

all gave curves in the paretic zone. However, among eleven tabetics, the paretic curve was present in three cases; six gave meningitic curves, and two were in the syphilitic zone. Thirty-nine cases of cerebrospinal syphilis gave three negative curves with the colloidal gold test, as noted above; twenty were in the meningitic zone, and fifteen were in the syphilitic, and one, in whom paresis could not be entirely excluded, gave a paretic curve.

We believe there is no such thing as a provocative colloidal gold reaction. While several fluids showing a negative Wassermann test became positive after treatment, no change was noted in the gold test.

Red blood cells—or blood plasma—appeared, at times, to cause disturbance in the final reading, but no definite conclusion can be drawn from our series. A case of cerebrospinal syphilis with a positive Wassermann test on the spinal fluid and a syphilitic curve gave later, when many red cells were present, a paretic curve. Two cases of cerebrospinal syphilis with negative Wassermann tests on the spinal fluid and syphilitic curves gave later, with red cells present, the same curve, the blood causing no evident change. A case of tabes with positive Wassermann test on the spinal fluid and paretic curve, with red cells present, gave complete precipitation in all tubes.

Vigorous intravenous and intraspinal treatment tends to bring all positive tests on the spinal fluid toward the negative. Our experience has been that the colloidal gold test is the last to become negative, and hence is the most reliable as a prognostic guide. It is also our experience that the colloidal gold test is the earliest reliable test to be found in the spinal fluid of syphilitic patients, being frequently earlier than the Wassermann reaction. Pleocytosis and increased globulin content are excluded since they are present in all inflammatory conditions of the meninges. We have been unable in any wise to prove, but feel justified in assuming, that a given spinal fluid passes successively, during the progress of syphilitic involvement, from syphilitic to meningitic to paretic curves, and vice versa, during intensive treatment. That is to say, the condition producing the change in the state of the colloidal gold is the same in all zones and merely present to a greater or less degree. Further observation will probably prove or disprove this assumption. We have several cases that have, under treatment, receded from the meningitic to the syphilitic zone, and some of these have finally become entirely negative. A case of clinical tabes which gave a paretic curve, with a positive Wassermann test on the spinal fluid and twenty cells, gave, after treatment, a meningitic zone curve, a negative Wassermann, and thirty cells. Clinically there was much improvement.

We believe that in active syphilis of the central nervous system, a positive colloidal gold test is always accompanied by one or more other indications of involvement of the central nervous system. Pleocytosis and increased globulin are always associated, but there is no constancy of association of other tests. There are, unquestionably, cases in which the colloidal gold curve will persist after all other findings are negative. This occurs probably in those cases in which no intraspinal treatment has been given, but which have reached apparent cure with only systemic medication. In these cases we believe the curve has little or no prognostic value. The patient is probably cured. In those instances in which repeated tapping of the canal has been done, we have found that the curve,

while persisting longer than other findings, becomes negative if the patient receives a clinical cure.

#### CONCLUSIONS

1. A colloidal gold reaction typical for syphilis is nearly constant in cases of syphilis of the central nervous system.

2. This reaction is more delicate than the Wassermann tests on the blood and spinal fluid and more reliable than pleocytosis and globulin content. Curves are, of course, given with other conditions than syphilis, but we believe the curves mentioned above to be specific.

3. The test is the most reliable of the various tests as a diagnostic aid, and is the best guide for prognosis during treatment, probably tending to become negative in a regular and constant order.

4. Known paretics always give a paretic curve; however, there is obtained occasionally a paretic curve in other phases of central nervous system syphilis.

5. There is no provocative colloidal gold test.

6. The presence of red blood cells—or plasma—in the spinal fluid often vitiates the result of the test.

#### VEGETABLE FOODS FOR THE DIABETIC\*

RUTH A. WARDALL

IOWA CITY, IOWA

Even a slight experience in the planning of the diet for the diabetic readily convinces one that careful thought and work along this line are needed, and that time and effort spent in an attempt to enlarge the meager diet list of such patients will be fully justified. With the necessary elimination of practically all fruits and many vegetables, because of their carbohydrate content, the diet of the diabetic becomes very much restricted and monotonous and undesirably reduced in bulk. The withdrawal of fruits and vegetables from the diet is keenly felt, and the diabetic craves the variety that is furnished by this type of food.

The usual analysis of our ordinary food materials gives their percentage composition in terms of so-called protein, fat, carbohydrate, ash and water, and from such data lists of foods have been compiled for the use of the diabetic. A familiar arrangement is that in which fruits and vegetables are classified into 5, 10, 15 and 20 per cent. carbohydrate groups, and from such lists definite portions are daily assigned to the diabetic in accord with his tolerance. Table 1, from Joslin's "Treatment of Diabetes Mellitus," gives an illustration of such a classification.

The figures of percentage composition of foods are capable of definite interpretation from the chemical, but not from the physiologic point of view. The end-products of a chemical analysis are not necessarily a safe index to the end-products of the same materials when taken as food into the animal organism. This is a well known fact, but one needs to bear it in mind when considering the amount of carbohydrate, and especially in the case of diabetes, in which the carbohydrate of the diet is so important a factor in the treatment. According to chemical constitution, cellulose and the hemicelluloses are as truly carbohydrates

\* From the Sheffield Scientific School, Yale University.

as the sugars and starch, and the hemicelluloses are easily hydrolyzed with acid to the same simple sugars that result from the digestion of complex sugars and starch. Agar-agar is characterized by the hemicellulose galactan, but utilization experiments have shown that agar-agar is not to any appreciable extent a source of available carbohydrate for man. Inulin has been suggested as a possible carbohydrate for the diabetic because it yields levulose on splitting and there is some indication that levulose can be better tolerated than glucose. The higher animals have no enzyme capable of splitting inulin, and therefore its conversion into levulose in the body is dependent on the acid of the gastric juice. Lewis<sup>1</sup> has shown that inulin is poorly utilized by man. Intestinal fermentation attends its use, and the value of inulin in the diet is questionable. Swartz<sup>2</sup> has given numerous other illustrations of the failure of man to utilize certain complex carbohydrates.

TABLE 1.—FOODS ARRANGED APPROXIMATELY ACCORDING TO PERCENTAGE OF CARBOHYDRATES

	5 per Cent.*	10 per Cent.*	15 per Cent.	20 per Cent.
Vegetables (fresh or canned)	Lettuce Cucumbers Spinach Asparagus Rhubarb Endive Marrow Sorrel Sauerkraut Beet greens Dandelion greens Swiss chard Celery	Tomatoes Brussels sprouts Watercress Sea kale Okra Cauliflower Eggplant Cabbage Radishes Leeks String beans Broccoli	Pumpkin Turnip Kohlrabi Squash Beets Carrots Onions Mushrooms	Green peas Artichokes Parsnips Canned lima beans Potatoes Shell beans Baked beans Green corn Boiled rice Boiled macaroni
Fruits	Ripe olives (20% fat) Grapefruit Lemons	Oranges Cranberries Strawberries Blackberries Gooseberries Peaches Pineapple Watermelon	Apples Pears Apricots Blueberries Cherries Currants Raspberries Huckleberries	Plums Bananas Prunes
Nuts	Butternuts Pignolias	Brazilnuts Black walnuts Hickorynuts Pecans Filberts	Almonds Walnuts (English) Beechnuts Pistachios Pine nuts	Peanuts 40 per Cent. Chestnuts
Misc.	Unsweetened and unspiced pickles, clams, oysters, scallops, liver, fish, roe			

\* Reckon available carbohydrates in vegetables of 5 per cent. group as 3 per cent, of 10 per cent. group as 6 per cent.

Since the carbohydrate-free foods are limited in number, efforts have been made to remove or reduce the carbohydrate naturally occurring in some of our foods, thereby making them suitable for the diabetic diet. The "thrice-cooked vegetables" represent such an attempt. In preparing them the water is changed twice during the cooking process and thrown away, carrying along a certain amount of soluble material. To learn something of the condition of the food after this treatment, "thrice-cooked vegetables" were prepared and analyses made to determine the extent to which carbohydrate is removable by water extraction. As might have been suspected, it soon became evident that there is a variation in the effectiveness of the method depending on the vegetable used.

A preliminary series of experiments was planned to gain a rough idea of the relative amount and nature

of the material that might be removed by water extraction. In order to facilitate the process, the solid vegetables were cut into small pieces or slices. The vegetable was well covered with cold water, heated to the boiling point, and cooked for several minutes. This first water extract was drained off, fresh cold water added, and another extract made in the same way. This process was repeated until an extract was obtained that contained no reducing substance. Each extract when drained off from the vegetable was concentrated and made up to a given volume, and then its reducing power was tested qualitatively with Benedict's solution. All of the reducing extracts were united, and a determination of the reducing substance in this total extract was made by Benedict's method for quantitative estimation of glucose. The reducing substance of the total extract was calculated as glucose. In many instances the color of the extract interfered with the quantitative test, and such extracts were therefore clarified and decolorized by the use of lead acetate, the excess of the latter being removed with hydrogen sulphid gas. The nature of the reducing substance was further tested with yeast to determine its fermentability. The residue of the vegetable, after all extractions were made, was finely ground and submitted to amylolytic digestion with saliva, and the salivary extract was tested for reducing substance. When the color did not interfere, tests for starch were made with iodine. All figures are calculated on the edible portion of the food.

Table 2 reveals the fact that at the end of the third extraction—which fairly represents the "thrice-cooked" vegetable—some of these materials were comparatively freed from reducing substance while others were not. The table also shows enough difference in the amount of reducing substance to suggest the wisdom of a choice among these illustrative vegetables in making up a diabetic diet. A dietitian recently remarked that diabetic patients do not tolerate cauliflower very well. This is not surprising in view of the fact that the cauliflower is not only comparatively rich in reducing substance, but is also slow to give this up by cooking, as evidenced by the number of extracts showing reduction. In all of these vegetables in which the extract reduces, it also ferments with yeast. No further attempt was made to identify the reducing substance. Most of these vegetables were evidently very poor in starch, for salivary digestion of the residues in very few cases resulted in an extract that showed any reducing substance. The common use of spinach in the diet of the diabetic is easily justified by the low carbohydrate content, by the ease of its extraction, and by its good color and appearance even after several extractions. Fortunately, spinach retains its flavor to an appreciable extent. Celery also deserves a place in the diet of the diabetic. The ordinary field mushrooms (*Agaricus campestris*) are unique among the foods examined. These seem suitable for use, without modification, in the most restricted diet, and may be prepared alone or in combination with other less tasty products for the sake of flavor. The value of the mushroom is in its flavor, for it is seen to have no extractable carbohydrate, and Mendel<sup>3</sup> has shown that its nitrogen does not occur as protein, but in an unavailable form. This variety of mushroom may be found in the fields in the proper season, and it is not very difficult to cul-

1. Lewis, H. B.: Value of Inulin as a Foodstuff, THE JOURNAL A. M. A., April 20, 1912, p. 1176.

2. Swartz, Mary D.: Nutrition Investigations on the Carbohydrates of Lichens, Algae and Related Substances, Yale University Press, 1911.

3. Mendel, L. B.: The Chemical Composition and Nutritive Value of Some Edible American Fungi, Am. Jour. Physiol., 1898, 1.

tivate. Mushrooms both fresh and dried are fairly common in many of our markets and are frequently obtained at a very reasonable price.

The findings in the foregoing experiments are only preliminary to further work. The analyses should be repeated so that the results will represent averages from many more tests, and a number of other foods should be examined. The results already obtained are

As it was realized that sucrose and other disaccharids, as well as the hemicelluloses, would not be detected in the foregoing direct examination of these vegetables for reducing substances, a more detailed analysis of carrots was made comparing the results of the extractions at boiling temperature and at 60 C. in experiments in which the extracts and residues were tested for reduction both before and after hydrolysis.

TABLE 2.—RESULTS OF BOILING WATER EXTRACTION

Vegetable	Arti-choke (French)	Aspara-gus (canned)	Carrot	Cauli-flower	Celery	Endive	Kale	Mush-room	Rhubarb	Spinach (fresh)	Spinach (canned)
Number of extracts showing reduction test	2	9	6	16	3	11	6	0	5	4	9
Percentage of reducing substance extracted and calculated as glucose.....	Trace	1.5	1.8	1.8	0.1	0.6	1+	0	0.4	0.2	0.4
Fermentation of extract with yeast.....	+ Very slight	+	+	+	+	+	+	0	+ Very slight	+	+
Percentage of reducing substance in sali-vary extract of residue.....	0	0	0	0.1	0	0	0	0	0	0	0
Iodin test for starch in extracts.....			0	+	0	0	....	0			
Total percentage of carbohydrate—average composition* .....		2.8	9.3	4.7	3.3	....	....	6.8	3.6	3.2	

\* Atwater and Bryant: Chemical Composition of American Food Materials, Bull. 28, Office of Experiment Stations, U. S. Department of Agriculture.

suggestive, however, of helpful possibilities in the preparation of food for the diabetic.

Following the principle used in the extraction of the sugar beet in the commercial preparation of sugar, similar treatment of a few other vegetables has been tried in an effort either to render them free from available carbohydrate or materially to reduce the amount. In this series of experiments the vegetables were finely sliced, well covered with water at 60 C. (140 F.) and allowed to soak. At intervals of ten or fifteen minutes, the water having cooled to 45 or 40 C. (113 or 104 F.) was drained off, and fresh water at 60 C. added for the next extraction. This process was repeated until, on removal of a portion of the vegetable and thoroughly cooking it at the boiling temperature, an extract was obtained which gave no reduction test.

Table 3 gives the results of the boiling water extraction and of the extraction at 60 C. The possibilities in the latter method have not been fully tested as yet. The extraction at the lower temperature seems equally efficacious in the case of some vegetables, but it is not adapted to the preparation of cabbage, for example, and probably not to some others. The extraction at 60 C. has the advantage of impairing color and texture less than the repeated extractions with boiling water.

To the normal person, with his liberty of choice of food materials, these extracted vegetables are not unusually tempting; but to the diabetic, with his restricted range of selection, they do offer something of interest. One diabetic was so much pleased with carrots prepared by the 60 C. extraction that he has planted this vegetable in his garden to assure his supply. It is evident that vegetables could be so treated and preserved for subsequent use either by canning or drying. By the use of a current of air from an electric fan, the carrots extracted at 60 C. can be easily and thoroughly dried in three and a half hours. They retain their color perfectly when desiccated in this rapid manner, and after soaking and cooking show little variation from the fresh carrot when cooked.

It is apparent that the carbohydrate of the carrot occurs almost entirely in the form of a soluble reducing substance, for neither salivary digestion nor hydrolysis adds materially to the total reducing power. This is not the result that occurs with the beet, for instance, for the carbohydrate of the beet occurs largely in the form of sucrose, and only a trace of reducing substance is found until after hydrolysis.

TABLE 3.—EFFECT OF TEMPERATURE ON EXTRACTION

Vegetable	Beet	Cab-bage	Car-rot	Egg-plant	Pars-nip	Pine-apple
BOILING EXTRACTION						
Number of extracts showing reduction test .....	2	8	6	7	6	9
Percentage of reducing substance extracted and calculated as glucose..	Trace	2.5	1.8	2.1	8.6	3.2
Fermentation of extract with yeast..	+	+	+	+	+	
Percentage of reducing substance in salivary extract of residue .....		Trace	0	0	0.4	
Iodin test for starch in extracts.....	0	.....	Trace	0	+	0
Percentage of reducing substance in salivary extract of residue .....	0	.....	Trace	0	+	0
SIXTY C. EXTRACTION						
Time required to free from reducing substance ....	1 hour	? Little affected	1½ hrs.	2 hrs.	1 hour	3½ hrs.

An attempt was made to extract carrots with cold water. The finely sliced vegetable was put into a heavy bag, which was fastened to the tap, and water at full pressure was forced through the bag for twenty hours; but this plan of diffusion with cold water removed only a very small amount of the reducing substance of the carrot.

These tests are preliminary to more extended work along the same and similar lines. Other foods may well be modified by these methods, and other methods of modification may suggest themselves for trial.

## CONCLUSIONS

Repeated water extraction as employed in the "thrice-washed" or "thrice-cooked" vegetables is more effective in removing carbohydrates from some foods than from others.

The effectiveness of the extraction at 60 C. in the case of the beet and carrot suggests the possible advantage of using the lower temperature in the preparation of other foods.

TABLE 4.—COMPARISON OF RESULTS OF EXTRACTIONS AT BOILING TEMPERATURE AND AT 60 C.

	Reducing Substance per Hundred Gm. Carrots	
	100 C. Extraction	60 C. Extraction
Total extract:		
Reducing substance before hydrolysis.....	1.5 gm.	1.2 gm.
Reducing substance after hydrolysis.....	1.9 gm.	1.6 gm.
Residue:		
Reducing substance after hydrolysis.....	0.5 gm.	0.7 gm.
Reducing substance after salivary digestion	Trace	0.14 gm.

If the soluble carbohydrate is in an available form, the repeated extractions are justified, provided that the resulting product is still reasonably palatable. If, however, the carbohydrate is not available, as in the case of mushrooms, the process is useless.

Information concerning the nature and physiologic significance of the carbohydrate will lead to a rational method of procedure in the preparation of the foods.

## PROLAPSUS UTERI AND ITS TREATMENT\*

A. J. RONGY, M.D.

Fellow of the American College of Surgeons  
NEW YORK

It is not the purpose of this short paper to bring forth a new method for the treatment of uterine prolapse, nor is it my intention to enter into a detailed discussion of the technic of the various operations now in vogue. I feel that much has been said and written on the subject. To me it seems that the entire subject of pelvic hernia has in the past been viewed from the standpoint of repair only. The inventive powers of the gynecologist have been heretofore directed toward the development of a newer and better technic for the construction and their replacement of tissues and organs in the proper places. True, this resulted in the development of one of the most ideal operations, and one which may be performed in the case of the largest percentage of patients suffering from uterine prolapse, namely, "the vaginal fixation or interposition operation."

This operation, if well performed in properly selected cases, completely cures the patient. No other single or combined surgical procedure accomplishes such desirable results. It is surprising to note that many gynecologists, however, still resort to other means to correct this condition, the most troublesome to which middle-aged women are subject. Is it because the interposition operation presents a more difficult technic? Or is it because a great number of gynecologists are better trained in the older methods and refuse to progress?

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It seems to me that in the light of our present knowledge there should not be a difference of opinion as to the indications and contraindications for this operation. However, while it is true that we have perfected a good surgical technic for the cure of pelvic hernia, yet it appears to me that no attempt has been made by either the gynecologist or the obstetrician to seek deeply into the causes which bring about the various degrees of hernia of the vaginal vault, resulting from childbirth. Poor obstetrics is usually the reason assigned in a large percentage of cases. Now, is this true? It has been my good fortune to be associated with large obstetric services since the days of my early training. I had unusual opportunities to observe both normal and abnormal obstetrics as it is practiced in hospitals. I also had the advantage of examining and carefully watching a large number of patients in my office during their antepartum period. I tried to correlate the size and consistency of the fetal head, the nature of the labor; whether short, spontaneous or instrumental, with the findings after a careful examination—six or eight weeks postpartum. I was soon convinced that the history of the labor, and the size of the child, very often did not coincide with the postpartum findings. Some of the most severe forms of procidentia were discovered in patients who had very easy deliveries. Again, very often few local disturbances were discovered, even after the most difficult instrumental delivery.

It seems to me that the causes for prolapse of the pelvic viscera is still not thoroughly established. Studies of the anatomy of the pelvic floor in cases of prolapse do not disclose all the etiologic factors. They simply reveal an existing condition as a result of trauma. The anatomist, during his studies, is not familiar with the obstetric history of the patient. He is unable to judge what were the mechanical factors concerned in the production of these anatomic distortions. I believe that if it were possible for the anatomist to observe the mechanical processes of a given case of labor and then study the structures of the pelvic outlet, he would reach a more definite conclusion as to the reasons why normal labor will very often cause prolapse of the pelvic viscera. To illustrate, let me quote from one of the most illuminating articles on the subject of repair of the pelvic outlet, by Haynes. He says:

The lesions considered in this paper are produced at childbirth by the passage of the child through the parturient canal, either unassisted or aided by the use of forceps.

Probably the premature application of the forceps or their faulty adjustment or ignorant use, contributes to the production of tears of the pelvic outlet. Indeed it is probable that the rarer form of rupture of the levator ani muscle close to the pelvic arch is due solely to the cutting action of the blade of the badly applied or used forceps.

At birth, then, the child must pass through the pubococcygeal loop of the levator muscle, through the gap in the perineal shelf, and through the vaginal slit in the pubococcygeal hammock. . . .

This passage is usually made without any material damage when the normal conditions affecting mother, child and time prevail by the gradual stretching of the structures composing the different layers. However, there may be such a disparity between the size of the child and the potential passageway or the birth so precipitate, that all the structures are torn through into the rectum or into the ischioanal fossa. Between these two extremes there are all grades of lacerations.

We all agree as to the truth of these statements when generally applied, but the description, while