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NUTRITIONAL ADEQUACY OF THE DIABETIC DIET

Advances in medicine have enabled the physician to reduce the mortality rate from diabetes mellitus. The introduction of insulin therapy, the understanding of fluid and electrolyte balance in the treatment of ketotic acidotic coma and the use of sulfa drugs and antibiotics were the contributing factors to this increased longevity. One of the major problems that remains is the avoidance of chronic invalidism of those whose lives have been extended. The treatment of a chronic disease should be designed to allow the individual to make his full contribution to society. The mere prolongation of life without health or happiness is short of the desired goal.

In the maintenance of good health and a sense of well-being, the *adequacy of the nutrition* of the individual is a very important factor. The term "adequate" is relative and its interpretation very variable. A diet adequate for a healthy young, vigorous adult male is excessive for a female or an elderly male. At the same time, it may be inadequate for a growing boy or in the rehabilitation convalescent period of the young adult. The problem is to define a set of nutritional requirements for the diabetic and teach the physician to calculate the diets accordingly.

A great many dietary standards have been promulgated for population groups and even for individuals. In 1940 the Food and Nutrition Board of the National Research Council accepted the responsibility for developing a dietary standard for the people of the United States. The philosophy of their recommendations was based on *allowances suitable for the achievement of good nutrition in the whole population* rather than filling the minimal needs of the average individual. These were published in 1943, and revised in 1945 and again in 1948. They are at present undergoing further revisions in certain detail.

It is universally accepted that diet therapy is the keystone to modern treatment of diabetes mellitus. The accent of the diet therapy has been on the control of one very obvious phase of the condition, that is carbohydrate utilization and prevention of hyperglycemia and glycosuria. This emphasis at times has distracted attention from the over-all nutritional adequacy of the diet. In the published literature in this field, frequent reference is made in the text of an article to the importance of nutrition. Examination of the tables and figures of diets actually prescribed not infrequently fail to substantiate the text. The statement, "If the weight is maintained, the diet is adequate in calories," is commonly quoted. An analysis of this statement proves its incompleteness. The statement should read "If the *ideal or optimum* weight is maintained, the diet is adequate in calories." Reduced caloric intakes result in adaptative mechanisms with associated lowering of metabolic requirements and slowing down of metabolic processes. Caloric equilibrium can be reached and body weight maintained at a 1200 to 1500-caloric intake for a young adult whose optimum calorie requirement may be 2600 calories. At the lower equilibrium, he is incapable of a full active, healthy life and will show easy fatigibility, decreased resistance to infection, loss of vigor, and even apathy and mental depression. At the higher level of a caloric equilibration, he can be a normal adult with a sense of well-being.

The most commonly prescribed diets for diabetic adults today (Table 1) provide approximately 1600 to 2100 calories.

TABLE 1
Food values of commonly used diabetic diets

Carbohydrates	Proteins	Fat	Calories
150	80	80	1640
180	80	80	1800
150	100	60	1540
200	100	100	2100

Compare these with the recommended calorie allowances of the National Research Council in the 1953 revision. (See Table 2A and B). It is apparent that the diabetic diets are inadequate in calories for most adults except middle-aged and elderly females. The prime requisite of the body is for calories. The administration of large excesses of vitamins will not prevent starvation if the caloric intake is inadequate.

In the case of the growing children, the diabetic diets are even less adequate. An analysis of the diabetic diets as prescribed fails to show any over 2600 calories and few of them even at the 2400-calorie level. The National Research Council suggested allowances as shown in Table 2A and B reach a much higher level. The calorie content of a diet should supply the needs of fully healthy individuals for their age, sex, size and activity to maintain optimum body weight, *support the optimum rate of growth* and full physical activities.

Protein allowances for the diabetic should be even greater than for the nondiabetic. The standard allowance of 1 gm. per kg. of body weight for adults is acceptable for the healthy individual. During periods of active growth the protein needs rise to 3 gm. per kg. of body weight, and during periods of slow growth go down to 1.5 gm. per kg. of body weight. These protein recommendations are predicated upon the consumption of an adequate caloric intake. The diabetic, it has been demonstrated, develops a negative nitrogen balance during episodes of ketosis, even very mild, transient ones. In deep ketotic acidosis, hourly nitrogen losses equivalent to 100 gm. of protein have been measured. This means that the diabetic must be insured with liberal amounts of protein

TABLE 2A
Daily dietary allowances[1] (revised 1953) designed for the maintenance of good nutrition of healthy persons in the U.S. as recommended by the Food and Nutrition Board, National Research Council

Allowances Are Considered to Apply to Persons Normally Vigorous and Living in Temperate Climate	Age Years	Weight kg. (lb.)	Height cm. (in.)	Calories	Protein gm.	Calcium gm.	Iron mg.
Men	25	65 (143)	170 (67)	3200[2]	65	0.8	12
	45	65 (143)	170 (67)	2900	65	0.8	12
	65	65 (143)	170 (67)	2600	65	0.8	12
Women	25	55 (121)	157 (62)	2300[2]	55	0.8	12
	45	55 (121)	157 (62)	2100	55	0.8	12
	65	55 (121)	157 (62)	1800	55	0.8	12
	Pregnant (3rd Trimester)			400	80	1.5	15
	Lactating (850 ml. daily)			1000	100	2.0	15
Infants[3]	1/12-3/12	6 (13)	60 (24)	kgx120	kgx3.5	0.6	6
	4/12-9/12	9 (20)	70 (28)	kgx110	kgx3.5	0.8	6
	10/12-1	10 (22)	75 (30)	kgx100	kgx3.5	1.0	6
Children	1-3	12 (27)	87 (34)	1200	40	1.0	7
	4-6	18 (40)	109 (43)	1600	50	1.0	8
	7-9	27 (59)	129 (51)	2000	60	1.0	10
Boys	10-12	35 (78)	144 (57)	2500	70	1.2	12
	13-15	49 (108)	163 (64)	3200	85	1.4	15
	16-20	63 (139)	175 (69)	3800	100	1.4	15
Girls	10-12	36 (79)	144 (57)	2300	70	1.2	12
	13-15	49 (108)	160 (63)	2500	80	1.3	15
	16-20	54 (120)	162 (64)	2400	75	1.3	15

[1]In planning practical dietaries, the recommended allowances can be attained with a variety of common foods also providing other nutrient requirements less well known; the allowance levels are considered to cover individual variations among normal persons as they live in the United States subjected to ordinary environmental stresses common thereto. Other nutrients discussed in the report of the Board include: Fat, Water, Sodium Chloride, Phosphorus, Copper, B_6, Vitamin B_{12}, Folacin, Biotin, Pantothenic Acid, Vitamin K, and Fluoride.

[2]These calorie recommendations apply to a moderate degree of activity for the standard man (40-hour work week with at least 8 hours of weekend outside physical activity, in temperate climate). For the urban "white-collar" worker they are probably excessive. In any case, the calorie allowance must be adjusted to the actual needs of the individual as required to achieve and maintain his desirable weight.

[3]The recommendations for infants pertain to nutrients derived primarily from cow's milk or commercial milk preparations. There should be no question that human milk is a desirable source of nutrients for infants, although expected intakes may not provide the above recommended levels of certain nutrients; e.g., protein, calcium, riboflavin and thiamine.

This table has been made available by special permission in advance of publication of the full text of the Board's report. This will be published in the spring of 1954 as a bulletin in the numbered series issued by the National Academy of Sciences.

TABLE 2B

Daily dietary allowances (revised 1953) designed for the maintenance of good nutrition of healthy persons in the U.S. as recommended by the Food and Nutrition Board, National Research Council

	Allowances Are Considered to Apply to Persons Normally Vigorous and Living in Temperate Climate						
	Age Years	Vitamin A I.U.	Thiamine mg.	Riboflavin mg.	Niacin mg.	Ascorbic Acid mg.	Vitamin D I.U.
Men	25	5000	1.6	1.6	16	75	
	45	5000	1.4	1.6	14	75	
	65	5000	1.2	1.6	12	75	
Women	25	5000	1.2	1.4	12	70	
	45	5000	1.0	1.4	10	70	
	65	5000	1.0	1.4	10	70	
	Pregnant	6000	1.5	2.0	15	100	400
	Lactating	8000	1.5	2.5	15	150	400
Infants[3]	1/12-3/12	1500	0.4	0.5	4	30	400
	4/12-9/12	1500	0.5	0.8	5	30	400
	10/12-1	1500	0.5	0.9	5	30	400
Children	1-3	2000	0.6	1.0	6	35	400
	4-6	2500	0.8	1.2	8	50	400
	7-9	3500	1.0	1.5	10	60	400
Boys	10-12	4500	1.3	1.8	13	75	400
	13-15	5000	1.6	2.1	16	90	400
	16-20	5000	1.9	2.5	19	100	400
Girls	10-12	4500	1.2	1.8	12	75	400
	13-15	5000	1.3	2.0	13	80	400
	16-20	5000	1.2	1.9	12	80	400

See footnotes of Table 2A.

at all times. After ketotic episodes, a distinct effort should be made to replenish the losses as rapidly as possible. The nature of the amino acid requirements to replenish these protein losses are unknown. In accordance with the law of the minimum, no amino acid mixture is more efficient than the least amount of the essential amino acid present. It is necessary, therefore, to supply an excess of mixed proteins in order to insure the adequacy of the amino acid mixture. The protein allowance of the diabetic adult should be in the order of 100 gm. each day and for children and adolescents, proportionately as high. It must be remembered that there is a real possibility that many of the degenerative diseases seen in the accelerated form in the diabetic can be nutritional in origin.

The diabetic should be encouraged to consume a diet which is nutritionally adequate. Sufficient insulin should be given to enable him to metabolize the ingested nutrients.

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Publicity Regarding Medical Science in Spanish America

The Interlingua Division of Science Service has announced the publication of a booklet containing abstracts from "The Story of the Adaptation Syndrome," By Dr. Hans Selye, translated into Spanish. This illustrates one phase of the work of Science Service, "the Institution for the Popularization of Science," which was organized in 1921 as a non-profit corporation with trustees nominated by the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, the E. W. Scripps Estate and the Journalistic Profession.

The Interlingua Division, through this Spanish publication, will make possible dissemination in Latin America of the interesting and important concept pioneered by Selye, which has received such wide attention from the medical profession of this Continent. The booklet contains a glossary of the abbreviations and technical terms which have been used in writings on stress. It presents with illustrations the ideas concerning stress proposed in 1936 and also developments which have appeared in 1937, 1944, 1945 and 1952. It gives an excellent review of the subject for readers in Spanish-speaking countries.