract of the pancreas of healthy slaughter-house animals. Drugs are useless. Insulin itself is useless taken by mouth, and no effective oral substitute is known. The purveyors of so-called cures and other diabetic nostrums are responsible for untold thousands of diabetic deaths. Distrust all of them! Whoever asserts that diabetes can be cured, or offers an oral remedy, either is misinformed or deliberately is preying on the misfortunes of his fellowmen.

On the other hand, with what is known today about

the treatment of diabetes, deaths from it are needless. Ignorance and carelessness account for most of them. Insulin, properly used, not only saves life; it also restores health by enabling the diabetic to eat the good, wholesome food he requires for satisfactory nutrition. Its self-administration with a hypodermic syringe and needle is no more burdensome and takes no more time than brushing the teeth, nor is it more painful if properly performed.

Hundreds of thousands of diabetics are alive today in the United States who, without insulin, would have died, and strange as it may seem, most of these individuals are endowed with a greater average intelligence and greater emotional stability than their fellowmen. Representative diabetics are found in almost every walk of life, including all the professions. Their physical strength is likely not to be up to par, but this can be remedied. They can be made as fit as possible if treatment is made as good as possible.

More cannot be promised, but research is continuing the world over, and the future undoubtedly has further blessings in store. It was only yesterday that Dr. Banting and his colleagues provided insulin. In the light of this and of the rapid progress now observed in very many other fields of medicine, no one but a confirmed pessimist can fail to anticipate increasingly efficient means for combating diabetes.

Questions

Patients attending our Diabetic School are not willingly dismissed until, without prompting, they can answer correctly the questions printed after each chapter of the Primer.

The answers can be found on the pages indicated.

CHAPTER II

THE TESTS OF URINE FOR SUGAR AND DIACETIC ACID

The first thing a diabetic should learn is how to test his own urine for sugar. The test is made at least once daily, as a guide to treatment. In emergencies, or if the diet is being changed, it ought to be made three or more times a day. This is too often to call on the doctor, and tests by drugstore laboratories may or may not be reliable. The Benedict test is preferred. Directions for it will be found below.

The presence of sugar in the urine signifies that the level of sugar in the blood is above normal, and this means either that the diet is neglected or that the dose of insulin is insufficient. If the test is strongly positive acidosis must be suspected (see Chapter IV). The breath in acidosis has the fruity smell of acetone. Relatives and physicians may be able to recognize this smell, but a more reliable index is another urine test, the Gerhardt, or ferric chloride test for diacetic acid (see p. 14). Unless the test for sugar is strongly positive the Gerhardt test should not be made. Acidosis never develops dangerously until large amounts of sugar are being excreted in the urine.

Collection of Urine for Testing.—Empty the bladder approximately thirty minutes before collecting a specimen of urine for testing. If necessary, a glass of water may be taken as an aid in obtaining a specimen. By this means urine that has been secreted recently by the kidneys is obtained for the test. If the bladder is not emptied a short time before the specimen of urine is collected, the specimen may contain sugar long after the blood sugar has fallen to a normal level, or below.

Benedict's Test for Sugar in the Urine

The frontispiece shows the appearance of tests made with Benedict's solution and urine with and without sugar.

Supplies Necessary:

Benedict's qualitative solution.*
Test tube (2 in case of breakage).
1 test tube holder.
1 medicine dropper.
A source of heat (alcohol lamp or $7\frac{1}{2}$ grain tablets of methenamine).

* Benedict's solution can be ordered from several wholesale drug firms. When placing such an order the patient should be sure to specify Benedict's qualitative solution. There is another Benedict solution, called the quantitative solution, which does not give a color with sugar. The use of this by mistake has led to disastrous consequences. Benedict's qualitative solution can be prepared by the local druggist according to the following directions:

To Prove the Reliability of the Benedict's Solution.—Before placing dependence on any new supply of Benedict's solution, its activity should be tested as follows: Place a teaspoon of the solution in a test tube, add 8 drops of orange juice or 2 drops of either corn syrup or honey and heat as directed below. If the solution is satisfactory a brick red color will develop, and on cooling a brick red deposit will occur, leaving a water-clear, colorless fluid above.

Directions for Testing for Sugar—The Standard Method.—Place a teaspoon of Benedict's solution in a test tube and add 8 drops of urine. Mix these by shaking gently and heat either in a pan of boiling water for five minutes or over a free flame until the solution is boiling vigorously. If the color of the solution changes to green there is a trace of sugar; if it changes to yellow or brick

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	Gm. or c.c.
Copper sulfate (pure crystallized)	17.3
Sodium or potassium citrate	173.0
Sodium carbonate, crystallized. (If the anhydrous sodium carbonate is used, only half this amount should be taken)	200.0
Distilled water, to make	1000.0

The citrate and carbonate are dissolved together with the aid of heat in about 700 c.c. of water. The mixture is poured (through a filter if necessary) into a large beaker. The copper sulfate is dissolved separately in about 100 c.c. of water and is poured slowly into the first solution, with constant stirring. The mixture is cooled and diluted to 1 liter. This solution will keep indefinitely.

red there is a large amount of sugar (see Plate I, frontispiece).

The Micromethod.—Using a test tube 3 inches long and $\frac{3}{8}$ inch in diameter, put 8 drops of Benedict's solution and 1 drop of urine in it; mix and heat either in the water bath or over the free flame, as directed above.

When using a free flame exercise care to avoid explosive boiling. This can be prevented by adding a small piece of white paper to the contents of the tube before heating.

In any case the tube should be pointed away from the body and shaken gently while heating. A convenient source of heat for use when traveling is a $7\frac{1}{2}$ grain tablet of methenamine. A bottle of these can be packed in a traveling bag without injury to the clothing, and can be placed, burning, on any noninflammable surface such as porcelain without injury. The tablet is ignited with a match and gives a flame much like that of an alcohol lamp.

A convenient travel set for testing urine is marketed by the Eli Lilly Company, Indianapolis. It is contained in a small bakelite case. A tablet dissolved in the urine provides the reagents of Benedict's solution. Heating is effected by burning a tablet of methenamine.

Another very convenient outfit is the Clinitest, marketed by the Ames Company, Inc., of Elkhart, Indiana. Directions accompany the outfit. In this test the tube is heated chemically by caustic soda.

The Gerhardt or Ferric Chloride Test for Diacetic Acid

Directions for the Test.—To 5 c.c., or a teaspoonful, of freshly voided urine in a test tube add a 10 per cent water solution of ferric chloride* (chloride of iron) one drop at a time. If diacetic acid is present a wine-red color will be produced. Continue adding drops of ferric chloride until, on the addition of each drop, no further deepening of the color is noted. The cloudiness that often forms is due to salts thrown out of solution by the iron, and is of no importance. These salts usually redissolve when enough ferric chloride is added. Now pour half the contents of the tube into a fresh tube and heat this portion to boiling for two minutes, comparing its color after heating to the unheated portion. If the original color is due to diacetic acid, it will fade on heating, and the heated tube will have a lighter hue than the unheated tube. The test is not complete, therefore, until the effect of heat on the color has been determined. Certain drugs, such as aspirin and antipyrine, will cause a bluish red color when the ferric chloride is added. This color, however, does not fade on heating.

Questions

1. Have you made the test for sugar in the urine? Page 10
2. What is the full name of the solution used? Page 11

*Liquor ferri chloridi, U.S.P., obtainable at the druggist's.

CHAPTER III

INSULIN AND PROTAMINE-ZINC INSULIN AND THEIR ADMINISTRATION

In mild cases of diabetes it is possible to prevent the presence of sugar in the urine simply by omitting foods sweetened with sugar and restricting foods richest in starch. This is known as qualitative management. It is described later (p. 74). In more severe cases control still can be maintained without insulin if the diet is more rigidly restricted, although it is far better to use insulin than by too rigid restriction to run the risk of poor health from insufficient food. In the severest cases insulin is necessary to save life.

New patients frequently have been erroneously informed that insulin, if once used, can never be discontinued thereafter. They think of insulin as a habit-forming drug, an impression all too current among the laity and one that is absolutely false. Insulin is not habit-forming, and using it when it is needed does not make it necessary always to use it. Indeed, in mild cases, the probability of being able to do without insulin later is increased by taking insulin whenever sugar is present in the urine, because thereby the pancreas is protected and further injury to it is prevented. In severe

cases patients always may require the injection of insulin, because in them the pancreas may never produce enough insulin to sustain life. Before insulin was made available commercially, the patients in severe cases died.

Although in mild cases injections of insulin can be discontinued if, as often happens, sufficient improvement occurs, they should never be discontinued without the advice of a physician.

Preparations of Insulin

There are now several kinds of commercial insulin: notably regular (unmodified) insulin and solution of zinc insulin crystals, both in clear watery solution, both with quick action of short duration;* protamine-zinc insulin, in milky suspension, with slow action of long duration; and globin insulin, in clear, watery solution, of intermediate action of intermediate duration. It has not been our experience that globin insulin offers greater advantages than the use, described subsequently, of mixtures of regular and protamine-zinc insulin. Globin insulin has a place in the treatment of the rare cases in which sensitivity of the skin to protamine is encountered.

Insulin is manufactured by several reliable firms under regulation of the United States Federal Security Agency. Uniformity thereby is assured, and the patient

* Contrary to early claims there is little, if any, difference in the speed or duration of action of regular insulin and solution of zinc insulin crystals.

may feel secure in purchasing insulin of any make from any reliable druggist. Insulin is dispensed in 10 c.c. rubber-capped vials (5 c.c. is the capacity of one

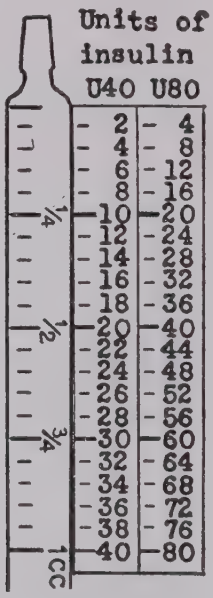

Fig. 1.—Syringe for injecting insulin, with chart illustrating the measurement of doses of various "strengths" of insulin.

standard teaspoon. See p. 151). On the label is printed the number of units contained in each 1 c.c. The insulin syringe described later holds 1 c.c. when filled to the upper mark.

All types of insulin are prepared in solutions of different strengths. The ones in most common use are designated as "U–40" and "U–80." The number indicates the number of units of insulin in each cubic centimeter. The different strengths of insulin are prepared to provide a convenient volume for measurement of doses of various sizes. If small or moderate doses (40 units or less) are required, U–40 insulin is used; if large doses (more than 40 units) are necessary, U–80 insulin is used. Insulin should be measured with the greatest care, especially when U–80 insulin is used.

A dose of insulin, 20 units for example, has the same effect regardless of the strength of the insulin solution from which it is measured. Twenty units of U–40 has the same effect as 20 units of U–80. The volume which is measured is different. To get 20 units one would measure out $\frac{1}{2}$ c.c. of U–40 or $\frac{1}{4}$ c.c. of U–80. This is illustrated further in Figure 1.

Directions for Injecting Insulin

Stability of Insulin.—The commercial preparations of insulin and those of protamine-zinc insulin are astonishingly stable, retaining their original potency for twelve months or more, providing the container has not been entered for withdrawal of any part of its contents. The activity of insulin remaining in a partly emptied vial for more than a month, or at most two months, should not be depended on. It is wise to keep insulin at temperatures below 90° F. Freezing also is to be avoided,

as it causes some loss of strength, and in the case of protamine-zinc insulin, slight clumping. More strength is lost if, after freezing, thawing occurs rapidly. Frozen insulin should be allowed to thaw gradually at room temperature.

Supplies:

2 insulin syringes (one should be kept in reserve in case of breakage).
6 "Yale" rustless hypodermic needles—$\frac{5}{8}$ inch, 25 gauge.
1 cylindrical cork-stoppered bottle to hold insulin syringe in alcohol.*
1 block of wood with hole in center to hold the glass tube upright (see p. 21).
"Insulin alcohol" (70 per cent grain alcohol).
Absorbent cotton.
Insulin, enough for two weeks.

Of the two glass syringes, capacity 1 c.c., one is for daily use and another to keep in reserve against breakage. A number of insulin syringes are on the market, with markings indicating the number of units they hold. There is an objection to these in that they lead to confusion whenever a patient changes from one strength of insulin to another. For this reason the Becton-Dickinson Company have prepared for me the 1 c.c. syringe illustrated in Figure 2. This syringe is graduated as indicated

* A convenient pocket case of bakelite is manufactured by the Becton-Dickinson Company for the Wilder syringe. The syringe fits into a cylindrical water-tight holder containing alcohol, and receptacles are provided for keeping needles in alcohol, for a small

in the figure. When it is filled to the 1 c.c. mark it contains the number of units indicated by the label on the insulin bottle, that is, 40 units in the case of U–40 insulin, 80 units in the case of U–80 insulin. Each of the smaller graduations of the syringe represents 1/20 of 1 c.c. and therefore, when U–40 insulin is used, contains 2 units and with U–80 insulin 4 units.

The chart shown in Figure 1 will be found helpful when used with the Wilder syringe.

Secure at least two, preferably six or twelve, hypodermic needles to fit the syringes. A $\frac{5}{8}$ inch, 25 gauge "Yale" rustless needle is recommended.

A convenient receptacle for the insulin syringe is a long, thick-walled test tube with a cork stopper. The tube is half filled with 70 per cent alcohol and a small wad of cotton is placed in the bottom. A piece of thread should be tied to the syringe. The syringe with needle attached is lowered into the alcohol and the end of the thread is allowed to emerge from the neck and is fastened there by the cork. Kept in this way syringe and needle are always sterile and ready for use. Boiling to sterilize is time-consuming and may crack the syringe. When through using it the syringe should be rinsed with alcohol and replaced in the tube. A block of wood about

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amount of cotton and for one bottle of insulin. The case is labeled "B-D Diabetic Outfit, with Syringe No. 60."

The Becton-Dickinson Company Syringe No. 60 (Wilder syringe) may be secured in single or small lots from the Weber & Judd Company, Rochester, Minnesota.

Fig. 2.—Syringe for injecting insulin.

3 inches square and $1\frac{1}{2}$ inches thick with a hole of a size to admit the end of the tube serves to hold tube upright.

The "alcohol" used is either 70 per cent grain alcohol or isopropyl alcohol. Denatured alcohols cause needles to rust or modify the insulin.

A supply of sterile absorbent cotton also is required.

How to Inject Insulin.—Great care must be taken to avoid touching the needle with the fingers and thereby contaminating it. Handle it by the hilt.

When preparing to take insulin empty the syringe and needle of all alcohol by pulling the plunger back and forth several times. Wipe the top of the bottle containing insulin with a piece of cotton wet with alcohol. Fill the syringe with air by pulling the plunger back, then push the needle through the clean rubber cap of the bottle. Point the syringe upward with the bottle inverted so that the insulin in the bottle covers the point of the needle. Force the air contained in the syringe into the bottle, then fill the syringe with the required amount of insulin, taking care to avoid air bubbles.

Before withdrawing protamine-zinc insulin the bottle must be inverted several times until its contents are thoroughly mixed. Avoid violent shaking to prevent undesirable foaming. A satisfactory mixture is evidenced by a uniform milky appearance. After mixing withdraw the dose required and inject this without delay; otherwise the protamine-zinc insulin will settle out and the dose will be diminished. The activity is in the insoluble suspension, not in the liquid. If settling occurs within

the syringe remix by inverting the syringe several times before injecting.

Fig. 3.—Injection of insulin. The needle is inserted at right angles to the fold of skin which is pulled up to receive the insulin.

Wash the skin where the insulin is to be injected with cotton wet with alcohol; pick up a fold of skin between thumb and forefinger and insert the needle into the side of this fold, as shown in Figures 3 and 4. Release the skin; then push home the plunger of the syringe. Firmly

hold the piece of cotton previously used for a sponge over the point of injection and withdraw the needle.

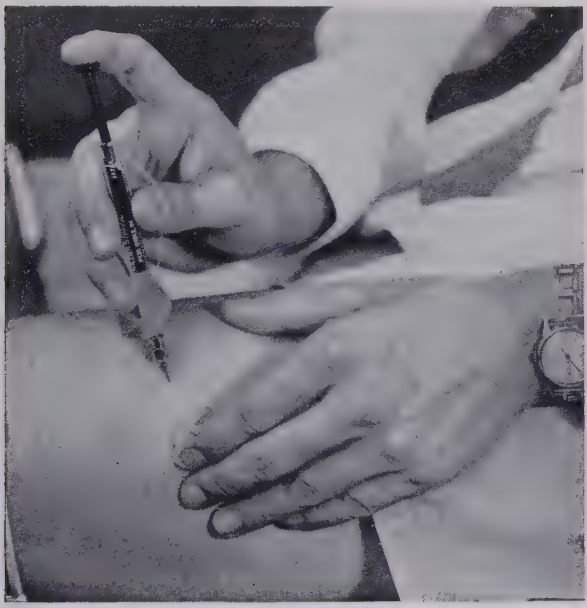


Fig. 4.—Injection of insulin: After the needle has been inserted (Fig. 3) the fold of skin is released; the plunger is then pressed home.

Massage gently with the piece of cotton, but do not change its position. Massage, but do not rub.

Where to Inject Insulin.—The injection may be made into any part of the body where the skin is loose. Suit-

able places are the upper arm, sides of the trunk, the abdomen and the outer surface of the thigh. Proximity to visible veins and to joints should be avoided. The place of injecting must be changed frequently; otherwise the tissues become hard or local loss of fat may occur. Likewise the skin at the site of each injection must be massaged after making the injection.

Adjusting Doses of Insulin

The uninstructed patient is advised not to attempt to treat himself with insulin. He requires the guidance of a physician and these directions are addressed to his physician. What follows, furthermore, is not a rule of thumb nor applicable to all diabetic patients. A procedure satisfactory for one patient may not succeed with another and, while that which is presented has been successfully employed in many cases, other patients will require modifications of this procedure in their cases.

Use of Soluble Insulin.—Control of diabetes can almost always be obtained with multiple daily injections of soluble insulin, either regular insulin or solution of zinc insulin crystals. The duration of action of soluble insulin is short, seldom exceeding eight hours, and therefore three or more injections are required daily except in cases in which the diabetes is relatively mild. The doses usually are given fifteen or twenty minutes before meals, an additional small dose without food being sometimes required at bedtime.

When beginning treatment, it is well to start treat-

ment with soluble insulin, giving an amount of insulin somewhat smaller than what may be required; for example, with 4 or 8 or 12 units before each meal. However, in conditions of emergency larger doses must be used at the onset (see page 53). The original doses can be stepped up rapidly if insufficient, 2 to 4 or more units being added each day to one or more of the doses until control of glycosuria is obtained. Once control has been established, it is possible in many cases to divide the noon dose between the morning and evening doses and thus limit the number of injections to two a day.

In cases of early diabetes the condition of the patient is likely to improve under treatment. The doses then must be decreased to avoid insulin reactions. Other circumstances may lower requirements for insulin. Increased physical exertion decreases requirements. Missing meals or inability to eat all of the food in the diet calls for taking less insulin but *not for discontinuing the use of insulin entirely*. On the other hand, the development of complications of many kinds will generally increase requirements. Larger doses usually are needed during periods of emotional disturbance, during infections, after fracture of bones, and after operations. In emergencies, in which the severity of diabetes is increased, more insulin may be needed even when a meal is missed.

Because requirements for insulin fluctuate from time to time, the patient must learn to estimate his needs. He does this by testing his urine regularly two or more

times daily. The tests are made before each dose of insulin is given, the bladder being emptied thirty minutes or an hour before the specimen for testing is collected. The appearance of sugar in any quantity (tests of grade 3 or 4) in any specimen suggests that the preceding dose of insulin has been inadequate. Therefore, on the following day the dose in question may need increasing. Negative tests suggest that the preceding dose may be excessive. In that case insulin reaction must be watched for. If symptoms of insulin reaction are encountered, the dose which preceded the negative test should generally be lowered on the following day. Changes in doses when the day's requirements for insulin are small—less than 20 or 30 units—are usually made in steps of 2 or 4 units; when the day's requirement is larger the changes may be larger (steps of 4 to 8 units).

Use of Protamine-Zinc Insulin.—The principal advantage of the use of protamine-zinc insulin and of mixtures of protamine-zinc insulin and soluble insulin (see next section) is that control of diabetes can be obtained in many cases with one injection daily. Protamine-zinc insulin is only slowly soluble in the fluids of the body. Therefore when it is injected beneath the skin, its action is prolonged for more than twenty-four hours.

In cases of diabetes in which the day's requirement for insulin is small (20 units or less), a single dose of protamine-zinc insulin given before breakfast will frequently suffice to prevent gross glycosuria for the day

and following night. Patients whose diabetes is controllable with a small dose of protamine-zinc insulin (6 to 20 units) are advised to test their urine twice daily, before both the morning and the evening meals. When both tests are negative for sugar for three days in succession, the dose is lowered 2 or 4 units on the morning of the third day. If the tests remain negative for three more days, the dose again may be reduced, and so forth. However, it is not advisable to reduce the dose to less than 6 units without the direction of the physician. If the tests again become positive, the dose should be increased by from 2 to 4 units, and further increases should be made each third or fourth day as necessary to regain control of glycosuria.

We usually advise against increasing the dose of protamine-zinc insulin to an amount larger than 20 units. Serious insulin reactions developing without warning, as well as many types of nervous disorder occurring among patients who were taking protamine-zinc insulin in amounts greater than 20 units daily, have prompted us to avoid giving more than 20 units of this type of insulin in any one day. Instead, when the day's requirement is greater than 20 units, we usually turn to the use of mixtures of protamine-zinc insulin and soluble insulin, as described in the succeeding paragraphs.

Insulin Mixtures.—The action of insulin mixtures differs from that of soluble insulin and from that of protamine-zinc insulin. It is intermediate between the two, with some rapid action to provide for the increased

requirements that follow the taking of food during the day and some delayed action effective over the night. However, in order to obtain sufficient rapid action, mixtures must be made using a larger proportion of soluble insulin than of protamine-zinc insulin. The proportion generally advisable is 2 units of soluble insulin to 1 of the protamine-zinc insulin but in many cases a larger or smaller proportion of soluble insulin than this will be found to be desirable.

The hazard attending use of large doses of protamine-zinc insulin, which was mentioned before, is also encountered with mixtures in which the amount of protamine-zinc insulin is large. Therefore, in cases in which the total insulin requirements are high—requirements, for instance, involving the use of more than 20 units of protamine-zinc insulin combined with 40 units of soluble insulin—we either increase the amount of soluble insulin in the mixture or give a supplementary dose of soluble insulin before supper.

When satisfactory control is not obtainable by the procedure here proposed, it sometimes is desirable to turn to multiple injections of soluble insulin or a 2:1 mixture of soluble and protamine-zinc insulin may be given before breakfast and a supplementary dose of soluble insulin injected before the evening meal.

Mixtures of protamine-zinc insulin and soluble insulin are prepared in the syringe as follows:

1. The use of mixtures of protamine-zinc insulin and regular insulin in one syringe calls for precautions to

prevent the introduction of one kind of insulin into the other bottle.

2. Write down on a piece of paper the amount of protamine-zinc insulin and soluble insulin you are going to take.

3. Draw into the syringe as much air as the amount of protamine-zinc insulin you are going to take, wipe the top of the bottle with a piece of cotton saturated with alcohol, and then inject the air into the bottle containing protamine-zinc insulin without permitting the needle to touch the protamine-zinc insulin. Withdraw the needle.

4. Then draw into the syringe an amount of air equal to the soluble insulin you are to take; clean off the top of the bottle, put the needle into the bottle containing soluble insulin, inject the air, and withdraw the dose of soluble insulin after clearing the syringe of air bubbles. Hold the syringe vertically with the needle and the bottle up when withdrawing the insulin and the needle from the bottle of soluble insulin.

5. Turn the bottle of protamine-zinc insulin upside down several times to mix the contents, and, again with the syringe held vertically and the needle and the bottle up, insert the needle into the bottle and withdraw the dose of protamine-zinc insulin desired. Mix the two kinds of insulin by drawing a small bubble of air into the syringe, inverting the syringe several times. The bubble of air is injected with the insulin. It can do no harm.

By adjusting the size of each component of these

mixtures it is possible to obtain more or less of either slow or quick action. If the patient tests freshly secreted specimens of urine before breakfast and before supper, the bladder being emptied no more than one hour before the specimen for testing is collected, the test made before breakfast serves as a guide to the amount of protamine-zinc insulin (slow acting), while that made before supper tells whether more or less of the soluble insulin (quick acting) is desirable.

The procedure for adjusting the dose of mixed insulin or of either component of the mixture, as is necessary to meet changing requirements for insulin, cannot be rigidly prescribed. It usually must be developed by trial and error to meet individual needs. Frequently, however, some variation of the following plan will serve the purpose:

When the test of the urine collected *before breakfast* has been grade 3 or 4 for three mornings in succession, increase the protamine-zinc insulin component of the mixture by 2, perhaps 4, units. However, if this necessitates giving more than 20 units of protamine-zinc insulin, try adding more of the soluble insulin to the mixture. If this should bring about an insulin reaction between breakfast and supper give instead a small dose of soluble insulin before supper.

Similarly, when the test of the urine collected before breakfast has been grade 0 or grade 1 for several successive days, usually not more than three, decrease the protamine-zinc insulin component by 2, perhaps 4, units.

Make no changes for traces of sugar (tests grade 1 or 2). The presence of a trace of sugar in the morning provides a measure of assurance that the blood sugar has not fallen too low in the night.

When the test of the urine collected *before supper* is grade 3 or 4 for two or more successive days, increase the soluble insulin component of the mixture by from 2 to 4 units. This change should be made the following morning.

Similarly, when the test of the urine collected before supper has been grade 0 or grade 1 for two or more successive days, reduce the soluble insulin component by from 2 to 4 units.

The occurrence of an insulin reaction calls for lowering the next day's dose of insulin. If the insulin reaction has developed between breakfast and supper, the soluble insulin component of the mixture should be lowered the next day. If the insulin reaction has occurred at night, the protamine-zinc insulin component should be lowered the next morning.

When the requirement for insulin, as revealed by the tests of the urine, has diminished to less than what can be provided for with a mixture containing 6 units of protamine-zinc insulin (P6) and 12 of soluble insulin (R12), do not reduce the amount of protamine-zinc insulin. Instead continue with P6 and reduce the soluble component in steps of 2 units. For example, with the mixture P6R12, the urine being sugar free morning and evening for three days, take P6R10. Three days later

if the urine continues sugar free lower this to P6R8 and again three days later if the urine is sugar free lower the dose to P6R6. From this point down use only protamine-zinc insulin, first P10, next P8 and finally P6. Do not reduce the dose below P6 without the direction of the physician. If at any stage of this progressive lowering of the dose of insulin the tests of the urine again show sugar in amounts greater than traces (tests grade 1 or 2), raise the dose of insulin to P6R12 and again make adjustments up or down from this amount according to the program here described.

Emergency Insulin Requirements

When fever occurs with any acute disease, as well as after injuries and operations, the severity of diabetes may change from hour to hour. Therefore, in emergencies *soluble insulin* must be given frequently, and in doses which are adjusted to meet the changing condition. A workable procedure is as follows:

Freshly secreted urine is tested for sugar not less frequently than before each meal and at bedtime. If on one day the results of all four tests are grade 4, tests on the next day should be made each three hours of the twenty-four and insulin should be given by the following schedule:

If the test of the urine is grade 4, give 10 units of insulin.

If the test of the urine is grade 3, give 6 units of insulin.

If the test of the urine is grade 1 or 2, give 4 units of insulin.

If the test of the urine is grade 0, give 4 fluidounces (120 gm.) of orange juice or a feeding of other food if scheduled at the time.

For young children the doses of insulin are smaller: 6 units when the test of the urine is grade 4, 3 units when the test is grade 3, 2 units when the test is grade 1 or 2, and orange juice or food if the test is grade 0.

If diacetic acid is present when the test for sugar is grade 4, adults should take 12 or more units of regular insulin and children should take 8 or more units.

If the illness is accompanied by loss of appetite or a digestive disturbance which makes it difficult to take the usual diet, an emergency diet is given (see p. 47).

If the patient has been using either protamine-zinc insulin alone or a mixture of soluble insulin and protamine-zinc insulin before breakfast and an emergency develops which necessitates administration of more insulin, it is better not to change the last dose of protamine-zinc insulin or that of the mixture of protamine-zinc and soluble insulin, but to supplement this dose with soluble insulin to provide the extra insulin that is necessary, the supplementary insulin being given every three or more hours, according to the foregoing schedule.

When the emergency has passed and convalescence begins, the requirement for insulin may decline rather quickly, and insulin reactions will be encountered unless

the supplementary doses of insulin are diminished. Safety is assured by testing the urine not less frequently than four times daily and decreasing the supplementary doses of insulin as the results of the tests improve. When recovery is complete, the doses of insulin that were effective before the emergency will usually again suffice.

Discontinuing Use of Insulin

A diabetic using insulin must guard against anything interfering with his regular supply. While it is true that tolerance may improve enough to permit gradual discontinuance, it is extremely dangerous to stop using insulin abruptly. This almost certainly will precipitate diabetic acidosis. Therefore: Always keep an adequate supply of insulin on hand, together with an extra syringe and extra needles. Never voluntarily discontinue administration of insulin except with the knowledge and approval of your physician. And if at any time insulin cannot be obtained, take only one third of the usual diet and remain in bed until the injections can be resumed. Physical exertion is detrimental unless insulin is acting.

The Insulin Reaction

Insulin reactions are due to rapidly falling and to abnormally low levels of blood sugar. They may mean diminishing severity of diabetes, but often they result from one or another of the following irregularities:

1. Error in filling the syringe and taking more insulin than is intended.
2. Missing a meal or eating it incompletely.
3. Taking more exercise than usual.
4. Making repeated injections into the same site. This practice leads to delayed absorption; larger doses seem to be required, and when later an injection is made into a fresh site an over-effect is produced.

The early symptoms of reaction to regular insulin include trembling, weakness and sweating. These symptoms are less noticeable in reactions to protamine-zinc insulin, and in their place appear drowsiness, headache, nausea, numbness and tingling of the mouth and fingers and blurring of vision. Later symptoms with any type of insulin include double vision, loss of awareness of surroundings, loss of memory, convulsions and loss of consciousness. Reactions are disturbing and sometimes serious.

Reactions from regular insulin develop rapidly and are relieved rapidly with sugar; those from protamine-zinc insulin develop more slowly and recovery is slow. With protamine-zinc insulin, used as has been recommended, in single doses before breakfast, the most common time for reactions is in the early morning. Usually they will awaken the patient and usually he will be conscious enough to recognize what is wrong and to correct it by taking sugar. If he fails to do this, he may be difficult to arouse and assistance then may be required. It is important to acquaint the other members of the family with what may be needed in case of such

emergencies. Reactions from mixtures of protamine-zinc insulin and soluble insulin are likely to occur during the day if the soluble insulin component of the mixture is too large and during the night if the protamine-zinc insulin component is excessive.

Frequently the behavior of a person in a more severe insulin reaction resembles that of a drunkard. To avoid embarrassment and insure proper treatment if this complication occurs away from home, every diabetic should carry on his person a card with the following information:

I have not been drinking.

I have diabetes and my present condition probably is the result of an overdose of insulin. The antidote is sugar. Place sugar or candy in my mouth. If it fails to restore me in fifteen minutes call my physician or send me to a hospital.

My name is:.....

My address is:.....

My physician is Dr.:.....

His address is:.....

His telephone number is:.....

Treatment of Insulin Reactions.—Reactions are avoided by adhering carefully to the diet and regulating the physical exercise so that both intake of food and amount of exercise will be nearly the same from day to day. If the diet is disregarded and more food is eaten on one day than the next, it becomes almost impossible to estimate correctly the amount of insulin which should be used. The same statement applies when the amount

of exercise varies widely. Patients in the hospital are less active than at home; therefore after leaving for home, they should increase the amount of exercise gradually during one or two weeks until the dosage of insulin has been adjusted to the new requirement. If it becomes necessary to engage in unusual exercise, it is advisable to take a loaf of sugar before and after it and when protamine-zinc insulin is being used it is well, when unusual exercise has been had, to test a specimen of urine at bedtime (having emptied the bladder an hour before), and if this specimen is entirely sugar free, to take a glass of milk and one or two soda crackers before sleeping.

The patient should learn to recognize the early symptoms of reactions, and when these occur to take the antidote, sugar. Hard candies are very useful for this purpose. A package of them, or sugar in one form or another, should always be carried. Sugar or a candy is to be placed in the mouth when the first symptoms appear and until the next meal 5 or 10 gm. of sugar, or this amount of candy, should be eaten every half hour.

There is no occasion for alarm on the part of attendants even if the patient loses consciousness. He will recover in time if sugar is placed in the mouth to dissolve and thereby be absorbed into the blood. It is not safe to put fluid (orange juice) in the mouth of an unconscious patient. A quicker recovery may be obtained if the physician will inject either 0.5 c.c. of 1 to 1,000 solution of epinephrine subcutaneously or a sterile

solution of glucose intravenously. If epinephrine is injected, sugar in some form must be given soon afterward.

Excessive amounts of sugar are to be avoided in treating reactions. A very little sugar, about 5 or 10 gm., will accomplish as much as more sugar, if it is given at fifteen minute intervals for one or two hours.

If reactions occur, the dose of insulin should be lowered, usually by 4 units. When regular insulin alone is being used, lower the dose that provoked the reaction. When protamine-zinc insulin alone is being used, lower the dose of it. When mixtures of protamine-zinc insulin and soluble insulin are used and the reaction occurs during the day, lower the dose of the soluble component in the mixture given the next morning; if the reaction occurs in the night, lower the protamine-zinc component.

Diagnosis of Severe Insulin Reactions.—It is important not to mistake unconsciousness caused by insulin for diabetic coma. The consequence of giving insulin when sugar is needed may be disastrous. The distinction usually can be made by the patient's breathing. Before consciousness has been lost, the patient in insulin reaction usually behaves like a drunken sailor, resisting assistance, talking boisterously and breathing noisily and irregularly. Before coma from acidosis the patient is drowsy and slow to respond, but never resistant. His breathing is increased in depth but is regular and usually not noisy. After consciousness is lost in insulin coma, the breathing almost always is very light and very shallow, whereas in diabetic coma it almost always is deeper

than normal, resembling the breathing of a runner at the finish of a race. The physician also may be guided by the tendon reflexes. They are overactive in insulin reactions (positive Babinski reflexes are usually obtained) and decreased in diabetic coma. The presence of sugar and even of diacetic acid in the urine must be evaluated cautiously, unless the bladder has been emptied thirty minutes or an hour before collecting the specimen for examination. Patients may pass rather quickly from diabetic coma into the coma of insulin reaction and the urine be deceptive. Another index is the state of dryness of the skin and mucous membranes. They are moist in insulin reaction, unless the patient has been in acidosis recently; they are usually very dry, in diabetic coma.

QUESTIONS

CHAPTER IV

COMPLICATIONS OF DIABETES. TREATMENT OF DIABETES DURING ACUTE ILLNESS. THE PREVENTION AND TREATMENT OF DIABETIC ACIDOSIS

Acute Illness

Fever, sore throat, carbuncle, attacks of gallstones or appendicitis and other types of illness, infection, operation or accident usually diminish the tolerance for sugar and make necessary the use of larger doses of insulin. This applies to mild as well as to severe diabetes. The danger often is greater if the diabetes is mild, because then the patient is likely to be unacquainted with the use of insulin. It has been difficult sufficiently to impress diabetics and physicians with the possible necessity for unusually large doses of insulin during emergencies such as those mentioned. The patient then may require insulin even if he is unable to swallow any food, and if the urine contains sugar and diacetic acid he must be given insulin, food or no food.

Operations

Persons who have diabetes always should inform their surgeons, dentists and chiropodists of this fact, in

order that necessary precautions may be taken before and after operation. This applies even to minor operations, and to such trivial manipulations as extracting teeth or removing calluses. However, when suitable preparation has been had beforehand and good treatment is obtained afterward, operation can be performed in the presence of severe diabetes with no greater danger than usual.

Emergency Diets

A complicating illness of any kind frequently makes it necessary to alter the diet by restricting the total amount of nourishment and omitting foods which are digested less readily. The diets shown below are designed for this purpose. The liquid diets and the milk and cracker diet are for patients who are very sick or recently have had operations. The soft diet is intended for less serious conditions. The food in these diets provides from 120 to 180 gm. of sugar, an amount which the patient ought always to receive. If the food in one of these diets is not eaten, or if it is vomited, 100 gm. of dextrose should be injected into the rectum or given by vein. For the rectal injection the dextrose may be dissolved in 2 quarts of tap water, and 1 pint of the solution, warmed to body temperature, given every six hours. The "Murphy drip" method is recommended. For intravenous administration nothing but the purest dextrose will do. It should be made into a 10 per cent solution with triply distilled water and sterilized before injection.

Orange Juice Diet—Sugar Value, 125 Gm.

Time.		Gm.		Gm.	Total carbohydrate gm.
a.m.					
8	Orange juice	150	Sugar	5	20
10	Orange juice	150			15
12 noon	Orange juice	150	Sugar	5	20
p.m.					
2	Orange juice	150			15
4	Orange juice	150	Sugar	5	20
6	Orange juice	150			15
8	Orange juice	150	Sugar	5	20

This diet contains approximately:

Carbohydrate.....125 gm.
Calories.....500

Liquid Diet—Sugar Value, 120 Gm.

Use 1,200 gm. (6 glasses) of 10 per cent fruit juice or 600 gm. (3 glasses) of 20 per cent fruit juice during the day. Take small amounts at frequent intervals. One glass of 10 per cent fruit juice or ½ glass of 20 per cent fruit juice may be taken every two hours. Broth, tea and coffee may be used as desired. The 10 per cent fruit juices are orange juice and the juice from pears and grapes canned without sugar. Ginger ale has the same value. Commercial grape juice contains 20 per cent carbohydrate.

This diet contains approximately:

Carbohydrate..... 120 gm.
Calories..... 480

Milk and Cracker Diet—Sugar Value, 125 Gm.

Use 200 gm. (1 glass) of milk and 14 gm. (2) of double soda crackers at intervals of about two hours five times during the day. This provides a satisfactory diet for temporary use.

This diet contains approximately:

Carbohydrate	101 gm.
Protein	37 gm.
Fat	46 gm.
Calories	966

Soft Diet—Sugar Value, 180 Gm.

Time.		Gm.
Breakfast	Fruit juice, 10 per cent	100
	Cereal, dry	20
	Toast	20
	Butter	10
	Cream (20 per cent butterfat)	75
	Soft cooked egg	1
10 a.m.	Fruit juice, 10 per cent	170
Noon	Baked potato or rice	100
	Toast	20
	Butter	10
	Cream (20 per cent butterfat)	25
	Fruit juice, 10 per cent	100
3 p.m.	Fruit juice, 10 per cent	200
Supper	Toast	20
	Butter	10
	Soft cooked egg	1
	Fruit, 10 per cent	100
8 p.m.	Fruit juice, 10 per cent	200

This diet contains approximately:	Gm.
Carbohydrate	160
Protein	25
Fat	60
Calories	1,280

Treatment of Diabetes During Acute Illnesses

Colds, infections, injuries and so forth are almost certain to make your diabetes temporarily more severe. Proper treatment during such illnesses will prevent the development of acidosis:

1. Go to bed and keep warm.
2. Test the urine every three hours during the day and at least every six hours during the night.
3. Do not change the usual dose of protamine-zinc insulin or of combined protamine-zinc insulin and regular insulin.
4. If the urine contains no sugar, take 120 gm. of orange juice or carbonated beverage. (If this test comes at mealtime, take the regular meal instead of the orange juice or carbonated beverage.)
5. If the test shows sugar, grade 1 or 2, adults take 4 units of regular insulin; children take 2 units of regular insulin.
6. If the test shows sugar, grade 3, adults take 6 units of regular insulin; children take 4 units of regular insulin.
7. If the test shows sugar, grade 4, test the specimen also for diacetic acid. If this is not present, adults take 10 units of regular insulin; children take 6 units of regular insulin. If diacetic acid is present, adults take 12 or more units of regular insulin; children take 8 or more units of regular insulin.
8. If the illness is accompanied by loss of appetite or a

digestive disturbance which makes it difficult to take the usual diet, use one of the special diets outlined on pages 47 to 49.

9. Call the doctor.

Diabetic Acidosis: Coma

In the definition of diabetes (p. 4) mention was made of poisoning by the products of incomplete combustion of protein and fat. The condition leads to diabetic coma, but the patient becomes drowsy and seriously ill before he loses consciousness. Diabetic acidosis may be precipitated by suddenly stopping the use of insulin, or by using insufficient doses of insulin, especially when more insulin is needed in one of the emergencies previously mentioned. Gross disregard of the diet also may provoke it by throwing a sudden overload on the islands of Langerhans and thus arresting their function. The most common cause, however, of diabetic acidosis is some acute illness, infection, operation or accident, as discussed earlier in this chapter.

To Prevent Acidosis.—1. Never neglect daily testing of urine and step up the doses of insulin to prevent gross glycosuria (see pp. 27, 29 and p. 32).

2. Never omit insulin because of inability to take food, unless the urine is sugar free.

3. Always inform surgeon, dentist and chiropodist of the presence of diabetes before operations, extractions of teeth and chiropody.

4. Keep up resistance to infection by avoiding

severe fatigue, either physical or mental, and securing recreation and regular sleep.

5. Avoid close contact with persons who have colds or other contagious diseases. Keep away from theaters and other assemblies in times of epidemics.

6. Consult your physician early for the treatment of any infection you may acquire, with or without fever; with or without any infection call him urgently if any two of the following group of symptoms develop:

(*a*) Unexplained weakness and drowsiness.

(*b*) Loss of appetite and nausea, with or without vomiting.

(*c*) Unusual pain in abdomen, legs or back.

(*d*) Dry skin and tongue with increased thirst.

(*e*) Increased respiration with fruity acetone breath.

(*f*) Persistent gross glycosuria with positive urine tests for diacetic acid.

7. Avoid heat exhaustion. The intensity of diabetes is increased by the loss of salt that accompanies excessive perspiration. When the weather is very warm take extra salt daily (3 or 4 gm. of sodium chloride, as salt tablets in the course of the day) or substitute very dilute salt water (0.1 per cent sodium chloride) for all fresh drinking water.

The Treatment of Acidosis.—(For the physician.) In order of relative immediate importance, the measures employed in treating diabetic acidosis are:

1. Rest and heat.
2. Insulin.

3. Water and salt.
4. Alkali.
5. Gastric lavage (rectal lavage).
6. Cardiac stimulation.
7. Urinary catheterization.
8. Dextrose.
9. Continued treatment.

The rationale of each of these measures is described elsewhere.* The following are the standing orders by which we are guided when a patient who has severe acidosis is admitted to the hospital.

Standing Orders for Treatment of Coma.—These are as follows:

1. Place the patient in a single room in bed between blankets. Place hot water bottles close to the body and thighs, carefully avoiding contact with the skin and avoiding the legs and feet. Call a special nurse and a special laboratory technician; if possible have them on hand when the patient arrives. Call the consultant.

2. Inject insulin without delay. Give 20 to 40 units of regular insulin at once and additional injections of regular insulin at intervals of two to three hours (see paragraph 10). It also is advantageous to give 50 to 100 units of protamine-zinc insulin in a separate hypodermic site.

3. Collect blood from vein. Fill a 20 c.c. centrifuge tube containing sodium oxalate for determination of

* Wilder, R. M.: Clinical Diabetes Mellitus and Hyperinsulinism. Philadelphia, W. B. Saunders Company, 1940, 459 pp.

the values for sugar, chloride, urea and carbon dioxide combining power. Repeat the examination of the blood for sugar and carbon dioxide combining power not less frequently than once every three hours until the patient is out of danger. Secure additional blood for grouping in case transfusion of blood is required later.

4. Start intravenous injection of physiologic salt solution at a rate of from 20 to 40 c.c. per minute. The same needle inserted for collecting blood should be used without withdrawal for this injection. Give *not less than* 30 c.c. per kilogram of body weight (14 c.c. per pound) in the first six hours, 15 c.c. per kilogram (7 c.c. per pound) in the second six hours, and 15 c.c. per kilogram (7 c.c. per pound) in the next twelve hours. For 60 kg. (132 pounds) the volumes will be 1,800 c.c., 900 c.c. and 900 c.c. When consciousness is not seriously impaired and the patient is not vomiting, the administration can be by mouth or by duodenal tube.

5. Prepare, or order prepared by the following directions, a 5 per cent solution of sodium bicarbonate. Boil 1,000 c.c. of freshly distilled water three minutes; remove from flame and dissolve in it 50 gm. of clean sodium bicarbonate. The solution must not be boiled. When it is ready aspirate the gastric contents, wash the stomach, using 500 c.c. of the bicarbonate solution for the purpose, and leave about 100 c.c. of the solution in the stomach. By this time the report, from the laboratory, of the carbon dioxide combining power of the plasma will have arrived. If the value is less than 20 volumes per 100 c.c.,

add the remaining 500 c.c. of the 5 per cent solution of sodium bicarbonate to the salt solution running into the vein.

6. Look for complications which may be responsible for the patient's acidosis—infection, hyperthyroidism. If infection is found, consider measures for its removal or treatment; if any suspicion of hyperthyroidism exists, give compound solution of iodine (Lugol's solution) (1 c.c. added to what fluid is being given by vein or duodenal tube each six hours).

7. Collect separately for analysis every specimen of urine voided. If micturition is impeded, catheterize the bladder once every three hours, exercising special precautions to avoid infection. Examine each specimen for sugar and aceto-acetic acid. It is to be remembered that the effect of frequently repeated injections of insulin may be cumulative, and that it is safer, until the patient has regained consciousness, not to give enough insulin to suppress glycosuria completely. In cases in which anuria results from circulatory collapse, slowly inject intravenously 60 c.c. of 10 per cent solution of sodium chloride.

8. After two or three hours start administering small doses of sugar. If the patient is not nauseated, this can be given by mouth or duodenal tube with orange juice or as 10 per cent solution of dextrose in amounts of 150 c.c. every two or three hours; otherwise 150 c.c. of a sterile 10 per cent solution of dextrose should be administered intravenously at three hour intervals. The solu-

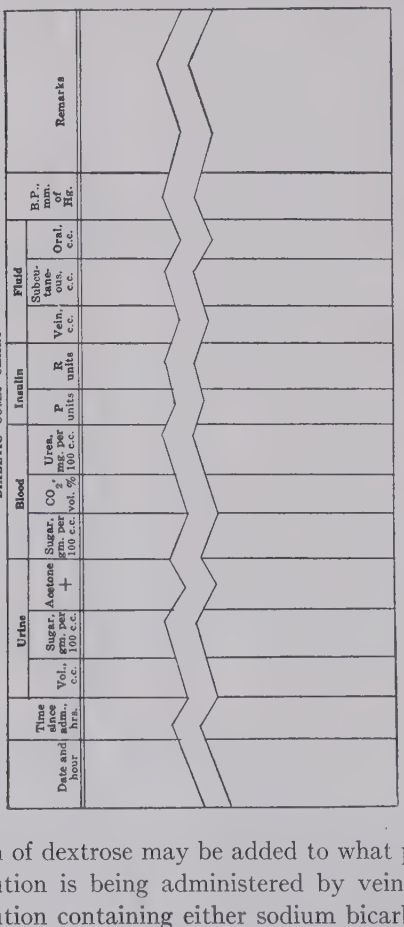


Fig. 5.—Form of the diabetic coma chart. Summarize data every twelve hours: total volumes of fluid given; total excretions. Doses of insulin given intravenously are to be indicated with letters IV after the numbers of units. In column for "Remarks" record all other items of treatment, such as gastric lavage, enemas, and so forth; also type of fluid given, and all other medication.

tion of dextrose may be added to what physiologic salt solution is being administered by vein, but not to a solution containing either sodium bicarbonate or compound solution of iodine (Lugol's solution).

9. Determine and record the blood pressure hourly. If the systolic pressure falls below 80 mm. of mercury, give the hypertonic salt solution mentioned in paragraph 7 and arrange for an immediate infusion of whole blood, blood plasma or solution of acacia.

10. Continue periodic examinations of blood and urine and administration of insulin at intervals of two or three hours. Until the consultant orders otherwise, give 15 units of regular insulin for a grade 4 test for sugar in the urine, 10 units for a grade 3 test, 5 units for a grade 2 test, and if there is no sugar administer 10 gm. of dextrose.

11. When the patient is seen in his home he should be transported to a hospital, but the first administration of insulin should be given before starting, and if the journey will take more than two hours the physician should accompany the patient and give what other treatment is possible in transit. Telephone the hospital so that arrangements can be made for immediate attention on arrival.

12. Record all laboratory reports and clinical observations on the "Diabetic coma chart" (Fig. 5).

Questions

CHAPTER V

OTHER COMPLICATIONS OF DIABETES, INCLUDING GANGRENE. THE PREVENTION OF GANGRENE

Tuberculosis

The undernourished are predisposed to tuberculosis, and diabetic patients of the era before insulin, ill-fed by necessity, frequently were tuberculous. Tuberculosis is much less common today than it was, and yet the incidence of it among diabetics remains too high. Either carelessness on the part of patients or the type of diet they have been told to take must be responsible. The widespread teaching that diabetic diets ought to be low in fat and restricted in calories is open to serious criticism on this score.

Advanced tuberculosis of the lungs in a case of diabetes usually is fatal, whereas early tuberculosis can be cured. Therefore, persons who have diabetes ought to submit themselves to health examinations at least once each year (a birthday examination), with special attention paid to the lungs. *x*-Ray pictures are necessary to detect early involvement. Also, whenever any chest cold or bronchitis persists longer than three or four weeks, or pains in the chest suggest pleurisy, a

physician should be consulted and tuberculosis looked for. By this means if the disease occurs, it will be detected early enough to be treated successfully.

Childbearing

The begetting of children involves a responsibility that conscientious persons afflicted with diabetes seek to avoid. The danger of transmitting the disease to offspring, and appreciation of the social consequences involved, act as deterrents. Only if one parent is free from diabetes and knows of no diabetes in his heredity is the risk acceptable.

Pregnancy in diabetic women demands special attention and the obstetrician selected should acquaint himself with the difficulties to be encountered. Cesarean section is the safest procedure to insure a live baby, especially in the case of women who are having their first baby. It is better to perform this between the thirty-sixth and thirty-seventh weeks of pregnancy. The insulin requirement of the mother is likely to fluctuate widely, not only during the last few months of pregnancy but also after the delivery, necessitating frequent changes in the doses of insulin. Usually the dose can be decreased in the second half of the period of pregnancy, but the reverse occurs. The child, during the first few days of its life, may suffer from an excessively low level of blood sugar, and this condition, unless combated with subcutaneous injections of sterile solution of dextrose and early, frequent feedings, may be fatal.

Hyperthyroidism

Goiter, if active, is borne badly by diabetics. The increased stimulation of heat production characteristic of this disease creates an increased demand for food. More insulin is required on this account, as well as because the activity of the goiter interferes with the effectiveness of what insulin is provided. In this complication early treatment by a competent surgeon is desirable.

Disturbances of Vision

The eyes of diabetic patients may be affected in a number of ways. Sudden changing of the level of the sugar in the blood is followed by changes in the optic lens, which interfere with refraction and cause either near- or far-sightedness. The disturbance, although annoying, is not serious; it disappears within a few weeks, provided the diabetes is treated properly. Wait until it has disappeared before having glasses fitted or the glasses may be unsuitable later.

A more serious disturbance of vision is occasioned by cloudiness in the lens. This is a harbinger of cataract and when the vision is sufficiently impaired operation is necessary to restore the sight. Diabetic cataracts usually are no different from ordinary cataracts, but a type of cataract is seen in diabetic children and young adults which is different. Fortunately, this type is very rare.

Retinitis is found in at least one out of every five

diabetic patients. The retina is the light-sensitive layer at the back of the eyeball. The retinitis characteristic of diabetes consists of microscopic hemorrhages associated with tiny, pearly deposits in this light-sensitive layer. Retinitis, for some unknown reason, may appear at any time in the course of diabetes without any relation between its occurrence or degree of severity and the severity of the diabetes. It never leads to total blindness and occasions little or no inconvenience unless one of the deposits happens to be placed over, or in, the important "yellow spot," the very center of the retina where close vision is focused. If this spot is touched, reading vision is endangered.

Disorders of Nerves

Diabetic patients, as has been mentioned previously, suffer from pain during attacks of acidosis. When their disease is poorly treated and chronic acidosis is present, they frequently have pain in many parts of the body. A more common pain among diabetics is that associated with interference to the circulation of blood to the nerves. It depends on narrowing of the internal diameter of arteries affected with arteriosclerosis and usually is limited to the legs.

Another type of disorder is so-called crossed-leg palsy; this is attributed to injuring a nerve in the leg by crossing one knee over the other when sitting. The nerve involved is one that activates muscles in front of the leg; their weakness results and footdrop follows, combined with sensations of numbness and tingling.

The nerves of persons who have diabetes seem to be more sensitive to injury than those of normal individuals; this is a reason why gross indulgence in alcohol and tobacco should be avoided by them.

Diseases of the Skin

Diabetics are more susceptible than others to boils, but if the diabetes is well controlled, the danger of this and other diseases of the skin is minimized. Dirty towels and dirty razors frequently are responsible. Dr. W. J. Mayo, years ago, contributed the following excellent bit of advice: "A boil of the neck or face often is due to infection from a barber's razor. It is well for a man with diabetes to shave himself and when the hair is cut to tell the barber to omit the customary shaving of the neck." If a boil appears, a physician ought to be consulted early, otherwise a carbuncle may follow and a carbuncle associated with diabetes is extremely dangerous.

Simple cuts of the skin are treated best by the application of a clean dressing, kept moist with equal parts of 50 per cent grain alcohol and saturated solution of boric acid. Medicated and rubbing alcohols are not to be used. After twelve hours the sore may be painted with tincture of merthiolate, 1:1,000 and dressed with dry sterile gauze. Strong antiseptics, such as tincture of iodine, solution of mercury bichloride, carbolic acid and medicated salves are dangerous. If pain, swelling, redness or other sign of inflammation develops, consult a physician. Do not walk on an injured foot so long as there is any pain, redness or swelling.

Gangrene

This complication occurs far more frequently than is necessary, and often with bad consequences. Almost always it affects the feet, rarely the hands, nose or ears. The cause is to be found in the poor circulation of blood in the extremities, a result of thickening of the walls and narrowing of the internal diameter of the arteries. The tissue dies and putrefies for lack of blood. It becomes infected and danger to life succeeds the spread of the infection to the blood. The threat of gangrene increases as age advances, but if the diabetes is well controlled by strict adherence to the diet and the proper use of insulin, and if the following suggestions are heeded, the chances of contracting this complication will be lessened materially and many cases will be prevented.

Directions for the Care of the Feet

The patient with diabetes who has poor circulation of blood in the lower extremities should heed the following admonitions. They are six in number:

1. Keep the feet clean; avoid "athlete's foot."
2. Avoid bruises and cuts, giving proper attention to toenails, corns, stockings and shoes.
3. Avoid burning and freezing the skin of the feet; avoid strong antiseptics.
4. Avoid constricting the circulation; avoid tobacco.
5. Provide rest for injured feet.
6. Make use of measures to promote the circulation; contrast baths, massage, exercises.

Adherence to these admonitions will obviate the necessity for many an amputation. Adherence to them will also help to prevent cramps on walking and numbness and pains in the legs at night.

1. Keep the Feet Clean

Wash the feet daily. Use a nonirritating soap and dry the feet carefully. Avoid rubbing with the towel. Blot off the moisture, especially that between the toes. Drawing the towel between the toes or pulling the toes too far apart may cause breaks in the skin.

After the bath gently rub the feet with alcohol, then apply boric acid or other dusting powder. If the skin is abnormally dry, apply lanolin, olive oil or cocoa butter.

Athlete's Foot.—Watch out for infestation with fungi (athlete's foot). Athlete's foot is to be suspected if tiny blisters are found between the toes, or if cracking and weeping of the skin occur with bad odor and itching.

Athlete's foot may be acquired in shower baths, on bathing beaches and in hotel bedrooms. Many remedies commonly prescribed for it are too strong for safety when the blood supply to the legs is poor. A reliable and safe treatment is to soak the feet for thirty minutes twice daily in a freshly made 1:8,000 solution of potassium permanganate—one 5 grain tablet of potassium permanganate (purchasable at a drugstore) in 2 quarts of warm, not hot, water. The solution stains the skin but is not injurious.

2. Avoid Bruises and Cuts

Bedroom slippers should be put on before getting out of bed and taken off after getting into bed. Walking in bare feet must be strictly avoided because of the danger of stepping on sharp objects or bruising the toes by bumping them.

Toenails.—Toenails should be cut straight across, not rounded, and should not be shorter than the flesh at the extreme tip of the toe. The corners should not be cut or pulled out. Never use a knife; employ nail clippers and a file or emery board, and exercise great pains to avoid cutting the skin and drawing blood. A piece of cotton twisted around the end of an orange-wood stick or toothpick and saturated with hydrogen peroxide should be used for cleansing under the nails, not a pointed nail file. A small piece of cotton inserted under the corners of the nails will help to prevent their becoming embedded in the flesh and will encourage them to grow straight. This cotton must be changed once a week. If the nail bed is painful insert less cotton.

Corns.—Corns grow from pressure, and if all pressure can be prevented they will disappear. Use corn pads (nonmedicated) or cover the corn with adhesive moleskin. If moleskin is used, replace it once a week; omit the covering with moleskin one day each week. Above all, wear shoes that neither press nor rub the corn. Do not attempt to cut corns or calluses. If their trimming becomes a necessity see a chiropodist (accredited pedicure). Ask your physician to refer you to one who is

competent. Remember to tell the chiropodist that you have diabetes, so that he will exercise every precaution to avoid drawing blood or introducing infection.

Stockings.—Stockings short in the feet cause as much foot trouble as ill-fitting shoes. There should be some looseness at the toe—room for foot expansion when weight is borne. Pull the stocking out at the toe before putting on the shoe. Stockings must be clean. They should be changed once a day and new stockings should be laundered before they are worn. Thick darns and seams in stockings are to be avoided.

Shoes.—Soft leather is to be preferred. Shoes should be broad in the toe and straight on the inner border. They should fit snugly over the instep so that the foot will not press forward. Metal arch supports are undesirable. A combination last is best for normal feet. This is two widths narrower at the heel than at the ball of the foot. Narrow-toed shoes must be avoided. Crowding the toes leads to ingrown toenails. The heel should be of medium height—not too low. The linings must be smooth. The counters of new shoes should be softened before the shoes are worn, and new shoes should not be worn more than two hours at a time for the first four or five days.

3. Avoid Burning or Freezing the Skin of the Feet

When the circulation of blood is poor, the skin of the feet is insensitive. Thus extremes of temperature may not be recognized. Furthermore, the skin of the

feet may be injured by temperatures that would not harm other parts of the body. Therefore, take great pains to avoid freezing or burning the feet. The greatest danger is from hot water bottles or electric pads. These must never be placed below the knee. For cold feet at night wear loosely woven woolen stockings in bed. Unless special precautions can be taken against overheating, heat lamps or bakers are to be avoided. Never place hot water bottles or electric pads below the knee.

Test the temperature of the bath water with the elbow or forearm, not with the foot.

Should blistering result from burns do not attempt to remove the fluid, but protect the blister from breaking by relieving all pressure. This may be accomplished by wearing a loose soft slipper, or an old shoe cut so that the blister is not covered by any leather. Keep the blister covered with a dry dressing made of sterile gauze until it dries and flattens of itself. Then if it breaks, infection will be less likely. Broken blisters are treated with dressings of boric acid and alcohol, as described below.

Wear warm wool socks and overshoes in cold weather, and avoid prolonged exposure to cold. Should the feet be frozen do not apply heat but warm them by gentle massage.

Antiseptics.—When treating abrasions of the feet avoid the use of strong antiseptics. Tincture of iodine, solution of bichloride of mercury, carbolic acid and medicated salves are dangerous. Simple cuts, burns and

broken blisters from burns are best treated by applying a sterile gauze dressing kept moist with equal parts of 50 per cent grain alcohol and saturated solution of boric acid. Alternate such a dressing with a dry sterile dressing every twelve hours.

4. Avoid Constricting the Circulation

Circular garters, constricting bandages, overtight shoes and sitting with the legs crossed slow the circulation of blood to the feet. Sitting with the legs crossed not only constricts the circulation but also, because of pressure on a superficially placed nerve at the knee, may provoke the development of a neuritis leading to footdrop.

Tobacco.—Nicotine slows the stream of blood by causing contraction of the muscular walls of the arteries. It is, therefore, advisable to avoid entirely the use of tobacco in any form.

5. Provide Rest for Injured Feet

Walking on a foot that is bruised, or otherwise injured, delays or prevents recovery. This applies even to minor injuries. When only one foot is affected, crutches will provide the necessary rest. When crutches are used they must be well padded, otherwise crutch palsy may develop from the pressure of the crutch at the armpit. In any case the weight of the body should be borne as much as possible by the hands. If both feet are affected, the patient must remain in bed unless he can be lifted

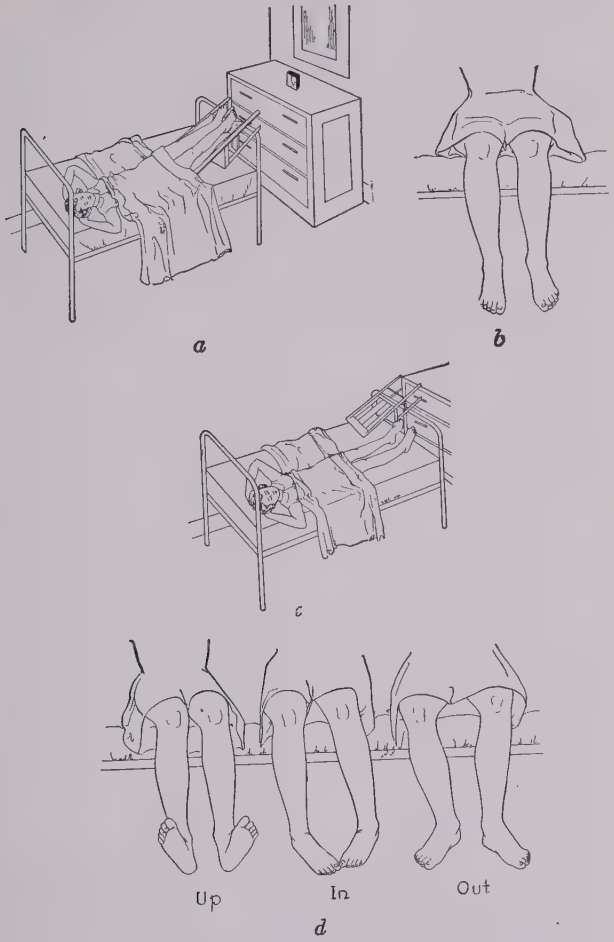
into a chair. If he sits in a chair, his legs must not hang down. Do not step on an injured foot until healing is complete.

6. Make Use of Measures to Promote the Circulation

Contrast Baths.—Forty minutes devoted once daily to contrast baths and to the massage and exercises to be described, will help greatly to improve the circulation in the legs. For the contrast baths two pails are used. One is filled with water warmed to 105° F., and the other with water at 50° F. *A bath thermometer (procurable at little cost in any drugstore) must be employed to secure these exact temperatures.* The feet and lower legs are immersed alternately for one minute in each bath, beginning and ending with the warm bath and changing from warm to cold and back again five times. This takes eleven minutes. Add hot water to the warm bath and cold water to the cold bath as necessary to maintain the original temperatures.

Massage.—After the contrast bath stroke and knead the feet and legs, beginning at the toes and working upward toward the knees. Use cocoa butter, lanolin, olive oil or mineral oil as a lubricant. Spend five minutes at this massage.

Exercises (Fig. 6).—1. Lie flat on the back in bed with the legs elevated for one minute, *a;* then sit on the bed with the legs hanging down for one minute, *b;* then lie flat in bed with the legs horizontal for one minute, *c.* Repeat six times. This exercise takes eighteen minutes.



a *b* *c* *d*

Fig. 6.

2. Stand on toes and heels alternately ten times. Sit on a table and swing the legs freely, rotating the feet slowly, as illustrated, *d*. Spend five minutes at this exercise.

QUESTIONS

1. How will periodic health examinations help to decrease the danger from tuberculosis? . . . . . Page 59

2. Under what circumstances can a diabetic person beget children with the least risk of transmitting predisposition to diabetes? . . . . . Page 60

3. What is required of the obstetrician selected to attend a patient with diabetes? . . . . . Page 60

4. How can you protect yourself against neuritis? . . . . . Page 62

5. What precautions should be taken to avoid boils and carbuncles? . . . . . Page 63

6. How will you treat cuts of the skin? . . . . . Page 63

7. Is it dangerous to use iodine, carbolic acid or other strong antiseptics? . . . . . Page 63

8. Why is it dangerous to put hot water bottles or other heating devices near the feet? . . . . . Page 67

CHAPTER VI

THE DIET

(For the Physician)

The decision about what treatment is best for the individual diabetic should be left to the physician. He is prepared by training and experience to determine how rigid a control of the diet is required, as well as to decide whether insulin ought to be used. In reaching his decisions he will be guided by the severity of the diabetes as well as by considerations such as the ability of the patient to follow instructions, the demands of occupation and the presence of complicating diseases of one kind or another.

Qualitative Management

Diabetes of adults which is proved to be mild may be treated according to the plan to be described without using insulin. The qualitative diet as outlined below includes no sugar or sweetened foods, and is restricted in foods known to be rich in carbohydrate.

Instruction in these cases may be limited to the technic of the Benedict qualitative test for sugar in the urine, but the patients must not neglect to perform this test once daily or to report to the physician when sugar

is found. Therefore, they must be informed about the aggravating effect on diabetes of infections and other complications.

Qualitative Diet.—1. Sugars and sweets of all kinds, such as candies, pastries, cakes, cookies, pies, puddings, ice creams, ices, custards, jellies and honey, are to be avoided entirely. Desserts of junket, custard or ice cream and ices, sweetened with saccharin, are permissible.

2. Cereal grains and their products, such as flour, rice, rice flour, corn and corn meal and potatoes, potato flour and foods made from these, such as breads of all kinds, biscuits, crackers, dumplings, spaghetti, macaroni and breakfast foods are to be used in amounts not to exceed two small servings daily from the group, except that in addition one slice of bread (1 ounce; 30 gm.) may be taken with each meal.

3. Meats of all kinds, including fowl and fish, are to be eaten, in an amount of about $3\frac{1}{3}$ ounces (100 gm.) daily. Cheese may be used as a substitute for meat.

4. Milk should be taken in an amount of one or two glasses a day.

5. Eggs should be taken in an amount of two a day.

6. Butter and cream should be taken in sufficient amount to compensate in calories for the restriction placed on sugar and starches. They may be added to vegetables in cooking, or the butter may be eaten with the bread allowance and the cream taken as a beverage or added to other beverages. Bacon, salad dressings made without sugar or flour, and salad oils are per-

missible in the amounts of these foods customarily consumed.

7. Vegetables of the 3 and 6 per cent groups are permissible as desired. (See tables of food values, pp. 152–157.) Sauces, other than pure butter sauce, are to be avoided. Fruits of the 5 and 10 per cent groups are permissible in moderation, one portion three times daily. Fruits canned or preserved with sugar are not allowed. Special brands of fruits canned without the addition of sugar may be used in place of fresh fruits. Dried fruits are not permissible.

8. Nuts are permissible in an amount equivalent to 10 half walnut meats daily.

9. Unsweetened coffee and tea or tea and coffee sweetened with saccharin are permissible in moderation. Drinks sweetened with sugar, such as ginger ale, coca cola and root beer, are to be avoided. Dry wines taken in moderation and whiskey in amounts not to exceed 1 ounce (30 c.c.) daily are permissible, beer and sweet beverages, cordials and cocktails are not.

Quantitative Management

More accurate control of intake of food is indicated when diabetes is moderately severe or severe, or when qualitative management proves inadequate, and in all cases of children. The food is weighed or carefully measured. It is essential to satisfactory treatment of diabetes to construct the diet properly and to teach the patient to plan his menus correctly.

An optimal diet for maintenance is one with which the diabetes can best be controlled without sacrifice of nutrition. Individualization of diet is desirable, but random prescribing of food and insulin usually confuses both patient and physician. Hence it is wise to have a plan that will fit the needs of the majority of patients and to deviate from this plan only when deviation is necessary. The following plan provides: (1) a palatable diet; (2) moderate restriction of carbohydrate, whereby, in most cases, greater stability of the level of blood sugar is secured; (3) a supply of fat foods, particularly those of dairy origin, and a supply of meat sufficient in amount to provide adequately for calories and proteins, and (4) a liberal supply of vitamins and salts.

The estimation of the calories is based on the fact that the total requirement for energy depends not on weight alone, as so generally is assumed, but also on height, sex, age and type of occupation. The basal metabolism for twenty-four hours is calculated and to this a definite percentage increment is made for occupation. The nomogram at the back of this book simplifies the procedure. Directions for its use are printed on its face.

Example.—A patient is a clerk, aged thirty years, 5 feet, 8 inches in height and weighing 140 pounds. The standard weight for such an individual is looked for in the average "Height, weight, age table" of the Medico-Actuarial Mortality Investigation (p. 158), and the ideal weight is estimated from this. If a patient is heavily

built, with broad shoulders and big bones, the ideal is assumed to be 10 per cent more than the standard weight given in the table. If he is small-chested and small-boned, it is assumed to be 10 per cent less. The ideal rather than the actual weight is taken, because then if a patient is overweight his diet will contain somewhat fewer calories than are required for maintenance and his weight gradually will fall to the ideal figure; whereas if he is underweight, more calories than required will be supplied and gradually he will gain to the ideal. In the case selected as an example, the patient being of average body build, the standard weight for men of his age and height may be regarded as ideal. The standard weight in his case, as given by the table, is 152 pounds. His actual weight is 140 pounds, 12 pounds less than this, and with a diet planned for 152 pounds he ought gradually to gain to that weight. Turning to the nomogram the point representing 152 pounds is located on scale I and the point representing 5 feet, 8 inches (68 inches) on scale II. The two points are connected with a straight edge (ruler) and the point where this edge crosses scale III is noted. It is at 1.8. This value, which is not of immediate concern, represents the surface area of the individual in square meters. Next the point on scale IV which corresponds to the patient's age and sex is located and connected by means of the straight edge with the point previously found on scale III. The edge now crosses scale V at a point representing 1,750 calories. This is the number of calories necessary to maintain the

basal metabolism of this patient for twenty-four hours. It also represents the food energy required by him at rest in bed.

To provide the extra calories for activity and work, the basal calories are increased by a definite percentage as follows:

For room rest add 10 to 20 per cent.
For very light work add 20 to 30 per cent.
For housework add 50 per cent.
For white-collar occupations and operators of machinery add 50 per cent.
For manual laborers and soldiers add 60 to 70 per cent.
For children add 50 to 70 per cent, depending on activity.

Having decided on the extra calories required for work (in the case taken as an example the patient is a clerk, and therefore the extra calories needed represent an increase of 50 per cent) this value is spotted on scale VI. The straight edge is then placed to join this point and the point previously found on scale V, whereby the total calories of the diet can be read where the edge crosses scale VII. In the example taken they are 2,600.

Subsequent gain or loss of weight will determine whether or not the extra calories allowed for work have been estimated correctly. It never is wise to permit the weight to rise above the ideal. If this occurs, the diet should be readjusted by omitting from it some of the butter or butter equivalents. If the patient loses weight or fails to gain, when gaining is desirable, the butter equivalent should be increased. The complaint of hunger

should not lead the physician to prescribe an increased allowance of food until he assures himself that the hunger is not the result of excessive doses of insulin. Less insulin may be the proper remedy rather than more food.

Reduction Diets

If a patient is grossly overweight, loss of weight should be accelerated by allowing him less calories than the basal requirement; for instance, basal calories less (minus) 20 or 30 per cent. In that case danger of deficiency of vitamins and calcium is avoided by prescribing dried brewers' yeast, halibut liver oil with viosterol and calcium phosphate.*

Diets for Children

It is highly important to emphasize to parents that the diet for a child must be readjusted not less frequently than once each year. The requirement increases with age and dwarfism may be the result of neglecting this.

The number of calories in the diet for diabetic children whose heights are less than the mean of those shown for corresponding ages, in the Baldwin Wood tables (pp. 160–161) are calculated (nomogram) using the mean height, rather than the actual height. Example:

* A customary prescription calls for 12 tablets of brewers' yeast, 4 with each meal; 1 capsule containing 3 drops of halibut liver oil after breakfast; and 1 rounded teaspoon of "reagent" tribasic calcium phosphate, to be taken stirred up in half a glass of water before retiring.

The range of heights for eight year old boys is given as from 42 to 56 inches. The mean height thus is 49 inches and if the patient is a boy eight years of age and measures less than this, 49 inches and not his actual height is used in the calculation. The weight used (nomogram) should be that which is given in the Baldwin Wood table for the mean height. In the case of boys eight years old this is 55 pounds.

The protein in the diet for undersized children is made from 20 to 40 per cent greater than that given in the standard diets. The additional protein is given in the form of extra meat, the calories of the addition being accounted for by omitting an iso-caloric amount of fat.

Diets for children who are not under average height are planned on the basis of actual heights and ideal weights for their heights.

Children in winter months should receive 2 to 3 teaspoons of cod liver oil or equivalent daily.

Standard Diets

After the total number of calories has been decided, the next step is the selection of amounts of food which will supply the calories demanded and provide adequate proteins, vitamins and salts. A chart on the back of the nomogram gives standard diets, in skeleton form. To complete them extra fat is added in the form of butter or butter equivalent, as is indicated by the tables of calories immediately below the skeleton diet. For the patient in the case taken as an example, the calories

were to be 2,600, and extra fat is called for in the form of 60 gm. of butter or equivalent of butter (p. 97). A part of this and some of the cream are used in cooking.

The diets listed on the chart are arranged differently for men and for women in order to meet the different food habits of the sexes. The diets for children are graduated according to age.

The skeleton of each of these diets is constructed of specified amounts of vegetable, fruit, cereal, bread, cream, milk, bacon, eggs and meat. Equivalents of any of these items may be substituted as desired (p. 87). No so-called diabetic foods are used. However, for canned fruits canning without added sugar is essential (p. 139).

Planning Menus.—The next step is the planning of the menus for the day. This the patient must learn. The three principal meals usually are made as much alike as possible in their content of carbohydrate, protein and fat, but some freedom is permitted in many cases.

The patient in the example was to receive 2,600 calories. The standard diet on the chart on the back of the nomogram allowed him vegetables (3 per cent*), 400 gm.; fruit (10 per cent*), 300 gm.; vegetables or fruits (20 per cent*), 150 gm.; cereal, 20 gm.; bread, 120 gm.; cream (20 per cent†), 300 gm.; milk, 400 gm.; bacon, 10 gm.; eggs, 2; meat, 125 gm.; butter or equivalent, 60 gm. These foods may be arranged as shown in the accompanying diet order and the following menus:

* Carbohydrate content, per cent.

† Fat content, per cent.

QUANTITATIVE DIET ORDER

Name..... Date.....

Carbohydrate 187 Protein 90 Fat 166 Calories 2602

Food.	Breakfast, gm.	Dinner, gm.	Supper, gm.	Total, gm.	Gm. Carbohydrate.	Gm. Protein.	Gm. Fat.
Vegetables, 3 per cent		200	200	400	12	4	0
Vegetables, 6 per cent				100	0	1	0
Fruits, 5 per cent				100	5	1	0
Fruits, 10 per cent	100	100	100	300	30	3	
Vegetables or fruit, 15 per cent				100	15	1	0
Vegetables or fruit, 20 per cent		100	50	150	30	3	
Cereal (dry)	20			100 20	80 16	10 2	5 2
Bread	40	40	40	100 120	53 64	9 11	2 2
Cream, 20 per cent	100	100	100	100 300	5 15	3 9	20 60
Cream, 40 per cent				100	3	2	40
Milk		100	200* 100	100 400	5 20	3 12	4 16
Bacon	10			100 10	0	25 3	50 5
Eggs	2†			Each 2†	0	6 12	6 12
Meat (lean)		75	50	100 125	0	25 31	15 19
Butter	10	15	15	100 40	0	0	85 34
Mayonnaise with salad oil		10	10	100 20	0	0	85 17
FOOD VALUE OF THE DIET			Total Gm..		187	90	166
Calories from carbohydrates			(4 calories for each gm.)		748		
Calories from protein			(4 calories for each gm.)		360		
Calories from fat			(9 calories for each gm.)		1494		
			Total calories		2602		

*At bedtime
† Number of eggs.

Sample Menus

Standard Diet, 2,600 calories

Breakfast	Gm.	Approximate measure.
Fruit, 10 per cent, orange juice	100	½ glass
Cereal, oatmeal, dry	20	1 serving
Bread	40	2 thin slices
Cream (20 per cent butterfat)	100	½ glass
Bacon	10	2 strips
Eggs		2
Butter	10	1 square

Dinner	Gm.	Approximate measure.
Vegetable, 3 per cent, cabbage and green pepper salad	100	½ cup
Vegetable, 3 per cent, tomato	100	½ cup
Fruit, 10 per cent, peaches	100	½ cup
Vegetable, 20 per cent, potato	100	1 medium
Bread	40	2 thin slices
Cream (20 per cent butterfat)	100	½ glass
Milk	100	½ glass
Meat, roast beef	75	1 large serving
Butter	15	1½ squares
Mayonnaise	10	2 teaspoons

Supper	Gm.	Approximate measure.
Vegetable, 3 per cent, lettuce	50	¼ small head
Vegetable, 3 per cent, asparagus	150	1 large serving
Fruit, 10 per cent, strawberries	100	½ cup
Vegetable, 20 per cent, corn	50	¼ cup

	Gm.	Approximate measure.
Bread	40	2 thin slices
Cream (20 per cent butterfat)	100	½ glass
Milk	100	½ glass
Meat, cold chicken	50	1 serving
Butter	15	1½ squares
Mayonnaise	10	2 teaspoons

Bedtime

	Gm.	Approximate measure.
Milk	200	1 glass

Note: One cup of coffee or tea without sugar may be used with each meal if desired.

Substitutions.—Some change in the menus from day to day is imperative. Monotony in food is intolerable. Monotonous diets are avoided by making suitable substitutions for the foods in the standard diet, as indicated in Chapter VII.

Questions

This chapter was written for physicians; nevertheless the patient should be able to answer the following questions:

1. If you gain more weight than is desirable on the diet prescribed for you what will you do? Page 79

2. If you are losing weight what should be done? Page 79

3. What may account for excessive hunger other than too little food? Page 79

CHAPTER VII

SUBSTITUTIONS FOR FOODS IN THE STANDARD DIETS; RECIPES

In the preparation of meals for the patient in the home, time can be saved by weighing the day's allowance of butter, milk, cream, eggs, bread and fresh fruit before the first meal. Weighed portions of cooked vegetables, cooked cereals and meats can then be removed from the supply prepared for the family before any trimmings have been added, and these portions can be prepared for the patient as desired, with the butter, milk, cream, and so forth, previously set aside. Enriched white or Graham (100 per cent whole wheat) breads are recommended because of their greater content of vitamins.

The standard diabetic diets, described in Chapter VI, are constructed of given amounts of a limited number of foods: vegetable, fruit, bread, cream, milk, eggs, meat and butter. Monotony is avoided by making suitable substitutions for any or all of these items according to the following directions, and by making use of the recipes provided herewith.

Substitutions for Vegetables and Fruits

In place of 100 gm. ($\frac{1}{2}$ cup) of 3 per cent vegetable one of the following may be used:

	Gm.	Approximate measure.
1. Vegetable, 6 per cent*	50	$\frac{1}{4}$ cup
2. Fruit, 5 per cent	60	$\frac{1}{4}$ cup
3. Fruit, 10 per cent	30	$\frac{1}{8}$ cup
4. Vegetable or fruit, 15 per cent	20	$\frac{1}{8}$ cup, scant
5. Vegetable or fruit, 20 per cent	15	1 tablespoon
6. Any one of these salads		

Perfection Salad:

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Tomato juice	50	$\frac{1}{4}$ cup
Celery, cubed	15	$\frac{1}{8}$ cup
Cabbage, chopped	15	$\frac{1}{4}$ cup
Vinegar		$\frac{1}{2}$ teaspoon
Gelatin		$\frac{1}{2}$ teaspoon
Stuffed olives		3 slices

Salt and pepper to taste.

Soak the gelatin in one tablespoon of cold water. Add the boiling tomato juice and allow to cool. When it begins to thicken add the vegetables and chill.

* Per cent here refers to content of carbohydrate. For classification of vegetables according to their percentage content of carbohydrate see table 1, Chapter IX.

Fruit Salad:

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Fruit, 5 per cent (any kind)	50	¼ cup

Pickled Beet Salad:

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Pickled beets	40	¼ cup (scant)

Note: Sugar must not be used in pickling beets.

Raw Carrot Salad:

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Celery, cubed	20	⅛ cup
Raw carrot, grated	30	⅙ cup

Pineapple and Carrot Salad:

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Pineapple, shredded	15	
Carrot, grated	20	⅛ cup (scant)
Gelatin		½ teaspoon
Water, cold		2 tablespoons
Water, boiling		⅓ cup

Shredded Lettuce and Orange Salad:

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Orange, cubed	25	⅛ cup

In place of 100 gm. ($\frac{1}{2}$ cup) of 6 per cent vegetable, one of the following may be used:

	Gm.	Approximate measure.
1. Vegetable, 3 per cent	200	1 cup
2. Fruit, 5 per cent	120	$\frac{1}{2}$ cup
3. Fruit, 10 per cent	60	$\frac{1}{4}$ cup
4. Vegetable or fruit, 15 per cent	40	$\frac{1}{4}$ cup (scant)
5. Vegetable or fruit, 20 per cent	30	$\frac{1}{8}$ cup

In place of 100 gm. ($\frac{1}{2}$ cup) of 5 per cent fruit, one of the following may be used:

	Gm.	Approximate measure.
1. Vegetable, 3 per cent	165	$\frac{2}{3}$ cup
2. Vegetable, 6 per cent	85	$\frac{1}{3}$ cup
3. Fruit, 10 per cent	50	$\frac{1}{4}$ cup
4. Vegetable or fruit, 15 per cent	35	$\frac{1}{6}$ cup
5. Vegetable or fruit, 20 per cent	25	$\frac{1}{8}$ cup
6. Soda crackers	7	1 double
7. Bread	10	$\frac{1}{2}$ thin slice

In place of 100 gm. ($\frac{1}{2}$ cup) of 10 per cent fruit one of the following may be used:

	Gm.	Approximate measure.
1. Vegetable, 3 per cent	335	$1\frac{2}{3}$ cups
2. Vegetable, 6 per cent	165	$\frac{2}{3}$ cup
3. Fruit, 5 per cent	200	1 cup
4. Vegetable or fruit, 15 per cent	65	$\frac{1}{3}$ cup
5. Vegetable or fruit, 20 per cent	50	$\frac{1}{4}$ cup
6. Cereal, dry	12	1 very small serving
7. Soda crackers	14	2
8. Bread	20	1 thin slice

In place of 100 gm. either of 20 per cent fruit or 20 per cent vegetable one of the following may be used:

	Gm.	Approximate measure.
1. Fruit, 10 per cent	200	1 cup
2. Vegetable or fruit, 15 per cent	135	$\frac{5}{8}$ cup
3. Soda crackers	28	4 double
4. Flour	26	2 tablespoons
5. Bread	40	2 thin slices
6. Cereal, dry	25	1 serving

Cooked Fruits.—When a serving of fruit is to be cooked or baked, weigh it raw, add water and cook. The juice as well as the fruit should be served.

Dried Fruits.—Dried fruits contain large and inconstant amounts of sugar and therefore should be avoided.

Substitutions for Bread

In place of 20 gm. (1 thin slice) of bread one of the following may be used:

	Gm.	Approximate measure.
1. Vegetable, 3 per cent	335	$1\frac{3}{4}$ cups
2. Vegetable, 6 per cent	165	$\frac{2}{3}$ cup
3. Fruit, 5 per cent	200	1 cup +
4. Fruit, 10 per cent	100	$\frac{1}{2}$ cup
5. Vegetable or fruit, 15 per cent	65	$\frac{1}{3}$ cup
6. Vegetable or fruit, 20 per cent	50	$\frac{1}{4}$ cup
7. Cereal, dry	13	1 very small serving
8. Soda crackers	14	2 double
9. Flour	14	3 teaspoons

As all dry cereals have approximately the same composition, you may use cornflakes, puffed rice, shredded wheat, cream of wheat and oatmeal according to your taste. Oatmeal is recommended because of its content of the vitamin B complex. A cooked cereal takes up a large amount of water. If cereal is to be taken from that cooked for the whole family, prepare it according to the following directions and weigh out seven times the dry weight. Add 120 gm. of dry cereal to 1 quart of boiling water. Bring to the boiling point and cook in top part of double boiler for the required length of time. Now 140 gm. of cooked cereal equals 20 gm. of dry cereal.

Substitutions for Cream

In place of 100 gm. ($\frac{1}{2}$ glass) of 20 per cent cream* one of the following combinations may be used:

		Gm.	Approximate measure.
1.	Milk	100	$\frac{1}{2}$ glass
	Butter	20	2 squares
2.	Fruit, 5 per cent	100	$\frac{1}{2}$ cup
	Meat	10	$\frac{1}{4}$ of average serving
	Butter	20	2 squares

In place of 230 gm. ($\frac{1}{2}$ pint) of 20 per cent cream one of the following combinations may be used:

		Gm.	Approximate measure.
1.	Egg		1
	Bread	20	1 thin slice
	Butter	45	$4\frac{1}{2}$ squares

* Per cent here refers to content of butterfat.

		Gm.	Approximate measure.
2.	Egg		1
	Orange	120	1 medium-sized
	Butter	45	4½ squares
3.	Milk	230	½ pint
	Butter	45	4½ squares
4.	Cream, 40 per cent	100	½ cup
	Egg		1
	Orange	100	1 medium-sized

If the butterfat content of the cream which is bought is 30 per cent and this is to be used in place of 20 per cent cream, the following directions apply:

1. In place of 230 gm. (½ pint) of 20 per cent cream, 230 gm. of 30 per cent cream (½ pint) may be used if 100 gm. of 3 per cent vegetable is added to the diet and 25 gm. of butter omitted.

2. In place of 230 gm. (½ pint) of 20 per cent cream, 150 gm. of 30 per cent cream may be used if 100 gm. of milk is added to the diet.

In place of 230 gm. (½ pint) of 40 per cent cream (whipping cream) one of the following combinations may be used:

		Gm.	Approximate measure.
1.	Milk	150	¾ glass
	Butter	100	10 squares
2.	Cream, 20 per cent	150	¾ glass
	Butter	70	7 squares
3.	Egg		1
	Orange	70	¾ medium-sized
	Butter	100	10 squares

If the cream which is bought contains 30 per cent butterfat, 230 gm. ($\frac{1}{2}$ pint) of it may be used in place of 230 gm. of 40 per cent cream, if 25 gm. of butter or equivalent is added to the diet and 100 gm. of 3 per cent vegetable or equivalent is omitted.

In place of 100 gm. of 40 per cent cream 45 gm. of butter or equivalent may be used if 100 gm. of 3 per cent vegetable or equivalent is added.

Substitutions for Milk

Milk is a valuable food which is rich in minerals and vitamins but it contains a considerable quantity of sugar and must be used with caution. The total daily allowance of milk and cream in a child's diet should be approximately 1 quart, and for an adult should total approximately 1 pint.

In place of 200 gm. of whole milk (1 glass) you may use one of the following combinations:

		Gm.	Approximate measure.
1.	Orange	100	1 medium-sized
	Egg		1 (or equivalent)
2.	Bread	20	1 thin slice
	Egg		1 (or equivalent)
3.	Cereal, dry	13	1 small serving
	Egg		1 (or equivalent)
4.	Soda crackers	14	2 double
	Egg		1 (or equivalent)
5.	Potato	50	$\frac{1}{2}$ medium-sized
	Egg		1 (or equivalent)

In place of 200 gm. of skimmed milk (1 glass) you may use one of the following:

		Gm.	Approximate measure.
1.	Orange	100	1 medium-sized
	Meat, lean	25	½ average serving
2.	Bread	20	1 thin slice
	Meat, lean	25	½ average serving
3.	Cereal, dry	13	1 small serving
	Meat, lean	25	½ average serving
4.	Soda crackers	14	2 double
	Meat, lean	25	½ average serving
5.	Potato	50	½ medium-sized
	Meat, lean	25	½ average serving
6.	Buttermilk	200	1 glass

Bacon

Bacon should be weighed after cooking. The fat which separates on cooking may be used in place of butter.

In place of 25 gm. of cooked bacon (2 or 3 strips) you may use one egg and 10 gm. (1 square) of butter.

Eggs

Eggs need not be weighed. An average-sized egg contains approximately 6 gm. of protein and 6 gm. of fat.

In place of one egg 25 gm. of meat or equivalent may be used.

Substitutions for Meat

Meat or proper substitutes must be eaten in amounts prescribed in your diet order, because the protein which is contained forms a considerable amount of sugar in the body. Meat should be weighed after it is cooked. Meats, such as beef, mutton, lamb or veal, are usually used. Fat beef or pork may be used also except on diets designed to reduce weight. Meats prepared for the rest of the family can be used if they are plain and free from flour, bread crumbs, thickened sauces or gravies.

In place of 50 gm. of meat, such as beef, mutton, lamb, fowl or veal, you may use one of the following:

	Gm.	Approximate measure.
1. Eggs		2
2. Beef's tongue	60	1 serving
3. Corned beef	70	1 large serving
4. Ham	60	1 serving
5. Liver	50	1 serving
and bacon	10	2 strips
6. Dried beef	40	1 serving
and butter	10	1 square
7. Sweetbreads	60	1 serving
8. Cheese, American	40	2 cubic inches
9. Sardines in oil	50	1 serving

Salmon, tuna fish and mackerel have the same fuel value as meat, but other fish contain less protein and fat and therefore are lower in fuel value. If fish such as halibut, white fish, lake trout and perch, or crab and lobster are to be used:

—take 35 gm. of fish and 5 gm. of butter in place of 25 gm. of meat.

—take 70 gm. of fish and 10 gm. of butter in place of 50 gm. of meat.

—take 105 gm. of fish and 15 gm. of butter in place of 75 gm. of meat.

Substitutions for Butter

The quantity of butter prescribed is probably greater than the patient has been accustomed to. What is not eaten with the bread may be added to the vegetables or to a broth. Time may be saved in weighing meals if the entire daily allowance of butter is weighed before breakfast. The butter is then used as needed for each meal. A square of butter as usually served in restaurants weighs approximately 10 gm. Oleomargarine, butterine, nut margarine, bacon fat, and salad oil contain about the same amount of fat as butter and may be substituted for it. Mayonnaise, French and other salad dressings on the market usually contain variable amounts of sugar or other carbohydrate and therefore are unsuitable for the diet. Mayonnaise, French and cooked salad dressing, when prepared according to the following recipes, may be substituted for butter.

Mayonnaise:

Mayonnaise made with salad oil by any standard recipe contains approximately the same amount of fat as butter; namely, 85 per cent.

	Gm.	Approximate measure.
Salad oil	250	1¼ cups
Vinegar		1½ tablespoons
Egg yolks		1 or 2
Paprika (if desired)		⅛ teaspoon
Salt		¼ teaspoon

Have all ingredients cold. Beat egg thoroughly. Add 2 tablespoons of oil slowly, drop by drop, beating constantly. Then add oil, 1 teaspoon at a time until the mixture thickens. When very thick add ½ tablespoon of vinegar. Add the remaining oil more rapidly, beating all the while. Finally add the salt, paprika and the tablespoon of vinegar. Place the mayonnaise in a jar and keep in a cool place.

French Dressing:

	Gm.	Approximate measure.
Salad oil	200	1 cup
Vinegar	100	½ cup
Salt		¼ teaspoon
Paprika (if desired)		¼ teaspoon
One may add:		
Catsup		2 tablespoons
Saccharin		½ grain

French dressing and mayonnaise have the same food value. One teaspoon is equal to ½ square of butter.

Cooked Salad Dressing:

	Gm.	Approximate measure
Egg yolks		4
Butter	45	4½ squares or 3 level tablespoons
Vinegar		5 tablespoons
Water		5 tablespoons
Mustard		1 teaspoon

Salt and pepper to taste.

One level tablespoon of cooked salad dressing is equal to 5 gm. of butter (½ square).

Other Substitutions for Butter:

1. In place of 30 gm. of butter 130 gm. of 20 per cent cream may be used if 10 gm. of bread is omitted from the diet.

2. In place of 50 gm. of butter 100 gm. of 40 per cent cream may be used if 100 gm. of 3 per cent vegetable or equivalent is omitted from the diet.

Other Substitutions: Recipes

Broth and Soup

Broth made from beef, veal, mutton or chicken may be used in reasonable amounts at mealtime or when a hot drink is desired between meals. Bouillon cubes may be used without deducting from other food allowed. A part of the vegetable allowance, cream and butter may be included in a soup.

1. *Noodle Soup:*

	Gm.	Approximate measure.
Broth, clear		1 cup
Egg		1
Butter	10	1 square

Beat the egg until stiff and bake in 10 gm. of butter as an omelet; let cool, cut into strips as noodles. Heat the broth and add the noodles. Season with salt and pepper.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Egg		1
Butter	10	1 square

2. *Tomato Soup:*

	Gm.	Approximate measure.
Broth, clear		1 cup
Tomatoes, cooked	80	½ cup (scant)
Onions, uncooked	10	2 teaspoons

To one cup of clear broth add 80 gm. of tomatoes and 10 gm. of onions cut fine. Cook for fifteen minutes. Season with salt and pepper.

When this soup is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup

3. *Vegetable Soup:*

	Gm.	Approximate measure.
Broth, clear		1 or 2 cups
Vegetable, 3 per cent, uncooked	50	¼ cup
Vegetable, 6 per cent, uncooked	25	⅛ cup

To the clear broth add 50 gm. of tomato, celery, and cabbage, and 25 gm. of onions and carrots. Cook until the vegetables are tender. Season with salt and pepper.

When this soup is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup

4. *Cream Soup:*

	Gm.	Approximate measure.
Cream	150	¾ cup
Vegetable, 3 per cent purée	30	⅛ cup

Add vegetable purée to hot cream. Season with salt and pepper.

When this soup is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	30	⅛ cup
Cream	150	¾ cup

5. *Oyster Stew:*

	Gm.	Approximate measure.
Milk	200	1 glass
Oysters	50	3 or 4
Butter	5	½ square

Season with salt and pepper.

When this stew is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	65	⅓ cup
Milk	200	1 glass
Meat	12	½ serving

Hot Breads

1. *Popovers:*	Gm.	Approximate measure
Flour	20	3½ tablespoons (scant)
Eggs		2
Whipping cream	60	4 tablespoons
Salt		⅛ teaspoon

Beat the eggs thoroughly. Add gradually, while beating, the flour with which the salt has been sifted. Add the cream slowly and beat until thoroughly mixed. Pour the mixture into hot buttered muffin tins. This recipe makes six popovers. Bake in a very hot oven for five to eight minutes; then reduce the oven temperature, and continue the baking until the popovers are dry and crisp.

When one popover is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup
Butter	5	½ square

2. *Plain Muffins:*	Gm.	Approximate measure.
Egg		1
Milk	15	1 tablespoon
Butter	5	½ square
Flour	25	4½ tablespoons (scant)
Baking powder		½ teaspoon
Salt		¼ teaspoon

Sift the dry ingredients. Beat egg, add milk and melted butter. Add other ingredients and beat until

smooth. Pour into greased muffin tins and bake in a moderate oven fifteen or twenty minutes.

This makes two muffins. When one muffin is used, omit from the meal:

	Gm.	Approximate measure.
Bread	20	1 thin slice
Meat	10	

3. *Blueberry Muffins:*

To the plain muffin recipe add 15 gm. of fresh blueberries.

When one muffin is used, omit from the meal:

	Gm.	Approximate measure.
Bread	20	1 thin slice
Meat	10	
Fruit, 5 per cent	20	1 rounding tablespoon

4. *Baking Powder Biscuits:*

	Gm.	Approximate measure.
Flour	40	7 tablespoons (scant)
Butter	15	1 tablespoon
Baking powder		$\frac{3}{4}$ teaspoon
Milk	40	3 tablespoons (scant)
Salt		$\frac{1}{3}$ teaspoon

Sift flour, baking powder and salt. Cut in the butter. Add the milk gradually. Knead just enough to make the dough smooth and shape into biscuits. Bake in a hot oven.

This makes two biscuits. When one biscuit is used, omit from the meal:

	Gm.	Approximate measure.
Bread	30	1 slice
Butter	10	1 square

Note: This may be used as shortcake by cutting in half and placing the fruit allowance between and also on top of the biscuit. Whipped cream may be used as garnish if the diet permits.

5. *Corn Bread:*

	Gm.	Approximate measure.
Corn meal	150	¾ cup
Flour	100	1 cup
Baking powder	13	3 teaspoons
Milk	200	1 cup
Egg		1
Salt		1 teaspoon

Mix dry ingredients. Add slightly beaten egg, then milk. Pour into buttered pan. Bake in hot oven. For one twelfth of this recipe omit the following from your meal:

	Gm.	Approximate measure.
Bread	30	1 slice
or		
Bread	20	1 thin slice
Fruit, 10 per cent	50	¼ cup

Protein Dishes

1. *Roast Pork and Apples:*

	Gm.	Approximate measure.
Roast pork, lean, cooked	50	1 average serving
Apple	50	½ medium-sized
Butter	5	½ square

Salt and pepper to taste.

Put 50 gm. of roast pork (cooked) into a small dish. Cover with 50 gm. of apple slices and 5 gm. of butter. Add a small amount of water; cover and bake in a moderate oven about twenty minutes.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	75	⅓ cup
Butter	5	½ square
Meat	50	1 average serving

2. *Beef Stew:*

	Gm.	Approximate measure.
Meat, uncooked	60	1 average serving
Vegetables, 3 per cent, uncooked	100	½ cup
Vegetables, 6 per cent, uncooked	50	¼ cup

To the uncooked meat add 2½ cups of boiling water and ¼ teaspoon of salt, and let simmer until tender. Remove meat from the water and add 100 gm. of cabbage, 25 gm. each of carrots and onions. Boil until the vegetables are tender. Add meat, heat again, and season with salt and pepper.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	200	1 cup
Meat, cooked	50	1 average serving

3. *New England Boiled Dinner:*

	Gm.	Approximate measure.
Meat, uncooked	60	1 average serving
Vegetables, 3 per cent, uncooked	100	½ cup
Vegetables, 6 per cent, uncooked	50	¼ cup
Vegetables, 15 per cent, uncooked	20	⅛ cup (scant)

To 60 gm. of corned beef add 3 cups of boiling water; simmer until meat is tender. Remove meat, add 100 gm. of cabbage, 50 gm. of carrots, and 15 gm. of parsnips. Boil until tender. Add meat, heat again, and season with salt and pepper.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup
Fruit, 10 per cent	60	¼ cup
Meat	50	1 average serving

4. *Creamed Chicken with Asparagus:*

	Gm.	Approximate measure.
Chicken, cooked	50	1 medium serving
Asparagus, cooked	100	½ cup
Cream	50	¼ cup

Cut the chicken into small pieces. Add the asparagus and to both add the heated cream. Heat again and

season with salt and pepper. Mushrooms may be added in place of part of the asparagus.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup
Meat, lean	50	1 average serving
Cream	50	¼ cup

5. *Chicken Supreme:*

	Gm.	Approximate measure.
Chicken, cooked	25	1 small serving
Egg		1
Milk	50	¼ cup
Celery	25	⅛ cup
Butter	5	½ square

Beat the egg slightly, add the chicken and celery (cut in small pieces), milk, salt and pepper. Put in a buttered mold, set in a pan of hot water and bake in a moderate oven until firm.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup
Meat, lean	50	1 average serving
Butter	5	½ square

6. *Baked Fish, Spanish:*

	Gm.	Approximate measure.
Fish, uncooked	45	1 small serving
Water		⅓ cup
Tomatoes, cooked	80	½ cup (scant)
Onions, uncooked	10	2 teaspoons
Bacon, raw	10	1 strip

Place the fish in a small baking dish, add the water, tomato, onion, and the bacon which has been cut into small pieces. Cover and bake in a moderate oven for twenty minutes. Season with salt and pepper.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	½ average serving
Vegetable, 3 per cent	100	½ cup
Butter	5	½ square

Note: If desired, 5 gm. of butter may be used instead of the 10 gm. of raw bacon.

7. *Baked Egg and Tomato:*

	Gm.	Approximate measure.
Tomato, uncooked	100	1 small tomato
Egg		1
Butter	10	1 square

Scoop out the center of a raw tomato that weighs 100 gm. Drop the egg into the tomato, cover with the scooped out pulp. Add the butter, season with salt and pepper and bake for about fifteen minutes in a moderate oven.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure
Meat	25	½ average serving
Vegetable, 3 per cent	100	½ cup
Butter	10	1 square

8. *Poached Egg and Tomato:*

	Gm.	Approximate measure.
Tomato, cooked	100	½ cup
Egg		1

Put the cooked tomato in a small pan and heat. When it is boiling, drop the egg into the center. Remove the pan to a cooler part of the stove, cover and let stand until the egg white is firm and a film forms over the yolk. Season with salt and pepper and serve.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup
Meat	25	½ average serving

9. *Egg with Tomato Sauce:*

	Gm.	Approximate measure.
Egg, hard cooked		1
American cheese	20	1 inch cube
Tomato, cooked	100	½ cup
Butter	5	½ square

Mash egg yolk and mix with salt and pepper. Chop egg white fine and put into the bottom of a buttered baking dish. Then add the yolk. Cover with the cooked tomato and sprinkle the cheese on top. Bake long enough to melt the cheese.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Meat	50	1 average serving
Vegetable, 3 per cent	100	½ cup
Butter	5	½ square

10. *Baked Egg with Cheese:*

	Gm.	Approximate measure.
Egg		1
Cream	15	1 tablespoon
American cheese	20	1 inch cube
Butter	5	½ square
Salt and pepper to taste.		

Butter a small baking dish with the 5 gm. of butter. Add the egg, cream, and the finely grated cheese. Bake in a moderate oven until the cheese is melted.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Meat	50	1 average serving
Butter	5	½ square
Cream (kind allowed on diet)	15	1 tablespoon

11. *Deviled Egg:*

	Gm.	Approximate measure
Egg, hard cooked		1
Vinegar		1 teaspoon
Mayonnaise	5	1 teaspoon
Mustard		a few grains
Paprika		a few grains
Salt and pepper		a few grains

Cut egg in half (lengthwise). Remove yolk and mix it thoroughly with seasonings and mayonnaise. Refill the white.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	½ average serving
Butter or mayonnaise	5	1 teaspoon

12. *Cottage Cheese Omelet:*

	Gm.	Approximate measure.
Egg		1
Cottage cheese	35	1 heaping tablespoon
Butter	5	1 teaspoon

Add 2 teaspoons of water to the egg yolk and beat until thick and lemon colored. Then add the cheese, salt and pepper, and fold into the stiffly beaten egg white. Cook as an ordinary omelet.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Meat	50	1 average serving
Vegetable, 3 per cent	50	¼ cup

13. *Vegetable Omelet:*

	Gm.	Approximate measure.
Egg		1
Vegetable, 3 per cent	50	¼ cup
Water		1 tablespoon

Add water, salt and pepper to the egg yolk and beat until thick and lemon colored. Then add the vegetable

(either asparagus or tomato). Fold in the stiffly beaten egg white. Bake as an ordinary omelet in part of the butter allowed on the diet.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure
Meat	25	½ average serving
Vegetable, 3 per cent	50	¼ cup

Vegetable Dishes

1. *Baked Cauliflower with Cheese:*

	Gm.	Approximate measure.
Cauliflower, cooked	100	½ cup
Tomato, cooked	100	½ cup
American cheese	20	1 inch cube
Butter	10	1 square

Season with salt and pepper.

Butter a small baking dish with the 10 gm. of butter. Add the cauliflower and tomato. Sprinkle the grated cheese on the top. Bake in a moderate oven for twenty minutes. Cabbage may be substituted for the cauliflower.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	200	1 cup
Meat	25	½ average serving
Butter	10	1 square

2. *Baked Onions:*

	Gm.	Approximate measure.
Onions, uncooked	85	1 medium-sized
Ground meat, lean, uncooked	15	1 tablespoon
Milk	25	2 tablespoons (scant)
Butter	5	½ square

Parboil the onion and scrape out the inside leaving only the shell. Weigh shell and scrapings to 85 gm. Add meat, butter, salt and pepper. Return to the shell. Put in a casserole with milk, and bake until tender.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	½ average serving
Vegetable, 3 per cent	200	1 cup

3. *Fried Tomatoes with Bacon:*

	Gm.	Approximate measure.
Bacon, cooked	25	3 to 4 strips
Tomato, uncooked	100	½ cup

Fry the sliced tomato until tender in part of the butter allowance. Serve hot with the crisp bacon, after seasoning with salt and pepper.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	½ average serving
Butter	10	1 square
Vegetable, 3 per cent	100	½ cup

4. *Squash Soufflé:*

	Gm.	Approximate measure.
Squash, cooked	75	⅜ cup
Milk	30	2 tablespoons
Egg		1
Butter	5	½ square
Salt and pepper		a few grains

Stir milk slowly into squash, add beaten egg yolk, salt and pepper. Fold in beaten egg white. Place in small, buttered baking dish, set in pan of hot water and bake in a moderate oven until firm.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	200	1 cup
Meat	25	½ average serving
Butter	5	½ square

5. *Cabbage au Gratin:*

	Gm.	Approximate measure.
Cabbage, cooked	65	⅓ cup
Meat (cooked and minced)	15	
Whipping cream, sour	30	2 tablespoons
Egg		1
American cheese, grated	10	
Salt and pepper		a few grains

Chop cabbage, add meat, cream, beaten egg, salt and pepper. Place in a buttered baking dish and sprinkle grated cheese on top. Bake in a moderate oven until firm.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent.	100	½ cup
Meat	50	1 average serving
Butter	15	1½ squares

6. *Tomato Sauce:*

	Gm.	Approximate measure.
Tomatoes, cooked	100	½ cup
Butter	10	1 square
Flour	2	½ teaspoon

Melt butter, add flour and stir in tomatoes (strained). Cook for several minutes, stirring all the time and add salt and paprika. Serve with meat dishes.

When this recipe is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent.	150	¾ cup
Butter	10	1 square

Salads

1. *Cabbage and Nut Salad:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Walnuts	10	4 halves
Cabbage, shredded	30	½ cup

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent.	100	½ cup
Butter	5	½ square

2. *Raw Carrot and Nut Salad:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Raw carrot, grated	20	$\frac{1}{8}$ cup
Walnuts	10	4 halves

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	$\frac{1}{2}$ cup
Butter	5	$\frac{1}{2}$ square

3. *Cottage Cheese Salad:*

	Gm.	Approximate measure.
Lettuce	50	$\frac{1}{4}$ small head
Cottage cheese	35	1 heaping tablespoon
Mayonnaise	5	1 teaspoon

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	$\frac{1}{2}$ average serving
Vegetable, 3 per cent	100	$\frac{1}{2}$ cup

4. *Pear and Nut Salad:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Pear	60	$\frac{1}{3}$ pear
Walnuts	10	4 halves

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	$\frac{1}{2}$ cup
Butter	5	$\frac{1}{2}$ square

5. Pear and Red Cherry Salad:

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Pear	50	¼ pear

One red cherry (canned without sugar) for garnish.

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent.	50	¼ cup
Vegetable, 3 per cent.	100	½ cup

6. Tomato and Cottage Cheese Salad:

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Tomato	30	½ medium-sized
Cottage cheese	35	1 heaping tablespoon
Mayonnaise	5	1 level teaspoon

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent.	100	½ cup
Meat	25	½ average serving

7. Wilted Lettuce:

	Gm.	Approximate measure.
Lettuce, shredded	50	¼ small head
Bacon, cut fine	25	3 to 4 strips
Vinegar		2 teaspoons
Bacon fat	5	1 teaspoon

Cut crisp bacon into small pieces and add to heated bacon fat. Then add the vinegar, salt and pepper—

cooking for a minute. Then pour over lettuce and serve at once.

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	50	¼ cup
Meat	25	½ average serving
Butter	15	1½ squares

8. *Tomato Jelly Salad:*

	Gm.	Approximate measure.
Tomato, cooked	80	½ cup (scant)
Onions, uncooked	10	2 teaspoons
Allspice		⅛ teaspoon
Cloves		⅛ teaspoon
Gelatin		1 teaspoon
Salt and pepper		a few grains

Cook the tomato, onions and spices for five minutes. Strain through a cheesecloth. Soak the gelatin in ¼ cup of cold water, and then add the hot tomato juice. Chill and serve.

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup

9. *Pea, Pickle and Peanut:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Pickle, dill, cubed	25	⅛ cup
Peas	25	⅛ cup
Peanuts	20	20

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	½ average serving
Vegetable, 3 per cent	200	1 cup

10. *Tomato Stuffed with Shrimp and Celery:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Tomato	150	1 large
Celery, cubed	30	¼ cup
Shrimp	50	7 to 8
Mayonnaise	10	2 level teaspoons

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	200	1 cup
Meat	50	1 average serving

11. *Chicken Salad:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Chicken, cubed	50	2 heaping tablespoons
Celery, cubed	20	¼ cup
Peas	15	1 tablespoon

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	½ cup
Meat	50	1 average serving

12. *Salmon Salad:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Salmon	50	2 heaping tablespoons
Pickle, dill, cubed	50	$\frac{1}{4}$ cup
Celery, cubed	30	$\frac{1}{4}$ cup

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	100	$\frac{1}{2}$ cup
Meat	50	1 average serving

13. *Egg and Cucumber Salad:*

	Gm.	Approximate measure.
Egg, hard cooked		1
Cucumber, uncooked	30	$\frac{1}{6}$ cup
Lettuce (or watercress)	20	2 or 3 leaves

Cut egg and cucumber in slices, arrange in a circle, alternating each and having the slices overlap each other. Fill the center with shredded lettuce or watercress.

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	$\frac{1}{2}$ average serving
Vegetable, 3 per cent	50	$\frac{1}{4}$ cup

14. *Waldorf Salad:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Celery, cubed	30	$\frac{1}{4}$ cup
Apple	70	$\frac{2}{3}$ medium-sized
Walnuts	10	4 halves

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup
Vegetable, 3 per cent	100	½ cup
Butter	5	½ square

15. *Pineapple and Cheese Salad:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Pineapple (canned without sugar)	25	½ slice
Cheese	20	1 cubic inch (may be grated)

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	½ average serving
Vegetable, 3 per cent	100	½ cup

16. *Cabbage and Apple Salad:*

	Gm.	Approximate measure.
Lettuce	20	2 or 3 leaves
Cabbage, shredded	30	½ cup
Apple, cut fine	30	¼ medium-sized

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	200	1 cup

17. *United Nations Salad:*

	Gm.	Approximate measure.
Lettuce, shredded	20	2 or 3 leaves
Orange	40	½ small-sized
Tomato, fresh	25	⅛ cup (scant)
Pineapple, fresh or canned without sugar	40	¼ cup (scant)
Cream (kind allowed on diet)	25	2 tablespoons (scant)

Mix and chill.

When this salad is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup
Cream	25	2 tablespoons (scant)

Note: Walnuts may be added for variety to any of the salads; when 10 gm. is used, omit from the meal:

	Gm.	Approximate measure.
Vegetable, 3 per cent	50	¼ cup
Butter	5	½ square

18. *Cranberry Relish:*

Grind 1 cup of cranberries and ½ a sectioned orange. Add the grated rind of ½ an orange and let stand one day. Add saccharin to taste.

If 20 gm., 2 teaspoons, of this relish is used, omit from the meal 20 gm. of 10 per cent fruit.

19. *Avocado:*

If 50 gm. is used, omit 100 gm. of 3 per cent vegetable and 15 gm. of butter.

Desserts

1. *Fruit Gelatin with Whipped Cream:*

	Gm.	Approximate measure.
Orange, cubed	50	½ medium-sized
Banana, cubed	25	¼ medium-sized
Water		½ cup
Gelatin		½ teaspoon
Saccharin		¼ grain
Whipped cream	15	1 heaping tablespoon

Soak gelatin in one tablespoon of cold water. Add ½ cup of boiling water and allow to cool. Then add orange, banana and saccharin. When ready to serve place whipped cream on top.

When this dessert is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup
Butter	5	½ square

2. *Fruit Cup:*

	Gm.	Approximate measure.
Orange, cubed	50	¼ cup
Grapefruit, cubed	50	¼ cup

When this dessert is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup

3. *Orange and Strawberry Cup with Whipped Cream:*

	Gm.	Approximate measure.
Orange	50	½ medium-sized
Strawberries, fresh	50	5 large
Whipped cream	15	1 heaping tablespoon

When this dessert is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup
Butter	5	½ square

4. *Orange and Apple Cocktail:*

	Gm.	Approximate measure.
Orange, cubed	50	½ medium-sized
Apple, cubed	30	¼ medium-sized
Lemon juice	5	1 teaspoon

When this dessert is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup

5. *Pineapple Bavarian Cream:*

	Gm.	Approximate measure.
Pineapple, shredded (canned without sugar)	100	½ cup
Gelatin		⅓ teaspoon
Water, cold		2 tablespoons
Saccharin		¼ grain
Whipped cream	15	1 heaping tablespoon

Soak the gelatin in cold water. Dissolve the gelatin over hot water. Add the pineapple and when it is almost solid fold into it the whipped cream to which the saccharin has been added. Chill before serving.

When this dessert is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup
Butter	5	½ square

6. *Plain Bavarian Cream:*

	Gm.	Approximate measure.
Egg		1
Milk	200	1 glass
Gelatin		1 teaspoon
Saccharin		½ grain
Vanilla		4 drops

Soak the gelatin in 2 tablespoons of cold water. Scald the milk in the top of a double boiler. Add it to the beaten egg and return to the double boiler, cooking the mixture until it coats the spoon (soft custard). Remove from the flame, add the gelatin and stir until it has completely dissolved, then add the saccharin and vanilla. When cool set it in refrigerator to chill.

This makes two desserts. When one dessert is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	50	¼ cup
Meat	25	½ average serving

For variety, 2 level teaspoons of cocoa may be added to the recipe. When this is done and one dessert is used, omit from the meal, in addition to the above:

	Gm.	Approximate measure.
Vegetable, 3 per cent	35	⅙ cup

7. *Plain Custard:*

	Gm.	Approximate measure.
Egg		1
Milk	200	1 glass
Saccharin		½ grain
Vanilla		4 drops

Beat the egg and add the milk which has been scalded. Then add the saccharin and vanilla. Bake in a moderate oven for about a half hour. The custard cups should be set in a pan of water.

This makes two custards. When one custard is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	50	¼ cup
Meat	25	½ average serving

8. *Pumpkin Custard:*

	Gm.	Approximate measure.
Egg		1
Milk	200	1 glass
Saccharin		¼ grain
Pumpkin	100	½ cup
Spices, as desired		½ teaspoon

Follow directions for baked custard, adding pumpkin to the beaten egg.

This makes two custards. When one custard is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	80	⅓ cup
Meat	25	½ average serving

9. *Orange Mousse:*

	Gm.	Approximate measure.
Whipped cream	50	½ cup
Orange	50	½ medium-sized
Saccharin		¼ grain

Add saccharin and orange, cut in cubes, to the whipped cream and freeze.

When this dessert is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	50	¼ cup
Cream, 40 per cent	50	¼ cup

10. *Ice Cream:*

	Gm.	Approximate measure.
Egg		1
Cream, 20 per cent	60	⅓ cup
Vanilla		2 drops
Saccharin		¼ grain

Prepare as soft custard, cool and freeze.

When this dessert is used, omit from the meal:

	Gm.	Approximate measure.
Egg		1
Vegetable, 3 per cent	100	½ cup
Butter	15	1½ squares

Commercial Vanilla Ice Cream:

	Gm.	Approximate measure.
Ice cream	100	½ cup

When this dessert is used, omit from the meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup
Milk	200	1 glass
Butter	5	½ square

11. *Orange Ice:*

	Gm.	Approximate measure
Orange, lemon juice, and crushed pineapple	50	¼ cup
Mashed banana	25	⅛ cup
Egg		½ of the white
Gelatin		½ teaspoon
Saccharin		½ grain

When this dessert is used, omit from meal:

	Gm.	Approximate measure.
Fruit, 10 per cent	100	½ cup

Miscellaneous Substitutions

		Gm.	Approximate measure.
1.	Cottage cheese	35	1 heaping tablespoon
	Butter	5	½ square

When this is used, omit from the meal:

Meat	25	½ average serving
Vegetable, 3 per cent	50	¼ cup

2.	Oysters	100	6–7
	Butter	5	½ square

When this is used, omit from the meal:

	Gm.	Approximate measure.
Meat	25	½ average serving
Vegetable, 3 per cent	135	¾ cup

3. Pecans 10

When this is used, omit from the meal:

Vegetable, 3 per cent	50	¼ cup
Butter	10	1 square

4. Almonds 10

When this is used, omit from the meal:

Bacon	10	2 strips

5. Brazil nuts 10

When this is used, omit from the meal:

Vegetable, 3 per cent	25	⅛ cup
Butter	5	½ square

6. Peanuts 20 20

When this is used, omit from the meal:

Vegetable, 3 per cent	35	⅙ cup
Meat	25	½ average serving
Butter	5	½ square

7. Peanut butter ..... 20 .... 1 tablespoon

When this is used, omit from the meal:

Meat	25	
Vegetable, 3 per cent	35	⅙ cup
Butter	5	½ square

	Gm.	Approximate measure.
8. Walnuts	10	

When this is used, omit from the meal:

Vegetable, 3 per cent	50	¼ cup
Butter	5	½ square

9. Cocoa	2	1 teaspoon

When this is used, omit from the meal:

Vegetable, 3 per cent	35	⅙ cup

10. Avocado	50	

When this is used, omit from the meal:

Vegetable, 3 per cent	100	½ cup
Butter	15	1½ squares

11. Popcorn, popped and unbuttered	13	1 small bowl

When this is used, omit from the meal:

Bread	20	1 thin slice
or		
Fruit, 10 per cent	100	½ cup

12. Potato chips	20	

When this is used, omit from the meal one of the following combinations:

1.	Fruit, 10 per cent	100	½ cup
	Butter	10	1 square
2.	Bread	20	1 thin slice
	Butter	10	1 square
3.	Potato	50	½ average-sized potato
	Butter	10	1 square

	Gm.	Approximate measure.
13. Sweet potatoes	75	1 small potato

When this is used, omit from the meal:

Vegetable, 20 per cent	100	½ cup

Questions

Before answering these questions see also Chapters VIII and IX (pp. 136–169).

1. What type of food scales is most satisfactory?
.....Page 147

2. What is a "gram"?
.....Page 149

3. How is "gram" abbreviated?
.....Page 149

4. What is the weight in grams of 300 c.c. of milk?
.....Page 149

5. Fill in the blanks below:

100 gm. of 3% vegetable = ...gm. of 6% vegetable
100 gm. of 3% vegetable = ...gm. of 10% fruit
100 gm. of 3% vegetable = ...gm. of 20% vegetable
Page 88

6. Name three salads you may take in place of 100 gm. of 3% vegetable
.....Page 88

7. Fill in the blanks below:

100 gm. of 6% vegetable = ...gm. of 3% vegetable
100 gm. of 6% vegetable = ...gm. of 10% fruit

100 gm. of 6% vegetable = ...gm. of 20% fruit
100 gm. of 5% fruit = ...gm. of 10% fruit
100 gm. of 5% fruit = ...gm. of 3% vegetable
100 gm. of 5% fruit = ...gm. of 20% fruit
100 gm. of 10% fruit = ...gm. of 15% fruit
100 gm. of 10% fruit = ...gm. of 20% fruit
100 gm. of 10% fruit = ...gm. of bread
100 gm. of 20% fruit = ...gm. of 10% fruit
100 gm. of 20% fruit = ...gm. of bread

Pages 90–91

8. If you wish to stew, bake or otherwise cook a serving of fruit, should you weigh it before or after cooking? ..... Page 91

9. Is it safe to use dried fruits? ..... Page 91

10. Name two substitutions for 20 gm. bread ..... Page 91

11. If your diet calls for 20 gm. cereal how much cooked cereal could you use? ..... Page 92

12. If it were necessary for you to use $\frac{1}{2}$ pint of milk in place of $\frac{1}{2}$ pint of 20% cream how much additional butter will you need to take? ..... Page 92

13. If it were impossible for you to obtain your day's allowance of 20% cream what foods other than milk could you take in place of it? Name foods and give amounts ..... Page 92

14. Name and give the amounts of three groups of foods you can use in place of 200 gm. of milk . . . . . Page 94

15. What should be done with the fat which separates from bacon on cooking? . . . . . Page 95

16. If you take an egg in place of 25 gm. of bacon what else must you take? . . . . . Page 95

17. Do you need to weigh eggs? . . . . . Page 95

18. Should you weigh meat before or after cooking? . . . . . Page 96

19. Name and give the amounts of four substitutions for 50 gm. of meat . . . . . Page 96

20. How can you make use of your butter allowance if it is more than you wish to use with your bread? . . . . . Page 97

21. Do you need to weigh your allowance of butter before each meal? . . . . . Page 97

22. Is it advisable to use commercial salad dressings? . . . . . Page 97

23. If you wish to use the vegetable soup on page 100 what will you omit from the meal? . . . . . Page 101

CHAPTER VIII

FOOD FACTS

THERE are three classes of food material which provide fuel for the body; namely, carbohydrates, proteins and fats.

Carbohydrates are the sugars and starches. They form sugar in the body. Cane sugar, honey, rice, wheat and flour are examples of pure or almost pure carbohydrate. All vegetables and fruits contain some carbohydrate and they also contain small amounts of protein and fat. One gram of carbohydrate yields four calories.

Proteins are especially important foods because they are used for building material as well as fuel. Proteins are not all equally effective for building and repairing. Therefore, to insure satisfactory nutrition at least a half of the allowance of protein should be in the form of milk, eggs, meat, fish or cheese. Protein foods must not be taken in excessive amounts because they form a considerable amount of sugar in the body. One gram of protein yields four calories.

Fats are an important source of food energy in the diet. Examples of pure or almost pure fat foods are butter, lard and oil. Cream is from 16 to 40 per cent fat. Meats contain a certain proportion of fat. Nuts and

certain fruits, such as olives and avocados, are rich in fat. One gram of fat yields nine calories.

Breads. Diets which provide as much carbohydrate as is permitted in the plan described in Chapter VI permit an allowance of bread close to the amount consumed by persons who are not diabetic. Food habits in other countries differ from those in this country, and in other countries diets planned with more carbohydrate may be preferable. In any case, the day has passed when special breads are needed. They now actually are objectionable because all are expensive and their composition never is quite dependable. Gluten flours are made by removing starch from the protein, the gluten, of wheat flour. They vary enormously in their content of carbohydrate. Other flours are prepared from casein, a protein of milk. They are more constant in composition and represent better food. However, protein, irrespective of its source, is converted into sugar by the liver to an extent equal to at least half of its weight, so that the advantage of substituting gluten or casein for better tasting and much cheaper wheat flour is dubious.

Many patients and some doctors have the misconception that dark breads, such as rye and Graham breads, are poorer in carbohydrate and, therefore, more available for diabetic patients than white breads. The tables of food values (p. 154) show this not to be true. Another myth is the reputed virtue of toasted breads. The sugar which the body derives from breads of dif-

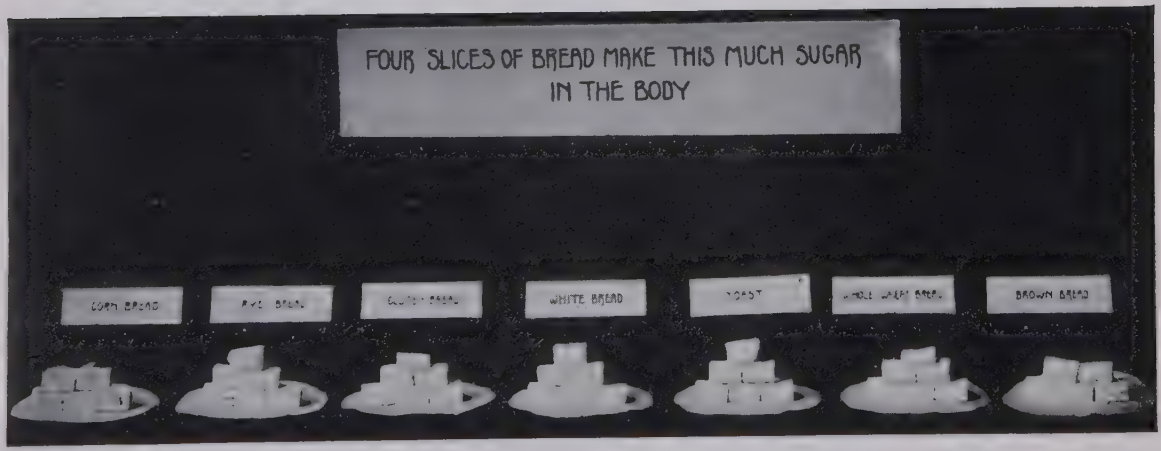


Fig. 7.—Relative amounts of sugar produced in the body by corn, rye, gluten, white, whole wheat and brown breads, and toast. (Reprinted by permission of Dr. Reed Rockwood.)

ferent kinds is illustrated in Figure 7. Bread should be weighed before toasting.

A nutritional advantage of enriched white and Graham (100 per cent whole wheat) breads is their higher content of vitamins. However, the allowance of 3 and 6 per cent vegetables should not be cut down for the sake of more bread, lest the diet become inadequate not only in vitamins, but also in bulk. Many breads contain added sugar. Especially is this true of corn bread and brown bread. They should be avoided.

Desserts and Fruits.—The diabetic is somewhat handicapped in the choice of desserts. Cakes, pies, puddings, and in fact, all sugared articles are so rich in carbohydrate that they are out of the reach of his carbohydrate allowance. Ice cream he may have if suitable omissions are made (see p. 127), and most of the fruits are available if he takes them in their natural state or preserved without sugar.

It is possible to preserve fruit without sugar by the cold or water-packed method. Water-packed fruits can be purchased in small and large cans from several wholesalers, or they may be prepared at home.* The contents

* To can fruits at home without adding sugar proceed as follows: Prepare the jars, rubber rings and tops as usual for any canning process. Select and prepare the fruit, taking care to choose firm fruit. Precook the fruit in water or juice until it boils, pack boiling hot into sterilized jars, cover with boiling liquid (juice or water) and process at once. For the boiling water bath process, select a kettle with straight sides or a container deep enough to allow jars standing on a rack to be covered 2 inches with boiling

of the cans of such fruits are about half as rich in carbohydrates as the original fruit, since in canning them the quantity of water used equals the quantity of fruit, and the carbohydrate of the fruit divides itself equally between the juice and the fruit. Fruits canned in their own juice (juice-packed fruits) have the same carbohydrate content as raw fruit. Fruits canned with sugar are unsuitable because of their high content of sugar. The

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water. The cover should fit snugly. Heat water to boiling and place jars on the rack in the kettle. Begin to count processing time as soon as the water returns to a rolling boil. Maintain the boiling point continually while the fruit is being processed. Remove the jars with a jar lifter as soon as the process is completed. Place jars upright and apart to cool quickly.

Time of Processing	Time, minutes
Apples	20
Apricots	15
Blackberries	20
Blueberries	20
Cherries	25
Currants	20
Peaches	15
Pears	20
Plums	20
Raspberries	20
Rhubarb	10
Strawberries	10

Government bulletins on canning of foods may be obtained from the Superintendent of Documents, Washington, D. C.

amount may vary from 20 to 50 per cent of the content of the can. Dried fruits also contain large and variable amounts of sugar and are unsuitable for diets.

Both raw and canned fruits are good sources of the important antiscorbutic vitamin, vitamin C.

Fruits and vegetables are classified according to their content of carbohydrate. (See Tables 1 and 2, pp. 152 and 153.)

Vegetables.—Vegetables come high on the list of desirable foods because their bulkiness aids in preventing constipation, and because they are important carriers of several vitamins and minerals. Canned vegetables are wholesome, palatable, and if properly prepared for serving satisfactorily retain their richness of vitamins. The juice or water in the can contains much of the vitamins and mineral originally in the vegetable. When canned vegetables are to be served hot, they should be heated in a covered pan, because they lose vitamins rapidly if exposed to the air during cooking. It is not necessary to purchase special brands of canned vegetables, and in fact, a brand suitable for the other members of the family is preferable.

Warning. Some brands of canned vegetables today have more or less sugar added. It is safer to secure brands known to be packed without any additional sugar.

Milk and Cream.—Milk is the best food source of calcium and a good food source of the vitamin B complex and vitamin A. The diet for a child should contain

at least one quart and the diet for an adult should contain at least a pint of milk and cream. Twenty per cent cream, that is, cream containing 20 per cent of butterfat, is the cream ordinarily sold for table use. This sometimes is called coffee cream. Forty per cent cream is the heavy, rich cream, commonly called whipping cream. The fat content varies considerably both in coffee cream and whipping cream. Therefore, the patient should make inquiry at his dairy as to the butterfat content of the cream he is buying and readjust his diet accordingly.

Butter.—Butter is an excellent source of calories and a good source of vitamin A. In composition it is 85 per cent fat.

Margarine is equally satisfactory nutritionally provided it is fortified with vitamin A. The salad oils, lard and vegetable shortenings are 100 per cent fat, or nearly so, but provide no vitamins.

Bacon.—Bacon is made more palatable by broiling crisp. Served in this way it should be weighed after and not before cooking.

Condiments.—Pepper and other spices are without significant food values. The same is true of vinegar and extract of vanilla.

Sweetening Agents.—Saccharin is permissible for sweetening purposes, but too much saccharin, or saccharin added to acid foods while they are cooking, imparts a bitter taste. It should be used, therefore, in correct amounts and added to acid foods after the food

has been removed from the fire. Glycerin used for sweetening is neither satisfactory nor advantageous. Honey, contrary to old beliefs, is utilized by diabetics no better than cane sugar.

Beverages.—Coffee and tea are permissible in moderate amounts, such as one cup of coffee or one cup of tea at a meal. Clear tea and coffee have little or no food value and therefore need not be counted in calculating the composition of the diet. Other beverages should be avoided unless they are known to be free from sugar.

Alcoholic Beverages. Sour wines add greatly to the attractiveness and palatability of the diet. Their content of carbohydrate is insignificant and the alcohol they contain adds to the fuel value of the diet without placing much if any strain on metabolism. Used in moderation they are not undesirable. Sweet wines and beers are less suitable because the carbohydrate they contain is variable. Unsweetened distilled liquors, such as brandy and whisky, injurious if taken immoderately, are serviceable when used judiciously as appetizers. Sweetened cordials and liqueurs should be avoided.

Tobacco. –The abuse of tobacco is probably more harmful to a person with diabetes than it is to others. Considerable moderation is advisable, therefore, in this indulgence. (See page 69.)

Traveling

The best health resort for diabetics is the patients home, because the diet can be adhered to with greater

accuracy than is usually possible elsewhere. No climate or spring water will compensate for the damage done by neglecting this diet while sojourning at a spa or traveling.

The well-instructed patient, however, who knows how to make use of the substitutions for the foods of his diet, as listed in Chapter VII, will not find it difficult to select foods in hotels and restaurants. The selection may be made easily and with great accuracy in cafeterias, where a varied choice of foods is offered and the foods can be inspected before ordering.

Questions

Before answering these questions see also Chapter IX (pp. 147–163).

1. Name three examples of foods composed almost entirely of carbohydrate . . . . . Page 136

2. Name three foods composed almost exclusively of fat . . . . . Page 136

3. Name three foods rich in protein . . . . . Page 136

4. Name two objections to the use of special breads. . . . . Page 137

5. Can brown bread be used more safely than white bread? . . . . . Page 137

CHAPTER IX

WEIGHING FOOD, THE METRIC SYSTEM, FOOD TABLES, OTHER TABLES

Food Scales

The patient is urged to use food scales for the first six months of management, or until he has trained himself accurately to measure or estimate portions of food. It requires much experience to obtain the skill necessary to "eat quantitatively" without using scales.

The food scales procured should be well made and durable. Those provided by John Chatillon and Sons, New York City (Fig. 8), and those of the Hanson Brothers Scale Company, 525 North Ada Street, Chicago, are particularly suitable, because the dials on the faces of these are movable and thus permit the adjusting of the zero point so that plates or cups may be employed for scale pans. The dials of these scales are graduated in grams, another advantage, since the calculating required in planning diets is much easier in the metric system than when the weighing is done by ounces and pounds.

Fig. 8.—Chatillon gram scales with movable disk. A balance convenient for weighing food. An empty glass was placed on the scale pan. The dial was turned by means of the knob, so that its 0 point coincided with the pointer. Milk was then poured into the glass until the pointer stood at 105, the amount of milk desired for a certain diet.

The Metric System

The gram, abbreviated "gm.," is the weight unit of this system. The average serving of many foods weighs approximately 100 gm.; for instance, a small apple, orange, or tomato will weigh about 100 gm. A square of butter cut with a standard butter cutter weighs 10 gm. A lump of domino sugar weighs 5 gm. The metric system, like that of American dollars and cents, eliminates troublesome fractions. For instance, here is the type of problem the physician must solve in planning menus for diabetics. How much sugar is contained in an orange? To answer it one must first know the weight of the orange, so he puts it on the scale and finds, let us say, that it weighs 120 gm. The tables of food values are consulted, and it appears from them that 10 per cent (ten hundredths) of this weight is carbohydrate (sugar), and the problem is answered by multiplying 120 by 0.10.

$$120 \text{ gm.} \times 0.10 = 12 \text{ gm.}$$

This calculation is exactly like what would be required to find the interest due on money borrowed. If a farmer should borrow $120 and the bank should ask him 10 per cent interest, what interest would he have to pay for the use of the money? The answer is

$$\$120 \times 0.10 = \$12$$

Similarly, 20 per cent of a portion of food weighing 120 gm. would be 24 gm. Five per cent of it would be 6 gm., and so forth.

The metric (gram) system is in general use in Europe and among scientists in this country. In this system the unit of measurement is the meter, a rule a few inches longer than a yardstick. The meter is divided into 100 centimeters. The unit of weight, as has been said before, is the gram; the unit of liquid measurement is a cube, each side of which is one centimeter long (cubic centimeter is abbreviated "c.c."). The system is so constructed that a gram is the weight of a cubic centimeter of water. This is a great convenience because it permits determining the amount of a quantity of water or liquid food, such as milk, either by weighing on a scale or by measuring its volume in a graduate. A thousand grams is called a kilogram; and larger weights, the weight of the body, for instance, are usually expressed in kilograms. Larger volumes of liquid are measured in liters. A liter is 1000 c.c., and since each cubic centimeter of water weighs a gram a liter of water weighs a kilogram.

Temperature in the metric system is measured with a centigrade thermometer. There are 100 degrees on this thermometer between the temperature of freezing water, called zero, and that of boiling water, called 100.

Heat is measured in calories, the calorie being the amount of heat necessary to raise the temperature of 1 liter of water 1 degree centigrade.* One hundred calories would bring to boiling a liter of freezing water.

Calories, in addition to being measures of heat, are measures of energy, because heat is evolved only in response to some expenditure of energy, such as occurs, for instance, in the burning of a fuel. Thus the fuel, or energy value of foods, and similarly the energy requirements of the human body, may be expressed in calories.

The following table of approximate equivalents gives the relations existing between the metric system and the weights and measures in more common use. The

* This is the large calorie.

diabetic patient is advised, however, to learn to think in the metric system rather than to attempt the translating of grams into ounces, and so forth.

Approximate Equivalents:

1 gram (gm.)	= 1/30 ounce
1 kilogram (kg.) (1000 gm.)	= 2.2 pounds
1 cubic centimeter (c.c.)	= 1/30 fluidounce
1 liter (L.) (1000 c.c.)	= 1 quart plus $1\frac{1}{3}$ fluidounces
1 degree centigrade (1° C.)	= 1.8 degrees Fahrenheit
1 calorie (cal.)	= 4 British thermal units (B. T. U.)

To convert ounces to grams, multiply the ounces by 30.

To convert pounds to kilograms, divide the pounds by 2.2, or consult Scale I, Food Nomogram (insert back cover).

Household measures should rarely be depended on for accurate diets; roughly:

1 teaspoonful of fluid	= 5 c.c.
1 dessertspoonful of fluid	= 10 c.c.
1 tablespoonful of fluid	= 15 c.c.
1 large cup or tumbler of fluid	= 240 c.c.

Tables of Food Values

The composition of the foods in most common use is to be found in the following tables. More complete food lists are contained in Tables of Food Composition in Terms of Eleven Nutrients, Miscellaneous Publication No. 572, U. S. Department of Agriculture, 1945. This

pamphlet can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for fifteen cents in coin.

In Table 1 a variety of vegetables and fruits are classified according to their percentage content of carbohydrate.

TABLE 1

Vegetables

3 per cent	6 per cent	15 per cent	20 per cent
Asparagus	Beets	Artichokes	Corn
Beet greens	Carrots	Green peas	Hominy, cooked
Broccoli	Kohlrabi	Parsnips	Lima beans, canned
Brussels sprouts	Onions	Soybeans	Macaroni, cooked
Cabbage	Pumpkin		Noodles, cooked
Cauliflower	Rutabagas		Potato
Celery	Soybean sprouts		Rice, boiled
Cucumbers	Hubbard or winter squash		Shelled beans, cooked
Dandelion greens	Turnips		Spaghetti, cooked
Eggplant			
Endive			
Green peppers			
Lettuce			
Mushrooms			
Radishes			
Sauerkraut			
Spinach			
String beans			
Summer squash			
Swiss chard			
Tomato			
Watercress			

TABLE 1 (*Continued*)

Fruits

5 per cent	10 per cent	15 per cent	20 per cent
Apricots*	Blackberries	Apples	Bananas
Blackberries*	Cantaloupe	Apricots	Grapes
Cherries, red or white*	Cherries, black*	Blueberries	Plums
Loganberries*	Cranberries	Cherries	
Peaches*	Grapefruit	Currants	
Raspberries*	Gooseberries	Huckleberries	
Rhubarb, fresh	Grapes, white*	Mangoes	
Strawberries*	Lemons	Pears	
	Oranges	Raspberries	
	Papayas		
	Pears*		
	Peaches		
	Pineapple, fresh		
	Pineapple*		
	Strawberries		
	Watermelon		

* Canned without sugar.

Fruits canned without sugar have about one-half the carbohydrate content of fresh fruits if an equal amount of fruit and water are used in canning.* Fruits packed in their own juice have the same carbohydrate value as the fresh fruits.

In the process of cooking, foods lose both in weight and in content of carbohydrate, due to loss of water

* See page 139 for method of preserving fruit without addition of sugar.

and dissolving out of carbohydrate. These losses approximately balance each other, and so foods may be weighed either before or after cooking. When they are served in the water in which they are cooked, as in the case with stewed rhubarb, vegetable soups and stewed fruits, they should be weighed before cooking.

In Table 2 percentage composition (grams in each 100 gm.) of carbohydrate, protein and fat is given for

TABLE 2*

	Average composition of 100 gm.		
Vegetables and fruits:	Carbohydrate, gm.	Protein, gm.	Fat, gm.
3 per cent vegetables	3	1	0
6 per cent vegetables	6	1	0
15 per cent vegetables	15	2	0
20 per cent vegetables:			
Potato	20	2	0
Shelled beans	20	7	0
Green corn	20	3	1
5 per cent fruits	5	1	0
10 per cent fruits	10	1	0
15 per cent fruits	15	1	0
20 per cent fruits	20	2	0
Green olives	4	2	14
Ripe olives	4	1	20

* Slight discrepancies will be found between a few of the values in this table and values published in 1945 by the Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, in cooperation with National Research Council, Miscellaneous Publications No. 572, U. S. Department of Agriculture, 1945.

TABLE 2 (*Continued*)

	Average composition of 100 gm.		
Cereals and breadstuffs:	Carbohydrate, gm.	Protein, gm.	Fat, gm.
Breakfast cereals, dry	77	11	2
Breakfast cereals, cooked (see instructions, p. 92)	11	1	0
White bread	52	9	2
Whole wheat bread	49	9	3
Rye bread	58	6	3
Wheat flour	75	11	1
Soda crackers	73	10	11
Soy beans	12	35	18
Dairy products:			
Whole milk	5	3	4
Skimmed milk	5	3	1
Cream, 20 per cent fat	4	3	20
Cream, 30 per cent fat	4	3	30
Cream, 40 per cent fat	3	2	40
Buttermilk	5	4	1–
Cheese	2	24	32
Cottage cheese	4	19	1
Eggs, each	0	6	6
Egg white (one)	0	3	0
Egg yolk (one)	0	3	6
Meats and fish:			
Meat, cooked	0	25	15
Fat meat, cooked	0	25	30
Fish (halibut, lake trout, perch, white fish)	0	18	5
Fish (salmon, fresh or canned)	0	21	10
Oysters	4	6	1

TABLE 2 (*Continued*)

	Average composition of 100 gm.		
	Carbohydrate, gm.	Protein, gm.	Fat, gm.
Liver	4	20	4
Fat bacon	0	10	67
Lean bacon	0	16	43
Cooked bacon	0	25	50
Fats:			
Butter	0	0	81
Lard, tallow, oleomargarine, crisco, bacon fat	0	0	85–100
Olive oil and other oils	0	0	100
Mayonnaise (see recipe, p. 97)	3	2	78
Peanut butter	21	26	48
Nuts:			
Butternuts	3	28	61
Brazil nuts	7	17	67
Hickory nuts	11	15	67
Black walnuts	12	28	56
Pecans	13	9	73
Filberts	13	16	65
Beechnuts	13	22	57
English walnuts	16	15	64
Almonds	20	19	54
Peanuts	24	27	44
Chestnuts	42	6	5

a wide variety of foods. The figures for carbohydrate represent only available carbohydrate.

In addition to their fuel, the foods contain water, indigestible residues, minerals in the form of salts, and

vitamins. The omission of either minerals or vitamins from the diet may be attended by the development of the so-called deficiency diseases, such as rickets and scurvy or early manifestations of these diseases. Some foods are richer in vitamins and minerals than others. They are the leafy green and yellow vegetables, rich in the vitamin A precursor; butter and cream, rich in vitamin A; fresh fruits, especially citrus fruits, rich in vitamin C; milk, excellent as a source of calcium and riboflavin; eggs, rich in riboflavin; meat and whole grain cereals, rich in thiamine and other vitamins of the vitamin B complex. White bread and white flour, when labeled enriched, have been fortified by regulation with thiamine, riboflavin, niacin and iron and are greatly to be preferred to unenriched or plain white bread and flour. Table salt fortified with iodine and margarine fortified with vitamin A are likewise to be preferred to unfortified salt and margarine.

Average Height—Weight—Age Table (Men)

GRADED AVERAGE WEIGHT

Age	4 Ft.	4 Ft. 1 In.	4 Ft. 2 In.	4 Ft. 3 In.	4 Ft. 4 In.	4 Ft. 5 In.	4 Ft. 6 In.	4 Ft. 7 In.	4 Ft. 8 In.	4 Ft. 9 In.	4 Ft. 10 In.	4 Ft. 11 In.	5 Ft.	5 Ft. 1 In.	5 Ft. 2 In.	5 Ft. 3 In.	5 Ft. 4 In.	5 Ft. 5 In.
15	107	109	112	115	118	122	126	130	134	138	142	147	152	157	162	167	172	177
16	109	111	114	117	120	124	128	132	136	140	144	149	154	159	164	169	174	179
17	111	113	116	119	122	126	130	134	138	142	146	151	156	161	166	171	176	181
18	113	115	118	121	124	128	132	136	140	144	148	153	158	163	168	173	178	183
19	115	117	120	123	126	130	134	138	142	146	150	155	160	165	170	175	180	185
20	117	119	122	125	128	132	136	140	144	148	152	156	161	166	171	176	181	186
21	118	120	123	126	130	134	138	141	145	149	153	157	162	167	172	177	182	187
22	119	121	124	127	131	135	139	142	146	150	154	158	163	168	173	178	183	188
23	120	122	125	128	132	136	140	143	147	151	155	159	164	169	175	180	185	190
24	121	123	126	129	133	137	141	144	148	152	156	160	165	171	177	182	187	192
25	122	124	126	129	133	137	141	145	149	153	157	162	167	173	179	184	189	194
26	123	125	127	130	134	138	142	146	150	154	158	163	168	174	180	186	191	196
27	124	126	128	131	134	138	142	146	150	154	158	163	169	175	181	187	192	197
28	125	127	129	132	135	139	143	147	151	155	159	164	170	176	182	188	193	198
29	126	128	130	133	136	140	144	148	152	156	160	165	171	177	183	189	194	199
30	126	128	130	133	136	140	144	148	152	156	161	166	172	178	184	190	196	201
31	127	129	131	134	137	141	145	149	153	157	162	167	173	179	185	191	197	202
32	127	129	131	134	137	141	145	149	154	158	163	168	174	180	186	192	198	203
33	127	129	131	134	137	141	145	149	154	159	164	169	175	181	187	193	199	204
34	128	130	132	135	138	142	146	150	155	160	165	170	176	182	188	194	200	206
35	128	130	132	135	138	142	146	150	155	160	165	170	176	182	189	195	201	207
36	129	131	133	136	139	143	147	151	156	161	166	171	177	183	190	196	202	208
37	129	131	133	136	140	144	148	152	157	162	167	172	178	184	191	197	203	209
38	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	198	204	210
39	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	199	205	211
40	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	206	212
41	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	207	213
42	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214
43	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214
44	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
45	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
46	134	136	138	141	144	148	152	156	161	166	171	177	183	189	196	203	210	216
47	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
48	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
49	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
50	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
51	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
52	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
53	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
54	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219
55 and up	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219

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When taking measurements remove the outdoor clothing, shoes and coat.

Age is taken to the last birthday.

Average Height—Weight—Age Table (Women)

GRADED AVERAGE WEIGHT

Age	4 Ft. 0 In.	4 Ft. 9 In.	4 Ft. 10 In.	4 Ft. 11 In.	5 Ft.	5 Ft. 1 In.	5 Ft. 2 In.	5 Ft. 3 In.	5 Ft. 4 In.	5 Ft. 5 In.	5 Ft. 6 In.	5 Ft. 7 In.	5 Ft. 8 In.	5 Ft. 9 In.	5 Ft. 10 In.	5 Ft. 11 In.	6 Ft.
15	101	103	105	106	107	109	112	115	118	122	126	130	134	138	142	147	152
16	102	104	106	108	109	111	114	117	120	124	128	132	136	139	143	148	153
17	103	105	107	109	111	113	116	119	122	125	129	133	137	140	144	149	154
18	104	106	108	110	112	114	117	120	123	126	130	134	138	141	145	150	155
19	105	107	109	111	113	115	118	121	124	127	131	135	139	142	146	151	155
20	106	108	110	112	114	116	119	122	125	128	132	136	140	143	147	151	156
21	107	109	111	113	115	117	120	123	126	129	133	137	141	144	148	152	156
22	107	109	111	113	115	117	120	123	126	129	133	137	141	145	149	153	157
23	108	110	112	114	116	118	121	124	127	130	134	138	142	146	150	153	157
24	109	111	113	115	117	119	121	124	127	130	134	138	142	146	150	154	158
25	109	111	113	115	117	119	121	124	128	131	135	139	143	147	151	154	158
26	110	112	114	116	118	120	122	125	128	131	135	139	143	147	151	155	159
27	110	112	114	116	118	120	122	125	129	132	136	140	144	148	152	155	159
28	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160
29	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160
30	112	114	116	118	120	122	124	127	131	134	138	142	146	150	154	157	161
31	113	115	117	119	121	123	125	128	132	135	139	143	147	151	154	157	161
32	113	115	117	119	121	123	125	128	132	136	140	144	148	152	155	158	162
33	114	116	118	120	122	124	126	129	133	137	141	145	149	153	156	159	162
34	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
35	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
36	116	118	120	122	124	126	128	131	135	139	143	147	151	155	158	161	164
37	116	118	120	122	124	126	129	132	136	140	144	148	152	156	159	162	165
38	117	119	121	123	125	127	130	133	137	141	145	149	153	157	160	163	166
39	118	120	122	124	126	128	131	134	138	142	146	150	154	158	161	164	167
40	119	121	123	125	127	129	132	135	138	142	146	150	154	158	161	164	167
41	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	165	168
42	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	166	169
43	121	123	125	127	129	131	134	137	140	144	148	152	156	160	163	167	170
44	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
45	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
46	123	125	127	129	131	133	136	139	142	146	150	154	158	162	165	169	172
47	123	125	127	129	131	133	136	139	142	146	151	155	159	163	166	170	173
48	124	126	128	130	132	134	137	140	143	147	152	156	160	164	167	171	174
49	124	126	128	130	132	134	137	140	143	147	152	156	161	165	168	172	175
50	125	127	129	131	133	135	138	141	144	148	152	156	161	165	169	173	176
51	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
52	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
53	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
54	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177
55	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177

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When taking measurements remove the outdoor clothing and shoes.

Age is taken to the last birthday.

Height—Weight—Age Table (Boys)

Height inches.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.	16 yrs.	17 yrs.	18 yrs.	19 yrs.
38	34	34													
39	35	35													
40	36	36													
41	38	38	38												
42	39	39	39	39											
43	41	41	41	41											
44	44	44	44	44											
45	46	46	46	46	46										
46	47	48	48	48	48										
47	49	50	50	50	50	50									
48		52	53	53	53	53									
49		55	55	55	55	55	55								
50		57	58	58	58	58	58	58							
51			61	61	61	61	61	61							
52			63	64	64	64	64	64	64						
53			66	67	67	67	67	68	68						
54				70	70	70	70	71	71	72					
55				72	72	73	73	74	74	74					
56				75	76	77	77	77	78	78	80				
57					79	80	81	81	82	83	83				
58					83	84	84	85	85	86	87				
59						87	88	89	89	90	90	90			
60						91	92	92	93	94	95	96			
61							95	96	97	99	100	103	106		
62							100	101	102	103	104	107	111	116	
63							105	106	107	108	110	113	118	123	127
64								109	111	113	115	117	121	126	130
65								114	117	118	120	122	127	131	134
66									119	122	125	128	132	136	139
67									124	128	130	134	136	139	142
68										134	134	137	141	143	147
69										137	139	143	146	149	152
70										143	144	145	148	151	155
71										148	150	151	152	154	159
72											153	155	156	158	163
73											157	160	162	164	167
74											160	164	168	170	171

Prepared by Bird T. Baldwin, Ph.D., and Thomas D. Wood, M. D.

When taking measurements remove the outdoor clothing, shoes and coat.

Age is taken to the last previous birthday.

Height—Weight—Age Table (Girls)

Height inches.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.	16 yrs.	17 yrs.	18 yrs.
38	33	33												
39	34	34												
40	36	36	36											
41	37	37	37											
42	39	39	39											
43	41	41	41	41										
44	42	42	42	42										
45	45	45	45	45	45									
46	47	47	47	48	48									
47	49	50	50	50	50	50								
48		52	52	52	52	53	53							
49		54	54	55	55	56	56							
50		56	56	57	58	59	61	62						
51			59	60	61	61	63	65						
52			63	64	64	64	65	67						
53			66	67	67	68	68	69	71					
54				69	70	70	71	71	73					
55				72	74	74	74	75	77	78				
56					76	78	78	79	81	83				
57					80	82	82	82	84	88	92			
58						84	86	86	88	93	96	101		
59						87	90	90	92	96	100	103	104	
60						91	95	95	97	101	105	108	109	111
61							99	100	101	105	108	112	113	116
62							104	105	106	109	113	115	117	118
63								110	110	112	116	117	119	120
64								114	115	117	119	120	122	123
65								118	120	121	122	123	125	126
66									124	124	125	128	129	130
67									128	130	131	133	133	135
68									131	133	135	136	138	138
69										135	137	138	140	142
70										136	138	140	142	144
71										138	140	142	144	145

Prepared by Bird T. Baldwin, Ph.D., and Thomas D. Wood, M. D.

When taking measurements remove the outdoor clothing, shoes and coat.

Age is taken to the last previous birthday.

Height—Weight—Age Table

(Children Between One and Four Years—Without Clothes)*

5,602 boys.		Age, months.	4,821 girls.	
Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.
26.5	18.0	6	25.9	16.8
27.3	19.1	7	26.5	17.4
27.6	19.8	8	27.0	18.3
28.1	20.4	9	27.6	19.1
28.5	20.9	10	27.9	19.5
29 0	21.4	11	28.4	20.1
29.4	21.9	12	28.9	20.8
29.9	22.9	13	29.4	21.0
30.3	23.0	14	29.5	21.6
30.8	23.6	15	30.1	21.9
31.1	24.1	16	30.5	22.6
31.4	24.5	17	30.8	22.9
31.8	24.6	18	31.1	23.4
32.3	25.5	19	31.5	23.8
32.6	25.8	20	32.0	24.1
32.9	25.8	21	32.3	24.8
33.3	26.9	22	32.6	25.3
33.6	27.0	23	32.9	25.6
33.8	27.1	24	33.4	26.4
34.0	27.9	25	33.8	26.9
34.1	28.3	26	33.9	27.3
34.8	29.0	27	33.9	27.3

HEIGHT—WEIGHT—AGE TABLE (*Continued*)

5,602 boys.		Age, months.	4,821 girls.	
Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.
35.1	29.1	28	34.6	27.8
35.4	29.3	29	34.8	27.8
35.4	29.5	30	34.9	28.3
35.5	30.5	31	35.1	28.8
36.0	30.6	32	35.4	29.0
36.1	30.6	33	35.6	29.1
36.5	31.1	34	36.5	30.1
36.8	31.9	35	36.5	30.3
37.1	32.3	36	36.8	30.5
37.4	32.3	37	36.8	30.8
37.5	32.4	38	37.0	31.0
37.9	33.1	39	37.3	31.6
38.5	33.5	40	37.5	32.0
38.6	33.6	41	37.8	32.3
38.6	33.8	42	38.0	32.5
38.8	33.8	43	38.3	32.8
38.9	34.3	44	38.5	33.0
39.0	34.5	45	38.5	33.5
39.0	34.8	46	38.8	33.5
39.3	35.8	47	38.9	33.5
39.5	35.9	48	39.0	33.8

* Reprinted from Crum, F. S.: Quarterly Publication of the American Statistical Association, Boston, September, 1916, N.S., No. 115, 15, 332.

DIET ORDER

Name.....Date.....

Carbohydrate.....Protein.....Fat.....Calories.....

Food.	Breakfast, gm.	Dinner, gm.	Supper, gm.	Total, gm.	Gm.		
					Carbohydrate.	Protein.	Fat.
Vegetables, 3 per cent				100	3	1	0
Vegetables, 6 per cent				100	6	1	0
Fruit, 5 per cent				100	5	1	0
Fruit, 10 per cent				100	10	1	
Vegetables or fruits, 15 per cent				100	15	1	0
Vegetables or fruits, 20 per cent				100	20	2	0
Cereal (dry)				100	80	10	5
Bread				100	53	9	2
Cream, 20 per cent				100	5	3	20
Cream, 40 per cent				100	3	2	40
Milk				100	5	3	4
Bacon				100	0	25	50
Eggs				Each	0	6	6
Meat (lean)				100	0	25	15
Butter				100	0	0	85
Mayonnaise with salad oil				100	0	0	85
			Total Gm.				

FUEL VALUE OF THE DIET		
Calories from carbohydrate	(4 calories for each gm.)	.....
Calories from protein	(4 calories for each gm.)	.....
Calories from fat	(9 calories for each gm.)	.....
	Total calories	.....

MENU

Breakfast

	Weight, grams.	Approximate measure.
Fruit, per cent		
Cereal		
Bread		
Cream		
Milk		
Bacon		
Egg		
Butter		

Dinner

Vegetable, 3 per cent		
Vegetable, 6 per cent		
Vegetable or fruit, per cent		
Fruit, per cent		
Bread		
Cream		
Milk		
Meat		
Butter		
Mayonnaise		

Supper

Vegetable, 3 per cent		
Vegetable, 6 per cent		
Vegetable or fruit, per cent		
Fruit, per cent		
Bread		
Cream		
Milk		
Egg		
Meat		
Butter		
Mayonnaise		

Note: Coffee or tea without sugar may be used with each meal if desired.

DIET ORDER

Name.....Date.....

Carbohydrate.....Protein.....Fat.....Calories.....

Food.	Breakfast, gm.	Dinner, gm.	Supper, gm.	Total, gm.	Gm.		
					Carbohydrate.	Protein.	Fat.
Vegetables, 3 per cent				100	3	1	0
Vegetables, 6 per cent				100	6	1	0
Fruit, 5 per cent				100	5	1	0
Fruit, 10 per cent				100	10	1	0
Vegetables or fruits, 15 per cent				100	15	1	0
Vegetables or fruits, 20 per cent				100	20	2	0
Cereal (dry)				100	80	10	5
Bread				100	53	9	2
Cream, 20 per cent				100	5	3	20
Cream, 40 per cent				100	3	2	40
Milk				100	5	3	4
Bacon				100	0	25	50
Eggs				Each	0	6	6
Meat (lean)				100	0	25	15
Butter				100	0	0	85
Mayonnaise with salad oil				100	0	0	85
				Total Gm...			

FUEL VALUE OF THE DIET		
Calories from carbohydrate	(4 calories for each gm.)	.....
Calories from protein	(4 calories for each gm.)	.....
Calories from fat	(9 calories for each gm.)	.....
	Total calories	.....

MENU

Breakfast

	Weight, grams.	Approximate measure.
Fruit, per cent		
Cereal		
Bread		
Cream		
Milk		
Bacon		
Egg		
Butter		

Dinner

Vegetable, 3 per cent		
Vegetable, 6 per cent		
Vegetable or fruit, per cent		
Fruit, per cent		
Bread		
Cream		
Milk		
Meat		
Butter		
Mayonnaise		

Supper

Vegetable, 3 per cent		
Vegetable, 6 per cent		
Vegetable or fruit, per cent		
Fruit, per cent		
Bread		
Cream		
Milk		
Egg		
Meat		
Butter		
Mayonnaise		

Note: Coffee or tea without sugar may be used with each meal if desired.

DIET ORDER

Name.....Date.....

Carbohydrate.....Protein.....Fat.....Calories.....

Food.	Breakfast, gm.	Dinner, gm.	Supper, gm.	Total, gm.	Gm.		
					Carbohydrate.	Protein.	Fat.
Vegetables, 3 per cent				100	3	1	0
Vegetables, 6 per cent				100	6	1	0
Fruit, 5 per cent				100	5	1	0
Fruit, 10 per cent				100	10	1	0
Vegetables or fruits, 15 per cent				100	15	1	0
Vegetables or fruits, 20 per cent				100	20	2	0
Cereal (dry)				100	80	10	5
Bread				100	53	9	2
Cream, 20 per cent				100	5	3	20
Cream, 40 per cent				100	3	2	40
Milk				100	5	3	4
Bacon				100	0	25	50
Eggs				Each	0	6	6
Meat (lean)				100	0	25	15
Butter				100	0	0	85
Mayonnaise with salad oil				100	0	0	85
				Total Gm...			

FUEL VALUE OF THE DIET

Calories from carbohydrate (4 calories for each gm.) .....

Calories from protein (4 calories for each gm.) .....

Calories from fat (9 calories for each gm.) .....

Total calories .....

MENU

Breakfast

	Weight, grams	Approximate measure.
Fruit, per cent		
Cereal		
Bread		
Cream		
Milk		
Bacon		
Egg		
Butter		

Dinner

Vegetable, 3 per cent		
Vegetable, 6 per cent		
Vegetable or fruit, per cent		
Fruit, per cent		
Bread		
Cream		
Milk		
Meat		
Butter		
Mayonnaise		

Supper

Vegetable, 3 per cent		
Vegetable, 6 per cent		
Vegetable or fruit, per cent		
Fruit, per cent		
Bread		
Cream		
Milk		
Egg		
Meat		
Butter		
Mayonnaise		

Note: Coffee or tea without sugar may be used with each meal if desired.

NOTES

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