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THE SWEET SICKNESS SYNDROME: I. THE REFINED CARBOHYDRATE CONSUMPTION

by

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Emanuel Cheraskin was born in Philadelphia, Pennsylvania, on June 9, 1916. He received his M.D. from the University of Cincinnati, College of Medicine in 1943. Nine years later he received his D.M.D. at the University of Alabama, School of Dentistry at Birmingham. From 1944 – 1945 he was a Captain in the United States Medical Corps. Presently, Dr. Cheraskin is Consultant, Northeast Academy of Clinical Nutrition. He is a member of various Professional organizations, including the International College of Angiology and the American Dental Association. He has received various honors and scientific recognitions, such as Consultant of Oral Medicine, Veterans Administration Hospital; editorial board member of the Journal of Orthomolecular Medicine; also listed in Who's Who in America 1973.

Introduction

This series of reports rests upon *four* hypotheses. In the first place, it is assumed that health and disease are a function of the environment *and* the organism's capacity to live in the environment. Hence, it must be granted that health and disease are multifactorial systems. Second, it is assumed that man may be viewed like a sphere.

The more peripheral layers of a sphere are easily observed as are the more peripheral aspects of man. Thus, clinical symptoms and signs represent the outer layer of man. However, the sphere is lamellated and the deeper layers represent the core problems. Third, this series of reports hinges upon the assumption that what is regarded as host resistance and susceptibility may be viewed as pluses and minuses in health and disease. Phrased otherwise, resistance agents (pluses) tend to discourage disease; susceptibility factors (minuses) invite disease. Finally, it will be assumed that greater success in our knowledge and treatment will come from shifting our emphasis from a study of diseases to an analysis of mistakes in living.

The series of reports will deal with one subject – refined carbohydrate consumption as it relates to health and disease. Specifically, this first paper will attempt to analyze the following five questions:

1. What is the refined carbohydrate consumption in a group of presumably healthy men and women?
2. Are there age differences in the consumption of these particular foodstuffs?
3. Are there family patterns in the eating of refined carbohydrate foodstuffs?
4. Is it possible to readily change the refined carbohydrate intake?
5. Of what clinical significance is such a change in daily refined carbohydrate intake?

Methods of Investigation

Three hundred ninety-five dentists and 320 wives originally participated in this experiment. These individuals are presently sharing in a multiple testing program conducted in Florida under the auspices of the Southern Academy of Clinical Nutrition; in Los Angeles, under the sponsorship of the Southern California Academy of Nutritional Research; in Columbus, Ohio, under the aegis of the Ohio Academy of Clinical Nutrition; in Connecticut, under the auspices of the Northeast Academy of Clinical Nutrition; and in the San Francisco Bay area, under the supervision of the Northern California Academy of Nutritional Research.

The multitesting program includes a periodic [annual] measurement of a host of clinical and oral, electrocardiographic and biochemical parameters. One of the unique features of the project is the inclusion of dietary evaluation. This is accomplished in two ways. First, each subject is required to record, according to stated instructions, all food consumed for seven consecutive days. The data are subjected to computer analysis, and a printout is obtained showing the daily intake of the major foodstuffs and the vitamins and minerals. Additionally, each participant completed a very simple questionnaire based upon the frequency of intake of critical foods. This form is also sent for a computer analysis. A printout showing the daily intake nutrients is returned. For purposes of this report, only the daily refined carbohydrate consumption as judged by the seven day food questionnaire will be considered.

The results were discussed with the membership at a series of, what might be called, group therapy sessions. The participants were shown how much daily refined carbohydrate intake there is on an individual basis. Discussions were held regarding the relationship of health and disease to refined carbohydrate consumption. Finally, the group was shown how to decrease the intake of refined carbohydrate foods in order to obtain a more optimal diet by restricting table sugar (sucrose), foods sweetened with sugar and baked goods made from white flour.

Approximately one year later, the dietary survey was repeated as well as the other parameters in a multitesting program. This has been done on an annual basis and information is now available extending over a several year period for the very same group.

Results

Question One

Table 1 summarizes the daily refined carbohydrate intake for the 395 dentists and the 320 wives at the initial examination. Several points warrant special mention. First, it is clear that the range is very broad extending from no refined carbohydrate consumption to as

Table 1. Daily Refined Carbohydrate Consumption (Initial Visit)

Daily Refined Carbohydrate Intake [grams]	*Number and Percentage Male Group*	*Number and Percentage Female Group*	*Number and Percentage Total Group*
0- 49	113 [28.6%]	111 [34.7%]	224 [31.3%]
50- 99	177 [44.8%]	162 [50.6%]	339 [47.4%]
100-149	84 [21.3%]	43 [13.4%]	127 [17.8%]
150-199	18 [4.6%]	3 [0.9%]	21 [2.9%]
200+	3 [0.8%]	1 [0.3%]	4 [0.6%]
Totals	395 [100.0%] *	320 [100.0%]	715 [100.0%]
Mean	77	65	72
S.D.	40	32	37
t		4.428	
p		<0.001†	
Minimum	0	1	0
Maximum	223	209	223
Range	223	208	223

*Approximate
†Statistically significant difference of the means.
November 1973#

much as 223 gm/day. Second, the evidence suggests that the male, on the average, consumes more refined carbohydrate foodstuffs than the female (77 versus 65 gm/day). This difference is statistically significant ($t = 4.428$, $p < 0.001$). Third, on the average, granting 4 gm per teaspoonful, the average male is consuming the equivalent of approximately 20 teaspoonfuls of sugar in a 24 hour period and the average female about 16 teaspoonfuls. Finally, the data in this report of 395 doctors and 320 wives support earlier findings from a smaller sample of 195 doctors and 158 wives reported elsewhere [1].

Hence, in answer to the first question, the refined carbohydrate consumption is considerable in view of the fact that this is a highly motivated health conscious group aware of the deleterious effects of refined carbohydrate consumption.

Table 2. Refined Carbohydrate Consumption According to Age Groups (Initial Visit)

Age Groups	*Male Group*	*Female Group*	*Total Group*
<40	[150] 84±44	[168] 70±34	[318] 77±40
40-49	[149] 77±39	[98] 63±30	[247] 72±36
50+	[96] 66±33	[54] 52±26	[150] 61±31
Total	[395] 77±40	[320] 65±32	[715] 72±37
Minimum	0	1	0
Maximum	223	209	223
Range	223	208	223

[Sample size]
November 1973#

Question Two

Table 2 summarizes the daily refined carbohydrate consumption in the two sexes separately and also breaks down the information with regard to age. *It is noteworthy, and quite apart from the generally held facts, that the daily refined carbohydrate consumption decreased with advanced age in this particular population sample.*

Question Three

The daily consumption of refined carbohydrate foodstuffs was determined from a seven day dietary survey of a group of 210 dentists, their 210 wives and 210 wives of other dentists age-paired against the wives of the dentists in this study. Table 3 shows that the most statistically significant correlation prevailed between the married couples ($r = +0.547$, $p < 0.01$). Additionally, the correlation coefficient is higher in the oldest couples ($r = +0.670$, $p < 0.01$). These findings are consistent with those earlier reported [1] in a smaller study of 82 husbands and wives. *Hence, with regard to the third question, within the limits of such a study, it seems reasonable to conclude that, with advancing age, couples tend to choose similar dietary components with regard to refined carbohydrate foodstuffs.*

Table 3. Correlation Coefficients for Daily Refined Carbohydrate Consumption

	Number of Pairs	*r*	*p*
Husband versus wife	220	+0.547	<0.01*
Husband versus unrelated female	220	-0.001	>0.05
Wife versus unrelated female	220	-0.026	>0.05
Husband versus wife			
[husband's age <40]	83	+0.611	<0.01*
[husband's age 40-49]	92	+0.344	<0.01*
[husband's age 50+]	45	+0.670	<0.01*
Husband versus unrelated female			
[husband's age <40]	83	-0.150	>0.05
[husband's age 40-49]	92	0.000	>0.05
[husband's age 50+]	45	+0.258	>0.05
Wife versus unrelated female			
[husband's age <40]	83	-0.291	<0.01*
[husband's age 40-49]	92	+0.001	>0.05
[husband's age 50+]	45	+0.370	<0.05*

*Statistically significant correlation coefficient.
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It must be granted, therefore, that environmental influences seem to play a dominant role in this dietary pattern since the partners in most of the marriages are not genetically related.

Question Four

It should be recalled that a dietary analysis was done on each subject in the group initially and on an annual basis. Following the initial examination, health education lectures were conducted in a group therapy fashion. Each subject, by this technique, learned of his daily refined carbohydrate intake which allowed each participant to evaluate whether it was inordinately high or not. Additionally, discussions were held regarding methods for reducing daily refined carbohydrate consumption.

Table 4. Changes in Daily Refined Carbohydrate Consumption in Subjects Before and One Year After Health Education Lectures

	Male Group		*Female Group*	
	Initial Visit	*Final Visit*	*Initial Visit*	*Final Visit*
Sample size	124	124	91	91
Mean	84	63	70	54
S.D.	45	33	37	29
Mean percentage change	-25%		-23%	
t_v	0.529		0.605	
p_v	<0.0005*		<0.0500*	
t_m	5.305		4.680	
p_m	<0.001*		<0.001*	
Minimum	0	0	1	0
Maximum	223	206	209	155
Range	223	206	208	155

*Statistically significant difference.
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Table 4 shows the initial values and one year after health education lectures. It is clear that the mean reduction is of a magnitude of approximately 25% in both sexes with the decline slightly higher in the male group. It is also evident that there is a statistically significant reduction in the variance and a statistically significant decline in the mean values. These observations here with 25% and 23% reduction in 124 males and 91 females, respectively, support earlier changes of 23% and 21% in 57 and 38 males and females, respectively [1]. *Hence, it seems reasonable to conclude that it is possible, by simple health education techniques, to reduce significantly daily refined carbohydrate intake.*

Discussion

Man may be viewed as a multilamellated sphere (Fig. 1) [2]. Any way one turns a ball, it looks the same. In a sense, any way one inspects man from the outside, he is also the same. True, when

viewed from a certain angle, one may see a limp characteristic of a cerebrovascular accident; viewed from a different angle, one may see pimples. But these and all other peripheral stigmata have a common denominator; each is an index of the syndrome of sickness.

A lamellated sphere permits the layers to be removed. In so doing, one eventually approaches the core. In man, layers may also be stripped away until the central problems are brought into focus.

The outer, most peripheral ring is readily inspected in both sphere and man. At this level, one can make three observations. First, one can identify evidence of the ravages of classical disease, e.g., the pathognomonic gait associated with a cerebrovascular accident, the skin eruption typical of impetigo, or a carious tooth. This type of information fits into the category of specific disease states. The end product of such an analysis is clear. For example, a patient may be identified as suffering with hypertension, the cause of which is unknown. There may also be emphysema, the etiology of which is not clear. The anemia frequently cannot be causally identified. This

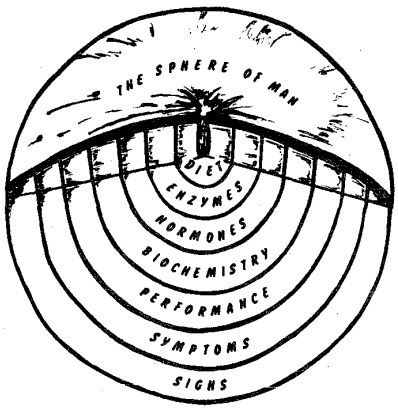

Fig. 1. Man may be likened to a multilamellated sphere. The periphery is easily inspected. Layers may be progressively removed exposing the core, which, in this case, is diet.

kind of diagnosis is simply an accounting of the damage, largely derived from a peripheral inspection of a human subject.

Second, information derived at the peripheral level provides an estimate of the quality and quantity of symptoms and signs referable to a particular system (e.g., gastrointestinal) or site (e.g., eye) even though the findings do not fit the textbook description of a particular syndrome. This type of information fits into a category of cluster of symptoms and signs in organ systems and/or anatomic sites.

Lastly, one can simply establish the numbers and kinds of symptoms and signs without any regard for how or where they fit into systems or sites, i.e., the sum of the number of findings. This type of information fits into the category of isolated symptoms and signs.

Regardless of the information desired at this peripheral level, the data can be readily derived by physical examination and history taking.

If one strips off the outer layer, the zone of symptoms comes into focus. However, the line delineating where the outer layer ends and the next most peripheral one begins can be quite arbitrary. Symptoms are not as readily discernable as signs and can be derived only through interrogation by means of a classical interview or questionnaire (e.g., the reporting of headaches, pains or burning sensations in the mouth). The important point for predictive purposes is that symptoms generally precede signs of disease. Hence, evidence obtained in this zone may be regarded as prognostic of more peripheral disease signs.

Stripping off the second layer reveals the world of performance. Impairment of performance generally heralds disease symptoms and signs. Such information can be elicited from questionnaires dealing with physical, organ and system performance. Physical activity is often used in the evaluation of organ and system performance (e.g., the treadmill in assessment of the cardiovascular system). The important point is that changes in performance precede the symptoms and signs of disease.

Removal of the performance layer brings into view the biochemical pattern. Illustrations would include blood sugar and serum fat

determinations. This lamella is predictive for the three peripheral zones, since biochemical imbalance antedates disturbances in performance and the advent of symptoms and signs. For instance, chemical diabetes mellitus characterized by disturbances in blood glucose concentration precedes clinical diabetes mellitus by months and even years.

Removal of the biochemical area brings into view the deeper hormonal areas. Here are the measures of the endocrine state (e.g., serum protein-bound iodine level). Aberrations in the hormonal state precede changes in biochemical homeostasis; for example, the hypothyroid patient often is hypercholesterolemic.

Nearly at the center of the core is the enzyme pattern. Many of the 2,000 known enzymes can be measured. For example, determination of the serum glutamic oxaloacetic transaminase (SGOT) level is often used as a predictive tool in impending cardiovascular disease. Since enzymes are essential for metabolism, enzymatic imbalance can be predictive of changes in every peripheral layer.

Finally, the core is represented in the center (Fig. 1). Basically, core problems are mistakes in living. Thus, physical activity, pollution and diet represent core problems. Since dietary nutrients are the building blocks from which enzymes are made, all the peripheral layers reflect dietary inadequacies or excesses. For purposes of this discussion, refined carbohydrate foodstuffs will be regarded as a core problem and consideration will be given as to its relationship to more peripheral reflections of health and disease.

Figure 2 pictorially portrays one relationship between a core problem (refined carbohydrate consumption) and a more peripheral problem, namely, serum cholesterol. In this particular study, 337 doctors and their wives were examined twice over a one year period. The sample was divided into two subgroups. One group, of 223 subjects, is characterized by a reduction in refined carbohydrate intake during the one year period. More specifically, this group initially consumed on the average 82 gm of refined carbohydrate per day. At the end of the year, the daily intake was 50 gm. This is obviously a statistically significant decline as shown by a t value of 16.712 and p less than 0.001. Additionally, and parenthetically, there is also a reduction in the variance from 41 to 30 gm/day which

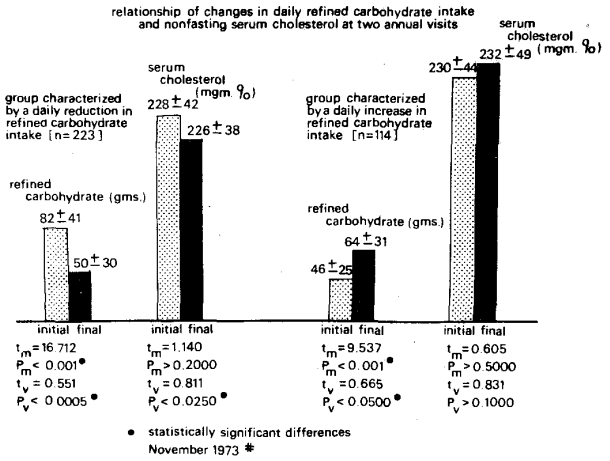

Fig. 2. The relationship between changes in daily refined carbohydrate consumption and changes in nonfasting serum cholesterol before and one year after a series of health education lectures. In the group (left) characterized by decrease in refined carbohydrate intake from 82 to 50 gm daily, the mean serum cholesterol did not significantly change but the variance did. In contrast, in the group characterized by an increase in daily refined carbohydrate foodstuffs from 46 to 64 gm, the mean serum cholesterol was not significantly different but the variance increased. This suggests that a reduction in refined carbohydrate consumption serves as a homeostatic agent with regard to nonfasting serum cholesterol.

is statistically significant ($t = 0.551$, $p < 0.0005$). It is noteworthy that in this group, the mean serum cholesterol level did not significantly change as shown by an initial value of 228 and a final score of 226 mg%. The lack of significance is demonstrated by $t = 1.140$ and $p > 0.2000$. However, during this one year period the variance did significantly drop ($t = 0.811$, $p < 0.025$) from 42 to 38 mg%. Conversely, the 114 subjects in the other group are characterized by an increase in daily refined carbohydrate from 46 to 64 gm/day. This is clearly a statistically significant mean rise ($t = 9.537$, $p < 0.001$). There is also a statistically significant increase in variance from 25 to 31 gm/day ($t = 0.665$, $p < 0.0500$). In this group there is

no statistically significant change in mean value ($t = 0.605$, $p > 0.5000$) in the cholesterol level. There is also no statistically significant increase in variance ($t = 0.831$, $p > 0.1000$). However, on a mean basis, there is an increase in variance from 44 to 49 mg%.

The evidence presented here, obviously within the limits of this study, suggests that refined carbohydrate reduction is a homeostatic mechanism in that it contributes to the decline of serum cholesterol in those with hypercholesterolemia and appears to aid in the elevation of cholesterol in those with hypocholesterolemia.

In traditional medical circles, hypercholesterolemia is viewed as a *cause* and cardiovascular pathosis as an *effect.* Additionally, in these same circles, high saturated fat consumption is viewed as a *cause* and hypercholesterolemia as the *effect.* Here we learn that (a) refined carbohydrate food is a hypercholesterolemic agent, (b) the reduction of refined carbohydrate food serves as a hypocholesterolemic factor and, more significantly, a (c) homeostatic agent. These observations have been earlier elsewhere reviewed [3].

The homeostatic effect of a low-refined-carbohydrate diet has also been observed for *blood* sugar, glucose, calcium, phosphorus, protein, erythrocyte count, calcium-phosphorus relationships, hematocrit, leukocytes and hemoglobin; and for blood pressure, urine pH, and the specific gravity of urine [4-18].

Summary

This study of presumably healthy members of the health professions and their wives reveals five interesting conclusions. First, the daily refined carbohydrate intake is considerable. Second, men tend to consume significantly more of such foods than women. Third, the dietary consumption of refined carbohydrate foods is an environmental problem as judged by the positive correlation between husband and wife. Fourth, the evidence suggests that it is possible, by health education lecture techniques, to substantially reduce the intake of these foodstuffs. Finally, refined carbohydrate food may be viewed as a susceptibility agent because it tends to encourage disease, in this case as demonstrated by dyscholesterolemia.

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Full details regarding the seven-day dietary survey technique utilized in this study may be obtained from Dicalator Systems, Post Office Box 3217, Olympic Station, Beverly Hills, Calif.