NUTRITIONAL EVALUATION AND WEIGHT RECORDS OF NEUROPSYCHIATRIC PATIENTS RECEIVING TRANQUILIZING DRUGS

A Thesis

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By

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CHAPTER I

INTRODUCTION

Few dietary studies of patients in neuropsychiatric hospitals have been reported. The idea has been expressed that the psychiatric patient had enough problems and confusion in life without the additional burden of thoughts concerning food. Since food may have numerous meanings to persons, representing not only nourishment and fuel for body energy, but also love, security, anxiety, or frustration, it is possible that these emotional feelings may influence food intake. The difficulty in measuring the influence of these feelings is a problem to investigators.

During recent years, as tranquilizing drugs have become available for treatment, problems have developed concerning the weight gain of patients. Observers have stated that many patients who are started on a regimen of tranquilizing drugs seem to gain weight quickly. A change in basal metabolism, a relaxation and serenity of the body produced by the drug, water retention, or increased appetite accompanied by increased food intake have all been postulated as probable explanations.

Due to the limited information about what food and how much food is eaten by subjects taking tranquilizing drugs, Part I of this study includes a fifteen-day food intake record and a nutritional evaluation of the foods consumed by twenty-eight subjects. At the same time the

weight records of the subjects were followed to note any relationships between food intake and weight change. The literature reviewed for this part of the study included the effect of tranquilizing drugs on weight, with attention to the type and amount of food consumed, methods of obtaining dietary information, and techniques to use for dietary analyses.

Since a change in basal metabolism resulting from the administration of tranquilizing medication has been suggested, a few cases were studied by measuring the basal metabolism before and after taking the drugs (Part II). Literature on the oxygen consumption of mental patients, the use of drugs to help in obtaining the basal metabolic state, and information on the actual basal metabolism test was reviewed.

Definition of Terms

ambulatory. Walking or able to walk; not confined to bed.

basal metabolic rate. The rate is expressed as a plus or minus percentage of the normal as listed on specific calculated tables. Calories per hour per square meter of body surface is generally the expression that is converted to percentage in the table.

basal metabolism. The minimal energy expended for the maintenance of respiration, circulation, peristalsis, muscle tonus, body temperature, glandular activity and the other vegetative functions of the body.

canteen book. A booklet of coupons worth two or five dollars issued to patients of the Chillicothe Veterans Administration Hospital. The book is used as a substitute for money on hospital grounds.

dextro-amphetamine sulfate. A chemical compound used in the treatment of mild depressive states, to restore the feeling of well being and ability to work; also used for control of the appetite in obese patients.

myxoedema. A condition characterized by boggy swelling of the face and hands, and occurring as a result of deficient functioning of the thyroid.

nembutal. A proprietary name for pentobarbital sodium; hypnotic, antispasmodic and sedative.

neuropsychiatry. The branch of medicine which includes both neurology and psychiatry.

niacin equivalents. These include dietary sources of the preformed vitamin and the precursor tryptophan; 60 milligrams of tryptophane equals one milligram of niacin.

placebo. An inactive substance or preparation used in controlled studies. One group of subjects would receive the placebo while another group would receive a medicine and results would be compared to determine the effects of the medicine.

prognosis. A forecast as to the probable result of an attack of a disease; the prospect as to recovery from a disease as indicated by the nature and symptoms of the case.

psychosis. Formerly, a generic name for any mental disorder. Specifically, the deeper, more far-reaching and prolonged behavior disorders, such as dementia precox and manic-depressive.

psychotic. Pertaining to, characterized by, or caused by psychosis.

recommended dietary allowances. Nutrient levels intended to cover individual variations among most normal persons as they live in the United States under usual environmental stresses; these are set by the National Research Council (revised 1958).

respiratory quotient. The ratio between the volume of carbon dioxide expired and the volume of oxygen inspired in a given time.

schizophrenia. A mental condition in which the person has difficulty in establishing the difference between the real and the unreal. Due to emotional pressures, he enters a dream world.

schizophrenic. A person affected with schizophrenia.

sodium amytal. A sedative.

thyrotoxicosis. The disease condition produced by poisons that enter the system through the thyroid gland, or by excessive activity of the thyroid gland; toxic adenoma of the thyroid.

tranquilizer. Ataractic; a group of phenotropic compounds whose effects are exerted primarily at a subcortical level, so that consciousness is not interferred with in contrast to hypnotic sedative drugs, which also have a calming effect. The following are a list of tranquilizing agents referred to in this paper: chlorpromazine, imipramine, isocarboxazid, trifluoperazine, reserpine.

PART I

CHAPTER II

REVIEW OF LITERATURE

Tranquilizing Drugs and Weight Gain

Recent studies on the use of chemical tranquilizers for the treatment of emotional and mental disorders have created an unprecedented enthusiasm. Ayd (as quoted by Gelber) stated that it is difficult to imagine any discovery that carries greater promise for our most urgent health problem than the advent of these drugs, whose experimentation began only in 1953 (1).

With all new discoveries come new problems and challenges. One of the problematic side effects of tranquilizing drugs is weight gain. In general, patients have been observed to gain weight, often considerable amounts, when treated with any of these agents (2). One researcher (3) has even referred to the "epidemic" of weight gain in hospitals since the introduction of the tranquilizing drugs and suggested that this could constitute a medical problem.

One group of investigators (4) who set out to answer several questions concerning the relation of weight and tranquilizers found that

1. there were more overweight than underweight patients in psychiatric hospitals (personnel of the Veterans' Administration Neuropsychiatric hospital used patients from a large state psychiatric hospital as a control). However, checking back, upon admission to the

Veterans' Administration hospital, there were more underweight than overweight patients.

2. more patients were currently gaining rather than losing weight at each hospital. The article pointed out that the Veterans Administration basic diet is about 2800 calories and seconds are available. Gordon and others (4) state that once the average psychotic patient encounters the regular routine of a hospital, along with relief from pressing problems of the outside environment, he starts to gain weight even if he is not taking tranquilizing medication. After several months of treatment, about 17 per cent of the psychotic admissions shift from being underweight to normal and 20 per cent of admissions go from normal range into the overweight range. Generally speaking, most psychotic patients tend to gain weight during at least the first four months of their hospitalization.

3. patients on tranquilizing drugs gained weight more rapidly than patients not on them. Patients on tranquilizers tended to make their largest gains in the first four months of treatment, then the rate of gain becomes smaller.

Gordon (4) and Post (5) suggest that the schizophrenic disorder may disturb the natural regulation of food intake to such an extent that it is no longer governed by feelings of appetite and hunger. So, calories ingested often cease to correspond with the subject's requirements and extreme deviations from a normal nutritional status are produced.

One experiment (6, 7) tells of a group of patients who took chlorpromazine for two months. The group was then subdivided and the study drugs of dextro-amphetamine, imipramine, isocarboxazid, trifluoperazine, and placebo were added to their medications. The results indicated that all groups gained except the group in which the study drug was dextro-amphetamine. Over the five-month period, a loss or gain of five pounds was considered to represent normal variability in weight and one-third to one-half of the patients fell within that range. The authors offer the possibility of regular use of dextro-amphetamine to control weight gain in connection with the use of tranquilizing drugs (providing an optimal non-disturbing dose can be determined).

Koltonow (8) has reported a study in which reserpine was used to treat patients with chronic mental disease. Increasing doses of the drug were given over certain time periods. At one period it was observed that the food consumption doubled. The patients gained weight, some very rapidly, while the dosage was increased, then later lost weight with continuation of the drug. The project extended over nearly a year. The average weight gain of those on reserpine was 10.6 pounds as contrasted to 3.2 pounds for those on the placebo. The gain in weight is believed to be significant and might be a prognostic aid in evaluating the effect of reserpine.

Another study (9) investigated fifty-nine chronic schizophrenic male patients and found that during the four-month period preceding the medication, no appreciable weight change occurred in either group (one

group was to receive placebos, the other chlorpromazine). During the three months on medication, the patients receiving the placebo lost weight (average of 2.5 pounds), whereas patients receiving chlorpromazine maintained their premedication weight with a slight mean gain (1.4 pounds). Heavier patients lost more weight irrespective of medication.

Planansky (3) studied seventy-three patients on chlorpromazine medication. A twelve-month control period preceded medication. A consistent increase in average weight occurred with the introduction of chlorpromazine medication. The patients could have unlimited amounts of calories before, as well as during, treatment. The average daily ration was about 3000 calories (without second helpings at the study hospital). Patients also had canteen books and volunteer group treats. The caloric intake was not controlled. Fairly satisfactory, but not precise, information on changes in caloric intake had been obtained through a close observation of changes in patients' eating habits.

All patients who had been feeding problems began to eat, either spontaneously or with encouragement. Many of those who had been eating adequately before medication started to ask for second helpings. One or two became voracious. Several men volunteered the information that the drug increased their appetites.

Fluctuations in physical activity are even less accessible to evaluation than eating habits. It may be assumed that energy expenditure decreased in individuals who, for instance, ceased pacing up and

down dayrooms. It is difficult to derive an even approximate impression of changes in the energy balance in patients who become more accessible and interested with treatment, and begin to participate in the therapeutic program. It is felt that on the whole, food intake has been a more decisive influence on weight changes than physical activity. Planansky concludes that, most likely, an increased food intake, subsequent to the amelioration of mental symptoms, is the main cause of the weight gain (3).

Mefferd and others (10) obtained a wide variety of biochemical, psychological, and clinical measurements from chronic schizophrenics receiving chlorpromazine or placebo in alternating arrangements. They inferred that observed weight changes were reflective of differences in food consumption from elevated potassium, urea, uric acid, sodium and phosphate excretions during treatment. Although they thought that some of the gain may be due to the accumulation and retention of tissue fluids, they decided that increased food consumption was more likely because urine flow was also elevated. Their concluding statement was: "The beneficial effects of chlorpromazine therapy possibly are due to a substantial extent to the fact that the condition of the appetite and other regulatory mechanisms in the brain, and the overall metabolic activity are improved. The patients receiving chlorpromazine ate more, consumed more liquid and salt and slept better than before receiving the drug. It is certain that most of them were improved physiologically by the long-term therapy.

The following literature has been reviewed to become familiar with the proper methods of collecting and analyzing dietary information.

Dietary Information

Methods of Obtaining Dietary Information

In any proposed study, objectives must be clearly defined, as objectives determine the methods to be employed both for obtaining and processing the dietary data (11). Young (11) stated that there are limitations in all of the methods, the greatest being the limitation of human error, which is most difficult to estimate.

There are certain basic facts that should be obtained about the subject to make dietary information meaningful, such as age, sex, occupation, activity, height, weight, history. All auxiliary data should be anticipated and obtained at the time when the data are collected (11).

Decisions that have to be made include: (a) the time period to be studied; (b) timing of the recording process; (c) methods to be used in determining amounts of foods; and (d) the persons providing the information. The choice of method is also based on the number of subjects, willingness and ability of the subject to cooperate, the time required per subject, cost, kind of interview to be used, whether trained interviewers are necessary and their availability (11).

There is also the question of whether the subject should be aware that he is to be questioned or observed. If an accurate and valid index is desired, better data can be obtained if the subject is unaware.

If he is to be asked later, however, about food intake, he will have to be told. Evidence indicated that there is greater accuracy when the subject has been alerted so he is aware of what he eats (11).

Trulson and McCann (12) have listed four methods of collecting dietary information:

1. An individual's written diary of all food and beverage consumed (subjects must be literate).
2. Weigh all food consumed--probably the most accurate method.
3. Use of a questionnaire.
4. Use of a dietary history interview.

The first two methods could be used to obtain a current record and the remaining methods to obtain a recalled record. The dietary history interview will now be discussed.

Interview

Good dietary interviewing requires skill, time, and some background knowledge of what goes into forming food habits, their significance and factors which affect them (13). It is important to be aware that food intake and eating habits represent a most complex facet of human behavior. When one attempts to influence food habits he is not dealing with physical nourishment or an intellectual matter alone. One is using instead an intellectual approach to a highly involved behavior pattern. Wallen (as quoted by Young) has said that feeding activity ranks with sexual behavior as a demonstration of that particular and delicate interaction of biological, psychological,

and cultural influences so often found in the study of human wants (13). Acceptance of food is a composite of biochemical, physiologic, psychologic, cultural, and educational factors. When this is understood and appreciated, one can readily understand why it is one of the most difficult aspects of human behavior to change. People cling to customary food habits, especially when other disquieting events may be taking place in their lives, for food has far more significance to them than physical nourishment alone (13).

Young (11) and Adelson (14) agree that the cooperation of the subject is necessary to obtain reliable data. The subject must understand what information is needed for the study and that it must be factual. The stress or apprehension from the survey itself may bring about a change in the subject's dietary practices or in what he reports, causing him to give misinformation. He may alter his intake to conform to his concept of what he should be eating. Another factor which may influence the quality of the data obtained is the direction or instruction provided the subject (11).

The interviewer must have rapport with the subject (11). Bryan and Anderson (15) suggest this may be established during the preliminaries of the interview by asked general questions, then proceeding to the food pattern or food intake. Young (16) has stated that there is no standard or uniform procedures applicable to all patients in the hands of all therapists. However, she is convinced that the preliminaries are the most important.

Dietary Analysis

A National Research Council bulletin (17) points out that the first question to decide in planning the analyses of dietary records is which of the nutrients needed by the body to include. Some nutrients are so widely distributed among foods or are sufficiently closely associated with others that not all need to be considered in equal detail. If the nutritive content of the diets is to be calculated rather than analyzed, the availability of suitable food composition data must be considered. The investigation should consider also the yardstick to be used in interpreting the nutrient content of the diet. It seems logical to calculate the quantities of a given nutrient for which standards of intake have been proposed.

The National Research Council (17) reports that agreement between calculated and analyzed values is remarkably good. For example, comparisons of the mean analyzed caloric value of individual diets with those calculated from modern food tables reveal that, despite differences between corresponding individual pairs, calculated and determined means of protein in diets also show good agreement, usually within 5 per cent. Calculated values for fat in the diets generally tend to be higher than the values obtained by analysis. A study by Whiting and Leverton (18) agrees with findings of the National Research Council. Comparison of results from two methods of processing the same data shows that for protein and calories, the calculated values for more than 50 per cent of the total number of cases fall within a range of 10 per cent of the analyzed value.

Perhaps the greatest discrepancies have been found and are to be expected in vitamin values because of wide natural variations and chance for loss in the handling of foods (17). The Council states in conclusion that results are considered to be sufficiently close to warrant the use of food tables in dietary surveys. This presupposes that the food intake is accurately measured, the length of period of study is sufficiently long, and proper food tables are applied.

One source of error in dietary calculations is in estimating the nutritive value of mixed dishes (17). Where recipes can be furnished, the results can be more accurate.

In general, one must conclude that, on an individual basis, results to be obtained from one method cannot be predicted by another method. With different methods, one is measuring different things. Though comparisons of one method with another have been made, these comparisons are between methods whose accuracy and reliability are not known; therefore, no conclusions may be reached regarding which method is the most accurate or reliable (11).

This brief review of the literature on tranquilizing drugs, weight gain, and methods of calculating and analyzing dietary information served as a background for developing the procedure used to study the food intakes and weight gains of a selected group of psychiatric patients.

CHAPTER III

PROCEDURE

Twenty-eight male neuropsychiatric patients participated in this part of the study. Members of the group had been patients at the Chillicothe Veterans Administration Hospital for two to four months when the study began. A few cases were readmissions. However, four months or more had intervened since the previous admission. According to the diagnosis, the doctor estimated that these patients would benefit from treatment lasting three months more and would be available and cooperative for this study. All of these patients were ambulatory and most of them had privileges of the open wards. Twenty-five subjects received tranquilizing drugs. The three subjects receiving no tranquilizing drugs will be discussed separately.

During the first week of the study, each patient was scheduled for a brief interview. A peripheral coding card (see Appendix) was used to record information, such as nutrition intake before coming to the hospital, number of meals taken daily, who prepared them, and food likes and dislikes.

A daily food intake record was completed for five days, Monday through Friday, the first weeks of August, September, and October, 1961. The food intake record was similar to one shown by Taylor (19) (see Appendix). The food tables used for calculations included

Nutritive Value of Foods (20) and Food Values of Portions Commonly Used (21).

The first day of each week of the study hospital nursing assistants helped to locate patients in the dining rooms and asked them to sit at the same tables for four, six, or twelve persons whenever possible. Each of the patients was contacted before he left the dining table or shortly after at breakfast, dinner, and supper.

The patients were all on regular diets and were informed that they could eat the amount of food they usually did. Each patient was permitted to visit the "seconds cart" as often as he desired. Most of the patients on the study had canteen privileges. Each evening at supper each patient was asked to report anything he might have eaten at the canteen since the evening preceding. There were occasions when the patients missed taking a meal in the dining room due to picnics associated with sports tournaments. When this occurred, the patient reported at the next meal what he had eaten at the picnic.

The admission weights and monthly weights were recorded for each patient. The Metropolitan Life Insurance Company Table, "Desirable Weights for Men of Ages 25 and Over, 1959," was used to determine weight status. The body builds of the subjects were determined by physicians.

CHAPTER IV

RESULTS AND DISCUSSION

Most of the patients studied were veterans of World War II and Korean Conflict and were thirty to fifty years of age. A diagnosis of schizophrenia was most common within the study group. All of the subjects had at one time or another been admitted to a mental hospital previous to this study. Three-fourths of the group were rated to have good physical health.

During the interview each subject was asked to judge his weight when they were nine to twelve years old. Twenty patients rated themselves as normal, five rated themselves as underweight, and two rated themselves as overweight. One could not remember.

The results of the weights taken at admission and at the end of the study are shown in Table 1.

Table 1 indicates that as the study progressed and the hospital stay lengthened the subjects in general shifted from the lower weight categories to the higher weight categories. This was also true of one subject receiving no tranquilizing drugs. His weight was under the ideal at admission and he gained five pounds in four months.

Table 2 shows the number gaining and losing weight from admission to the end of the study.

Table 1

A Comparison of the Weight Picture at Admission and at the End of the Study by Number of Subjects

Category	Receiving Tranquilizers		No Tranquilizers	
	Admission	End	Admission	End
At ideal weight range	6	8	-	1
1 to 5 pounds above ideal weight range	3	3	1	-
6 to 10 pounds above ideal weight range	1	2	-	-
11 to 20 pounds above ideal weight range	2	4	-	-
Over 20 pounds above ideal weight range	6	7	1	1
1 to 5 pounds below ideal weight range	5	1	-	-
6 to 10 pounds below ideal weight range	-	-	-	1
11 to 20 pounds below ideal weight range	2	-	1	-
Total	25	25	3	3

Seventeen of the patients gained weight from admission to the end of the study. Eight patients lost weight during this period. Some of the losses were small and the subjects did not change categories as listed in Table 1. Also, some weights in the category "over 20 pounds above ideal weight range" were so high that sizeable losses did not alter the category. A few of the men who lost weight had said they realized they were too heavy and were trying to cut down on their weight. One subject who lost weight weighed 299 pounds at admission

and was assigned to a closed ward, meaning he could visit the canteen only once per month. Of the three subjects not receiving tranquilizing drugs, two lost and one gained weight. One of the two who lost was grossly overweight. The one who gained approached the ideal weight.

Table 2

Number of Patients Gaining and Losing Weight From Admission to the End of the Study

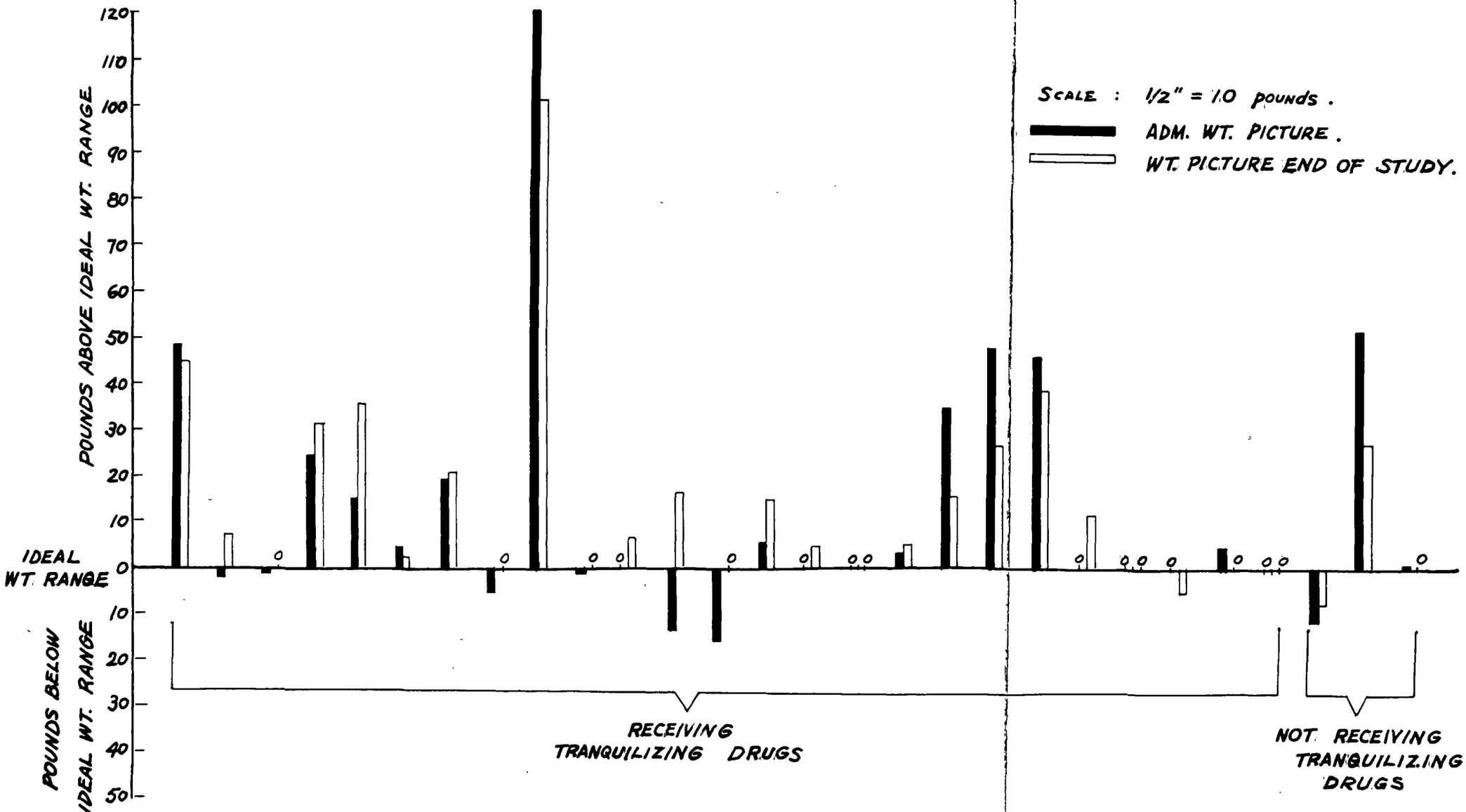
Pounds	Receiving Tranquilizers	No Tranquilizers
Weight Gain		
Less than 10 pounds	9	1
10 to 19 pounds	5	-
20 to 29 pounds	2	-
30 pounds and over	1	-
Total	17	1
Weight Loss		
Less than 10 pounds	4	1
10 to 20 pounds	3	-
Over 20 pounds	1	1
Total	8	2
Grand Total	25	3

Table 3 shows the relation (in pounds) of the ideal weight to the weight at admission and at the end of the study. Five of the eight who

TABLE III

THE RELATION (IN POUNDS) OF THE IDEAL WEIGHT TO THE WEIGHT AT ADMISSION AND AT THE END OF STUDY

(FOR INDIVIDUAL SUBJECTS)



lost were grossly overweight. This result agreed with Planansky (9) who also found that those with a high initial weight lost weight after taking tranquilizers. The other three losses were small, two approaching ideal weight, and the third going slightly below.

None of the preceding tables actually show the magnitude of weight gain in individual cases because of the ideal range which represents from 11 to 20 pounds. The greatest gain listed was 48 pounds. A few other individuals gained 18, 18, 18, 21 and 22 pounds. One of those gaining 18 pounds was put on a reduction diet several months later. The one gaining 21 pounds was diagnosed as being diabetic within two months. It is interesting to note that four of the subjects who made sizeable gains were also the ones who consumed the most calories. This result is in agreeance with Planansky (3) who states, "In the writer's patients, there had been no reason to believe that weight change was dissociated from food intake."

The analysis of the food intake indicated that taking the average for all of the days studied for each subject, three patients consumed under 2000 calories daily, seven from 2000 to 2499 calories daily, nine from 2500 to 2999 calories daily, five from 3000 to 3499 calories daily, and one consumed 3500 to 3999 calories daily. Of the three subjects not receiving tranquilizers, two consumed 2000 to 2499 calories daily and one consumed 2500 to 2999 calories daily.

Table 4 shows the distribution of subjects when the weekly averages were received.

Table 4

Distribution of Subjects According to Weekly Averages for Food Intake

Number of Calories	Number of Subjects		
	August	September	October
Below 2000	5	5	2
2000 to 2499	5	6	5
2500 to 2999	10	8	8
3000 to 3499	3	6	5
3500 to 3999	1	-	-
4000 and over	-	-	1
No record	1	-	4
Total	25	25	25

The number of patients consuming from 3000 to 3499 calories per day increased in September and October. The subjects on tranquilizers showed an increase in caloric consumption from August to October.

Over half the patients on the study consumed 100 or more grams of protein daily. Six consumed from 85 to 99 grams daily and the average of only one subject fell below the recommended dietary allowance of 70 grams of protein.

Other nutrients were reviewed on a daily basis to determine adequacy according to the recommended dietary allowances from the National Research Council. The calcium intake was adequate about 86 per cent

of the days; iron was adequate on 89 per cent of the days, Vitamin A was adequate 59 per cent of the days. Thiamine intake was adequate 70 per cent of the days; riboflavin was adequate 84 per cent of the days; niacin was adequate 31 per cent of the days; and Vitamin C was adequate 58 per cent of the days.

Looking at the averages of all days for each individual, the inadequacies become smaller. Only two subjects were deficient in calcium and iron; four were deficient in thiamine; three were deficient in riboflavin; and nine were deficient in Vitamin C. Twenty-two were deficient in niacin; however, the food table employed did not include niacin equivalents and the recommended dietary allowances do include them. Nutritive Value of Foods (20) suggests that the niacin value may be increased one-third by including equivalents. In that case, the diets of all but two of the subjects were adequate in niacin. Average intakes of all subjects were adequate for Vitamin A. See the Appendix for a complete listing of the low, average, and high intake of nutrients for each subject.

According to the analysis of the hospital menu, an adequate diet is offered. A partially selective menu allows inadequacies to occur because of selecting an item that is "liked" rather than one that is "good" for the body. The lack of nutritional knowledge of adequate food selection may also be a reason for inadequacies.

The subjects reported dietary intakes prior to admission. The pre-admission diets in most cases appeared to be inadequate in calcium, riboflavin, niacin, and Vitamin C. It is believed that the

subjects received a more adequate diet in the hospital than before admission.

A brief study of likes and dislikes was made. The groupings selected were milk, meat, bread and cereal, vegetable and fruit, and high calorie foods. The milk, bread and cereal, and high calorie food groups were well accepted. In the meat group lamb, fish, and liver were judged to be the least acceptable. Fruits were rated more acceptable than vegetables. Broccoli, spinach, and squash were judged to be the least acceptable vegetables.

PART II

CHAPTER V

REVIEW OF LITERATURE

Basal Metabolism

Information on food intake in relation to weight gain for subjects taking tranquilizing drugs has been investigated. It has been postulated that a change in metabolism occurs when taking tranquilizing medication. Since a number of subjects gained weight, this theory has been investigated.

History

The theoretical and practical bases for our present knowledge of metabolism were established before the end of the last century. Metabolism is expressed as a rate of heat production, measured as calories per hour. This can be determined by direct calorimetry, but as this technique is difficult and requires expensive apparatus, indirect oxygen consumption methods were devised. These methods are based on the assumption that a constant amount of oxygen is consumed in the oxidation of a given quality of food, for the production of a constant amount of heat. In the 1890's Magnus-Levy introduced the term "basal metabolism" and demonstrated its increase in thyrotoxicosis and its decrease in myxoedema. Shortly after 1910 measurements of basal metabolism were introduced into clinical medicine, chiefly using simple closed-circuit

machines, designed by Benedict, and there have been no major changes since (22).

Normal Range

Basal metabolism is measured as calories used per hour. Standards have been set according to tests of the population to determine the "normal." Deviation from the normal is expressed as a percentage of the base figure and called basal metabolic rate. In this country the standards of Robertson and Reid (1952) have replaced those of Aub and DuBois during the last five years, giving a normal of +13 per cent to -13 per cent (22). Hepler (23) recommends a ±15 per cent range for normal. Fulton (24) maintains that a normal range for the basal metabolic rate is ±10 per cent,

Oxygen Consumption of Mentally Disturbed Patients

It has been generally supposed that euthyroid nervous subjects show a tendency toward a high basal metabolic rate and that diagnostic errors due to emotional upsets may easily be made. This view is challenged by Melville and Mezey (25), who investigated the strength of the association between the emotional state and oxygen requirements in the lying, sitting, and standing positions in thirty-two psychiatric patients and ten healthy subjects. The serum protein-bound iodine levels of all subjects were within the normal range. The psychological state, which varied from almost normal to severe delusional fear, was estimated on a four-point system referring to symptoms indicating emotional disturbance. Two independent ratings were made,

one before testing and the other during the test procedure. It was expected that the more disturbed patients would show higher energy expenditures than the controls, but the results did not confirm this. The mean oxygen consumption of mentally disturbed patients was not significantly different from that of normal subjects in the lying and sitting position. The most striking finding was the absence of any relationship between the emotional state and the rate of oxygen consumption.

Method of Measuring Basal Metabolism of Neuropsychiatric Patients

"In anxious patients, particularly those admitted to mental hospitals, complete mental rest is usually impossible to attain," says Dally (26). Measurements of basal metabolic rate of such patients in the past have been unreliable and often of little value either for diagnosis or for following the course of treatment. The basal metabolic rate measures total body metabolism and therefore represents the end result of many oxidative processes, only one of which is due to thyroid hormone. Using non-sedated patients, results from 189 consecutive estimations of basal metabolic rates showed a wide range: sixty-four rates were +15 per cent or more and eleven rates were -15 per cent or more. Forty per cent of the basal metabolic rates were outside the normal range of ±14 per cent, 34 per cent being above normal. Of this total, only four patients were clinically "thyrotoxic," and one was clinically "hypothyroid."

Dally (26) describes the method of Fraser and Nordin used to measure the basal metabolic rate during sleep by giving nembutal orally or intravenously. Fraser and Nordin emphasize that this is the only satisfactory technique to use in nervous patients. Results indicated that in seventy-nine of the non-sedated patients, forty-two had basal metabolic rates of +15 per cent or more and two had rates of -15 per cent or less. Of eighty-one sleeping patients, nine had rates of +15 per cent or more and five had rates of -15 per cent or less. Four of these were clinically thyrotoxic. In this small series 53 per cent of the non-sedated patients had a basal metabolic rate above normal. When the sleeping metabolic rates of these same patients were estimated, only 11 per cent were still above +14 per cent. These researchers believe the sleeping metabolism rate to be synonymous with the basal metabolic rate. Dally (26) concludes that "valid estimations of basal metabolism rate of psychiatric patients are possible, but it is essential to carry out such estimations under sleeping conditions if the patient is tense or agitated; and the sleeping metabolic rate of thyrotoxic patients remains above the normal range."

In another study (27), sixty-two patients, thirty minutes after the first basal metabolism test, were given 80-250 milligrams of nembutal and the basal metabolic test repeated. The control group of forty-seven patients had two tests without nembutal. The results showed that the average basal metabolic rate of the nembutal group was somewhat higher than in the control. Approximately one-half fell asleep during the test with nembutal. The injection of nembutal in

most cases caused a decrease in metabolism and marked depressing effect on the respiratory quotient indicating carbon dioxide retention due to hyperventilation. Baron (22) tends to agree with the results of the above study. He states that unless basal conditions are observed, the oxygen consumption will be too high. On the other hand, by sedating the patient a barbituate basal metabolism rate or sleep basal metabolism rate can be measured which is lower than the standard basal metabolic rate.

The foregoing discussion explains the variable nature of results when nembutal is used. To limit variables in this study, perhaps it would be possible to use a non-sleep producing sedative.

CHAPTER VI

PROCEDURE

The five neuropsychiatric patients for this part of the study were selected by one of the admitting physicians at the Chillicothe Veterans Administration Hospital. Four of the patients selected had not received any tranquilizing drugs; the fifth had received a tranquilizing drug for only twenty-four hours prior to admission. Tranquilizing drugs were considered to be a new experience for these patients.

Soon after admission, the patient was transferred to the medical ward. Occupying a private room, the patient rested all night previous to the test. A sedative at bedtime was prescribed on several occasions prior to the tests. Nursing service personnel gave necessary instructions to prepare the patient. This included information on the omission of liquids, breakfast, activity, and smoking until after the tests were completed.

The basal metabolism tests were given by the author about 8:00 a.m. using a McKesson Recording Waterless Metabalor. Two or three tests were given on successive mornings. The temperature, pulse, and respiration of the subjects were taken immediately following the tests. Indicators on the machine showed the room temperature and barometric pressure. Tables for Computation of Metabolism accompanied the machine and were used for determination of results in this study.

Following the first series of basal metabolism tests, the patient returned to the admission ward where the doctor prescribed a tranquilizing drug.

From four to six weeks after the first series of tests, a second series was completed on each of the five patients to note any changes in weight and basal metabolism which might have occurred, possibly from taking the tranquilizing drugs.

CHAPTER VII

RESULTS AND DISCUSSION

The results for Part II will be presented as separate case studies since there were but five subjects.

E. P. M. Age 30, height 5'9", weight 154 pounds. This subject had initial basal metabolism test readings of -19 and -17 per cent of the normal. Six weeks later the subject weighed 172 pounds and had basal metabolism test readings of -17 and -10 per cent of the normal. No sedatives were given before the tests. During the period this subject gained 18 pounds and his basal metabolism increased slightly.

Z. W. Age 35, height 5'10½", weight 131 pounds. The readings for the first series of basal metabolism tests were -14, -29, and -12 per cent of the normal. Four weeks later the subject weighed 133 pounds. The second series of tests produced readings of -19, -9, and -12 per cent of the normal. Two pounds were gained during the period. Sodium amytal, grains three, were given the night preceding five of the tests.

E. S. Age 41, height 6'5", weight 159 pounds. Basal metabolism test readings for the first series of tests were +9, -4, and -4 per cent of the normal. Six weeks later the patient weighed 160 pounds. The second series of tests had only one accurate reading, +9 per cent of the normal, as technical difficulties were encountered. This patient had all his teeth extracted during the six-week period and gained one pound. A sedative was given before the first three tests.

H. W. Age 52, height 5'10", weight 112 pounds. The readings for the first series of basal metabolism tests were +33 and +23 per cent of the normal. After seven weeks, the patient weighed 118 pounds, a gain of 6 pounds. The second series of tests had the results of +23, -17, and +15 per cent of the normal. The patient received a sedative the nights preceding the first series.

H. B. Age 46, height 5'9", weight 125 pounds. The readings for the first series of basal metabolism tests were -7, -17, and -22 per cent of the normal. Six weeks later the subject weighed 128 pounds. The results for the second set of tests were +19, -9, and +17 per cent of the normal. During the period between tests, the subject gained 3 pounds. A sedative was given on the evenings preceding the first set of tests. The findings for this patient varied more than the others.

The subjects were quite cooperative, except one, who took extremely deep breaths during the second series of tests. These records were not included.

All of the subjects gained some weight from admission to the six weeks following. The change in basal metabolism from taking tranquilizing drugs does not seem to be significant for these subjects.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

Part I

Twenty-eight neuropsychiatric male subjects participated in a food intake study one week in each of August, September, and October, 1961. All except three subjects were receiving tranquilizing drugs. A weight record was kept during the study period. The results indicated that those subjects receiving tranquilizing drugs seemed to shift from the lower weight categories to the higher weight categories when beginning and ending weights were compared. About two-thirds of the patients receiving tranquilizing drugs gained weight, while one-third lost weight. Of the three subjects not receiving tranquilizers, one gained and two lost weight. Over half of the subjects receiving tranquilizing drugs who lost weight were grossly overweight initially. The others showed small losses. Some of these subjects were attempting to control their weight. However, at the end of the study most of the "grossly overweight" were still over twenty pounds above the ideal weight range. About two-thirds of those receiving tranquilizers consumed from 2000 to 2999 calories as a daily average. There was some increase in caloric consumption from August to October. Of those subjects who made sizeable gains, most were consuming the greatest number of calories.

Reviewing the adequacy of the nutrients, it was found that more subjects (nine) were deficient in Vitamin C than any other nutrient. A few subjects had deficient intakes in thiamine, riboflavin, calcium, iron, and niacin.

Part Ii

Basal metabolism tests were measured for five subjects before and six weeks after receiving tranquilizing drugs. All of the subjects gained some weight, ranging from one pound to eighteen pounds in a period of about six weeks. Comparing the results of the basal metabolism tests before the after taking tranquilizers, the change in basal metabolic rate did not seem significant.

From this data the writer concludes that the gain in weight of patients, while taking tranquilizing medication, is more likely due to an increase in the consumption of food than to a change in the basal metabolism of the individual. The writer recommends that upon admission to the hospital, the weight of the patient be checked carefully and if the weight is above the ideal weight range, he should be put on a "no seconds table" and given advice and guidance concerning diet. If he is grossly overweight, perhaps he should be put on a reduction diet. The canteen book might be so marked that the patient could purchase only black tea or coffee or other low calorie foods. If a patient who has been hospitalized for a time shows a continuous rate of gain, he should be given guidance early to get better weight control.

Even if the above suggestions were carried out, the problem of volunteer treats still exists. Perhaps these treats could be fruit juices rather than cookies or cakes. This would help to provide the Vitamin C in the diet which the subjects seem reluctant to choose for themselves in the dining room.

Throughout the study the patients were interested and inquisitive. Ahart (28) found this in her subjects also. At first, those participating in the food intake study were fearful of being placed on diets. They wondered how the information would be used. All questioned how "he" was chosen. Those subjects participating in the basal metabolism tests wondered if their tests were normal and asked questions about the recording. All questions were answered sincerely and several special appointments were held to discuss questions. In general, the cooperation was very good.

APPENDIX

[redacted]

PERIPHERAL CODING CARD

DAILY INTAKE BEFORE HOSPITAL ADMISSION AT CHILLICOTHE

Breakfast	Mid-morning	Dinner	Mid-Afternoon	Supper	Evening

Sp Amer.
WW 1
WW II ACTION SEEN
Korean
Other

Schizophrenic
Manic-depressive DIAGNOSIS
Organic as athero-scl.

VA PREVIOUS ADM.
Other TO MENTAL HOSPITAL

Overweight WEIGHT AS
Underweight A CHILD
Normal (9-12 yrs.)

At ideal weight RANGE
5# above ideal weight RANGE
6-10# above ideal weight RANGE
11-20# above ideal weight RANGE
Over 20# above ideal weight RANGE
5# under ideal weight RANGE
6-10# below ideal weight RANGE
11-20# below ideal weight RANGE
Over 20# below ideal weight RANGE

Less than 10 pounds
10-19 pounds WEIGHT
20-29 pounds GAIN
30 pounds and over

Under 10 pounds WEIGHT
10-20 pounds LOSS
Over 20 pounds

NAME:_____

ADDRESS:_____
_____

PHONE:_____

HOSPITAL #:_____

ADMISSION DATE:_____

HEIGHT: _____ WEIGHT: (Adm.) _____ (1)_____

(2)_____ (3)_____ (4)_____(5)_____

(6)_____ (7) _____

WEIGHT PICTURE
AT [redacted] ADMISSION
AND END

BODY BUILD: _____

MEALS PREPARED BY

Wife_____
Dau. or Dau.-in-law____
Self_____
Eats out_____
Other_____

PROTEIN INTAKE

Under 60 grams_____
60-64 grams_____
65-69 grams_____
70-74 grams_____
75-84 grams_____
85-99 grams_____
100 grams & over_____

CALORIC INTAKE

Under 2000_____
2000-2400 _____
2500-2900 _____
3000-3400 _____
3500-3900 _____
4000 & over_____

White
Nonwhite

Under 20 yrs.
20-29 yrs.
30-39 yrs.
40-49 yrs. AOE
50-59 yrs.
60-69 yrs.
70 & over

Excellent
Good PHYSICAL
Fair HEALTH IS
Poor

Eingle
Married STATUS
Divoroed NOW
Separated
Widower

0
1
2 CHILDREN
3
4
5 or more

Wife
Mother
Father
Daughter LIVES
Son WITH
Sib
Alone
Other

Excessive
Moderate ALCOHOL
None

Excessive
Moderate SMOKING
None

1
2 MEALS
3 PER DAY
Multiple
Self-restrioted diet
Other

[redacted]

(Raw) Lettuce
Greens
Cabrege
(Cooked) Asparagus
Beans, green
Beans, lima
Beets
Brecceli
Brussel Sprouts
Cabbage
Carrots
Cauliflower
Corn
Onicns
Peas
Potatoes
Scinach
Squash
Sweetpotatoes
Tomatoes

Tometo juice
Orapefruit juice
Orange juice
Other juices

PERIPHERAL CODING CARD

LIKES AND DISLIKES

MILK CROUP:

Milk
Ice cream
Cottage chocso
Amer. cheese

MEAT GROUP:

Beef
Pork
Vesl
Lamb
Liver
Chicken
Fish
Eggs
Dry beans and peas
Nuts

BREAD AND CEREAL:

Hot cereal
Cold cereal
Mocaroni and spaghetti

VEGETABLES AND FRUITS:

(Raw) Lettuce
Crenns
Cabbage
(Cooked) Asparagus
Beans, green
Beans, lima
Beots
Broccoli
Brussel Sproute
Cabbage
Carrots
Cauliflower
Corn
Oniens
Pens
Petntoes
Spinaoh
Squash
Sweetpotatoes
Tomatoes

Tomato juice
Crapefruit juice
Orange juice
Other juices

Apple_____
Applesauce_____
Apricots_____
Banana_____
Berries_____
Cherries_____
Crapefruit_____
Crapes_____
Melon_____
Crange_____
Peach_____
Pear_____
Pineapple_____
Plums_____
Prunes_____

HIGH CALORIE FOODS:

Candy_____
Pie_____
Cake_____
Carbonated beverages____
Milkshakes_____
Fried foods_____
Cravfos_____
Sauces_____
Soups_____
Snacks "chips", etc.____

[redacted]

[redacted]

AL ADMISSION AT ORILLIOOTRE

Mid-Afternoon	Supper	Evening
		Wife_____
_____		Dau. or Dau.-in-law____
	MEALS	Self_____
_____	PREPAREO	Eats out_____
_____	BY	Othsr_____
		Under 60 grams_____
		60-64 grams_____
	PROTEIN	65-69 grams_____
	INTAKE	70-74 grams_____
---		75-84 grams_____
		65-99 grams_____
-------		100 grams & over_____
		Under 2000_____
T: (Adm.) _____ (1)_____		2000-2400 _____
	OALORIO	2500-2900 _____
--- (3)_____ (4)_____(5)_____	INTARE	3000-3400 _____
		3300-3800 _____
--- (7) _____		4000 & over_____

EUILE: _____

Divorced NOW
Separated
Widower
0
1
2 CHILDREN
3
4
5 or more
Wife
Mother
Father
Daughter LIVES
Son WITH
Sib
Alone
Other
Excessive
Moderate ALOOHOL
None
Excessive
Moderate SMOKING
None
1
2 MEALS
3 PER DAY
Multiple
Self-restricted diet
Other

The items appearing on the regular menu for each day appear in column one; the size of each portion is listed in column two; the amount of each serving actually consumed is listed in column three. A check in the upper left-hand corner indicated that all the portion had been eaten; a check in the middle indicated that half the portion had been eaten; a check in the lower right-hand corner indicated that none had been eaten. The additional columns were used for calculating the amount of calories, proteins, vitamins, and minerals in each serving. Totals for the day were listed on each record.

[redacted]

A.Z.

October 6, 1961

Nutrients	Portion	Amt. Taken	Calories	Protein (Gm.)	Fat (Gm.)	Carbohydrate (Gm.)	Calcium (Mg.)	Iron (Mg.)	Vitamin A Value (I.U.)	Thiamine (Mg.)	Riboflavin (Mg.)	Niacin (Mg.)	Ascorbic Acid (Mg.
Banana	1	✓	85.0	1.0	T	23.0	8.0	.7	190.0	.05	.06	.7	10.0
Maltex	3/4 c.	✓	115.0	3.5	.4	24.0	18.0	1.1	0	.10	-	-	0
Fried eggs	1	✓	110.0	6.1	9.2	.3	27.0	1.3	702.0	.04	.13	T	0
Fried fillet of sole	3 oz.	✓	195.0	16.0	11.0	6.0	14.0	1.3	50.0	.09	.10	1.7	-
Tartar sauce	1 T.	✓	60.0	T	6.0	2.0	2.0	T	30.0	T	T	T	0
Mashed potatoes	#12 dip	✓	48.3	1.3	.3	10.0	15.7	.3	16.7	.06	.04	.1	5.7
Seasoned lima beans	1/3 cup	✓	50.0	2.7	.3	9.7	15.3	.9	153.3	.07	.05	.6	8.0
Cabbage and cocoanut salad	#12 dip	✓	33.3	.7	2.3	3.0	15.6	.1	26.7	.02	.02	.1	16.7
Peppermint candy ice cream - chocalate sauce	#12 dip 1 oz.	✓ ✓	158.0	1.8	6.0	26.3	62.5	.5	246.0	.02	.10	T	.6
Split pea soup	1 c.	✓	140.0	6.0	2.0	25.0	32.0	1.5	440.0	.17	.07	1.2	5.0
Crackers	2/pkg.	✓ x2	70.0	2.0	2.0	12.0	4.0	.2	0	T	T	.2	0
Tunafish salad	3-1/2 oz.	✓	256.7	27.1	15.0	2.1	18.0	1.6	296.7	.05	.15	10.9	-
Potato chips	15 g.	✓	82.5	.8	5.3	7.5	4.5	.3	T	.03	.02	.5	1.5
Seasoned corn	1/3 c.	✓	56.7	1.7	.3	13.7	3.3	.4	173.3	.02	.04	.8	4.7
Cottage cheese with green pepper rings on lett.	#16 dip.	✓	63.8	8.3	2.0	2.8	51.5	.3	165.0	.03	.17	T	19.8
Blueberry pie	1/8 pie	✓	192.5	2.9	9.3	25.0	11.0	.7	46.7	.21	.03	.5	6.7
Snicker Bar	1	✓ x3	122.0	1.9	3.0	22.8	27.0	.1	0	.01	.10	.1	T
Butter 1-1-1	1 pat	✓ x3	100.0	0	11.4	0	2.0	0	460.0	T	T	T	0
Bread 2-1	1 slice	✓ x3	180.0	6.0	3.0	36.0	57.0	1.8	T	.15	.15	1.8	T
Cornbread 1	1	✓	103.3	2.7	3.3	14.7	52.7	.6	85.0	.07	.10	.5	T
Cream 1-1	1 T.	✓ x2	40.0	T	4.0	2.0	32.0	0	140.0	0	.04	0	T
Sugar 2	7 g.	✓ x2	54.0	0	0	14.0	-	-	0	0	0	0	0
Milk 1-1-1	8 oz.	✓ x3	498.0	25.5	28.5	36.0	864.0	.6	1170.0	.27	1.26	.9	9.0
Total			2814.1	118.0	124.6	317.9	1337.1	14.3	4391.4	1.46	2.63	20.6	87.7

[redacted]

A Listing of the Low, Average, and High Value for Each Nutrient for the Subjects

Subject	Calories			Protein (Gm.)			Fat (Gm.)			Carbohydrate (Gm.)			Calcium (Mg.)			Iron (Mg.)			Vitamin A Value (I.U.)			Thiamine (Mg.)			Riboflavin (Mg.)			Niacin (Mg.)			Vita
	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High	Low	Average	High	Low
D.H.	2,672	3,566	5,023	93	135	195	117	161	212	283	411	620	1,025	1,642	2,407	15	20	25	4,698	9,456	20,235	1.4	2.8	4.6	2.2	3.1	4.5	15	24	49	46
L.C.	2,841	3,481	3,911	112	134	159	80	128	152	323	449	587	1,404	1,718	2,144	14	19	30	3,604	8,233	101,518	1.5	2.8	4.5	2.8	4.0	9.6	15	24	45	57
R.H.	2,320	3,160	3,702	84	114	159	97	138	172	292	378	453	991	1,444	1,981	11	16	22	3,538	6,087	9,711	1.0	1.8	3.6	1.9	2.8	4.2	9	17	25	22
L.S.	2,366	3,100	4,805	64	111	165	89	126	207	302	399	617	682	1,242	1,760	11	16	27	3,172	10,766	62,628	1.1	2.1	3.3	1.4	2.8	6.1	12	22	34	30
R.M.	2,725	3,075	3,694	102	113	131	105	128	149	284	387	518	1,100	1,513	1,963	14	17	24	5,930	18,811	73,069	1.6	2.5	3.6	2.3	3.2	6.8	12	19	30	72
R.E.	2,545	3,026	3,553	86	113	129	101	125	165	264	377	463	1,032	1,285	1,678	14	20	29	1,145	20,207	100,108	1.3	2.5	4.2	2.1	3.3	8.9	14	23	43	45
Lw.C.	2,563	2,991	3,632	87	115	151	95	130	158	290	366	412	960	1,362	1,852	13	17	22	3,841	10,766	27,937	1.1	2.5	5.1	2.0	2.6	3.3	13	19	29	61
D.B.	2,465	2,934	4,229	88	108	158	91	123	159	261	362	534	1,065	1,322	1,939	13	16	26	2,693	13,211	76,476	1.3	2.3	3.8	2.2	2.9	7.3	13	20	32	51
C.B.	2,322	2,785	3,640	89	112	148	98	124	174	269	317	400	930	1,272	1,762	11	16	23	3,129	8,662	54,637	1.1	2.2	3.6	2.0	2.7	5.8	11	20	41	37
E.N.	1,527	2,733	3,411	53	105	139	55	115	144	203	316	428	490	1,217	1,607	10	16	32	1,885	12,231	71,797	.8	2.3	3.3	1.1	2.7	6.8	11	18	34	22
L.B.	2,087	2,711	3,182	85	106	130	85	110	167	247	335	417	1,007	1,259	1,580	13	17	22	3,087	12,969	53,854	1.2	2.4	3.6	2.0	2.7	5.5	13	19	33	78
B.F.	1,457	2,592	3,360	60	100	123	58	106	141	182	312	425	466	950	1,371	11	16	20	2,325	8,434	16,028	1.2	2.2	3.6	1.3	2.1	2.6	11	18	29	38
A.Z.	2,261	2,558	2,893	72	99	118	91	110	125	253	305	350	950	1,205	1,433	13	15	18	4,028	10,036	22,544	1.2	2.1	3.5	2.0	2.3	2.6	11	17	28	66
J.L.	2,028	2,556	2,974	78	102	127	77	103	130	254	315	351	883	1,230	1,539	13	15	20	3,830	6,854	16,500	1.0	2.1	3.7	1.8	2.3	2.7	11	15	28	50
W.N.	1,655	2,550	3,384	73	101	130	53	104	147	227	307	440	710	1,111	1,848	8	15	24	1,996	10,378	53,067	1.1	1.9	3.5	1.5	2.7	6.0	9	20	37	35
L.G.	1,970	2,526	3,382	81	101	137	67	117	144	172	276	389	886	1,220	1,753	9	14	20	2,786	15,010	64,441	.9	2.1	3.3	1.7	2.9	6.6	9	17	29	27
W.H.	1,920	2,477	2,954	78	96	126	83	107	130	177	290	327	835	1,254	1,530	8	13	17	2,462	6,621	14,308	1.0	1.8	3.0	1.8	2.4	3.0	7	15	27	24
R.B.	1,567	2,409	3,430	61	101	171	52	77	110	177	338	475	346	871	1,991	9	18	26	1,011	17,885	122,318	1.1	2.2	3.8	.8	2.6	10	12	27	42	2
J.T.	1,126	2,315	4,334	41	91	123	50	96	147	134	253	324	765	1,109	1,560	6	12	17	1,916	5,445	23,320	.6	1.9	3.0	1.4	2.1	2.7	4	14	29	27
O.P.	1,957	2,306	2,839	76	92	115	82	107	133	191	253	295	820	1,080	1,355	9	12	17	2,754	5,260	14,051	1.0	1.8	3.2	1.6	2.1	2.6	9	15	28	22
W.L.	1,187	2,275	3,187	52	90	120	47	99	143	128	264	406	604	1,079	1,627	8	13	16	2,349	7,603	16,668	.8	1.6	3.0	1.2	2.2	3.2	10	15	25	30
A.Ma.	1,595	2,247	2,755	60	86	124	69	94	128	154	273	345	592	1,034	1,263	8	12	15	3,073	6,774	14,370	.8	2.0	4.3	1.4	2.0	2.8	8	15	28	40
H.T.	1,596	2,173	2,733	62	82	104	71	93	119	170	258	361	610	1,031	1,355	9	12	16	2,773	8,163	18,873	.9	1.7	3.0	1.3	2.0	2.6	9	15	25	33
L.C.C.	1,723	2,077	2,342	55	72	90	69	86	108	181	265	300	732	969	1,239	5	9	16	2,020	10,406	63,070	.6	1.6	2.7	1.4	2.2	6.0	8	12	24	20
L.M.	1,277	2,027	2,580	54	81	106	53	88	120	131	233	282	585	984	1,316	6	11	16	2,031	8,764	33,586	.5	1.4	3.0	1.2	2.0	3.4	7	14	26	9
A.Me.	1,375	1,793	2,150	45	72	132	50	73	102	156	205	299	320	668	1,185	9	13	22	2,415	10,234	47,981	.7	1.3	2.1	.8	1.7	4.9	7	15	41	6
J.M.	1,274	1,755	2,333	62	77	95	42	72	106	162	207	271	250	619	1,295	10	12	15	1,953	5,829	9,763	.6	1.4	2.0	.9	1.4	2.5	9	14	23	43
J.Ty.	1,097	1,640	2,417	41	68	110	30	57	88	107	219	328	433	942	1,650	5	8	10	800	4,604	17,121	.6	1.3	2.5	.8	1.6	2.3	5	11	24	21

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