



Calories, Protein, Lipids, Carbohydrates, and the Saccharine Diseases

A. HOFFER 1

Introduction

Nutritionists and physicians frequently refer to a balanced diet which is to provide all the nutritional needs for most people. They also assume that most people consume a balanced diet already, and therefore they do not question their patients about their food intake, do not try to relate the patient's condition to nutrition, and often send the patient home still suffering from a nutritional disorder they have failed to recognize.

The concept of the balanced diet has not been very helpful, perhaps because it is now out-of-date. When Canada's food rules were first developed a couple of decades ago, they applied to a time when it did not require much skill to purchase nutritious foods. Many years ago the majority of foods available were unprocessed. The processed foods were just coming onto the market. Any person could, blindfolded, pick up a number of foods in stores and come out with a diet of fair nutritional quality. A person shopping blindfolded today would undoubtedly not have a nutritious variety of foods. Junk food is any food

adulterated with sugar, salt, starch, and even white flour. Many shoppers with their eyes open fill their baskets with junk food, which may compose up to 75 percent of their total purchase. The food rules and the concept of the balanced diet are therefore of little value. Furthermore, there is very little public information which relates the various forms of malnutrition to common diseases and complaints.

The concept of the balanced diet is also used to justify poor food, the idea being that the balanced diet will compensate for the deficiencies of the particular food. Thus, the answer to the observation that white bread will not support growth is that no one lives on white bread only.

The drastic deterioration of the national diet over the past three decades is due to the massive expansion in the production of processed foods. Processing involves several changes in food.

The proteins, fats, and carbohydrates have been isolated in pure form and can be consumed in pure form or can be used to enrich other foods. In nature these food components do not exist in a pure form. They are all intertwined. Only the magic of chemistry has made it possible

¹ 1201 CN Towers, Saskatoon, Saskatchewan. S7K 1J5

to pull out these artifacts.

The extraction of protein probably will be beneficial since many people consume too little protein and would benefit from enrichment of their food with protein. Thus bread enriched with protein, say legume protein, may be made much more nutritious. Since many children have only toast and a glass of milk for breakfast, it would be helpful if the quality of the toast could be brought up to the standard of a hamburger properly made.

Fats have been available for many centuries in relatively pure form as butter, oils, etc. This has not been as harmful as one might expect since fats quickly satiate the palate. It would take a heroic effort to eat a pound of butter or drink a glass of oil at one sitting. Nevertheless, too much fat can be incorporated into foods by frying, e.g., doughnuts, fried potatoes, and into baked goods.

Some races have adapted to a high-protein-fat diet. The Eskimos were much healthier on their native diets than they are now when so much of their diet consists of our junk foods. They have adapted to their protein-fat diet over thousands of years and now are succumbing dramatically to our sugar-rich food.

The most toxic components to be extracted are the carbohydrates, the starches, and sugars. Alcohol is a liquid sugar. Starch from corn, wheat, and potatoes is available for addition to sauces, gravies, candies, pastries, and even are used as fillers for tablets of medicines and vitamins. These are not nearly as bad as the pure sugars. The pure sugars are used in syrups, confectionery, and as pure sugar. The consumption of all sugars is now 125 pounds per person per year. The sugars are without nutritional merit.

Vitamins are lost during processing, the degree of loss depending upon the manufacturing processes. The longer the interval between field and kitchen, the more manipulations to which the food has been exposed, the greater the loss.

Vitamins are lost by being dissolved in water. The heat-labile vitamins such as vitamin C are

often destroyed, and light may destroy others, such as vitamin B12. Vitamins are slowly oxidized when food is stored for a long time, even if frozen. Finally, vitamins are extracted out of foods and thrown away or fed to livestock. Thus wheat germ, rich in vitamin E and other vitamins, is milled out of wheat and used for feed. This is good for our livestock, not so good for us. Minerals are not destroyed by heat or light, but they are lost by leaching, and they are processed out of our food. Unfortunately most of the essential minerals are present near the outer covering of the cereal grains, those portions which are not used for human food. Foods which are deficient in essential minerals such as zinc make us much more vulnerable to extra quantities of copper, which may be present in our drinking water if we drink soft water and transfer it in copper plumbing.

Processed foods contain three kinds of additives, (1) preservatives which prolong the shelf life of food, (2) colors which increase the visual palatability of food, and (3) flavoring substances which make the food more palatable by making it simulate real food, by making it sweet, or by increasing the salt content. Processing foods destroys its natural flavor, and this is compensated for by these additives. Since our bodies have not had millions of years in which to adapt to these substances, it does not require much wisdom to suspect that in the long run these will be harmful to us.

The addition of salt is harmful because it throws an extra burden on the kidney which must eliminate it. The normal ratio of potassium to sodium in our common vegetables is about nine to one. But by the time the vegetables reach our plate if they have been processed, the ratio is one to nine, i.e., there is much more sodium than potassium. The extra salt is not needed.

The addition of sugars perverts our palate. Perhaps in time those of us who dislike the taste of sugar will repopulate

FOOD COMPONENTS AND SACCHARINE DISEASES

the earth, at which time sugar will no longer be a threat. I think it is better to use our knowledge of nutrition to protect those of us whose taste for sweets leads to serious malnutrition. This perversion of our taste for food is responsible for the enormous increase in the consumption of sugars. I have seen many patients who are surprised at the goodness of the natural taste of food after many months of a sugar-free diet.

It is becoming increasingly difficult to avoid mineral contaminants in our environment, and the incidence of lead poisoning, for example, is growing rapidly. A diet consisting of unprocessed food makes it easier for the body to excrete extra quantities of these minerals which can be very toxic when present in excess amounts.

Balanced Diet

A balanced diet provides the optimum quantity and quality of all of the nutrients along with a caloric intake which matches energy output. When the consumption of calories exceeds the calories used up as work, weight goes up. This is readily understood. What is less comprehensible is why many people eat too much. This will be discussed further on.

One should aim at achieving a balanced diet over a 24-hour period, over a meal, and for each food. The body has adapted to fluctuations in nutrients if they are not too pronounced, but each cell is served best if the nutrients required are present more or less at the same time. It is not sensible to eat all protein for breakfast, all fat for lunch, and all carbohydrate for supper. This is why each meal should contain all the nutrients necessary. It is possible to obtain this by combining high- and low-quality foods, but this is made simpler if each food in itself is balanced, i.e., is a whole unprocessed food.

Appetite is controlled by our palate (the taste of food), by our hunger, and by the amount of exercise. Increasing exercise appears to decrease appetite as if there were an appetite center, *appetstat*, in the brain which is set at a lower level by work.

Exercise thus serves a double function of keeping our muscles in good trim and in decreasing our desire for food: Vigorous attempts are being made to increase the interest in running, swimming, and so on, but there has been no companion effort to provide a similar interest in good nutrition. Any exercise program which ignores nutrition can only be partially successful. In some of the recent programs school children have been rewarded for running with doughnuts and soft drinks.

One reason for obesity is the lack of exercise or work. However, according to Cleave, Campbell, and Painter (1969) this is a minor factor. Much more important is a perversion of our palate combined with the availability of pure, refined foods such as sugar, white flour, and so on. Excessive intake of sugar leads to abnormalities in carbohydrate metabolism such as low blood sugar. This also increases the desire for food since the low blood sugar causes tension, anxiety, and a variety of other uncomfortable symptoms. These are temporarily alleviated by eating. Food becomes an anxiety-relieving substance and leads to excessive intake. Food addiction is another factor. As long as the addicting food is consumed it must be had frequently and regularly or else there is an uncomfortable withdrawal, comparable to the feeling generated by not smoking in a smoker or not drinking in an alcoholic.

Usually a person suffering from a food allergy feels much better after a prolonged fast, usually four to seven days, for by the end of the fast the offending allergen has been excreted. It occurs to me that this may be an explanation for some cases of *anorexia nervosa*. This is a condition where patients simply refuse to eat, but appear active, energetic, and cheerful. It they could live without eating there would be no problem, but the continued weight loss leading to emaciation becomes a very serious, life-threatening situation.

They remind me of the allergic person on the fifth day, after his fast. I suspect the patient with anorexia nervosa has a cerebral allergy but is not aware of this. But he is aware that eating makes him uncomfortable. I hope to test this idea the next time I have a chance to treat this problem. An explanation and testing individual foods would permit restoration of a diet which would allow him to feel well.

Food Components 1. Proteins

There are two ways of judging protein in food, by the quality and by the quantity. The quality of a protein is determined by the number and quantity of essential amino acids which are present in the food. Of the 20 or so amino acids, eight are considered essential because the body cannot make them in adequate quantity and they have to be provided by food. The other amino acids can be transformed one from the other and therefore are not considered quite as essential. However, recent work suggests that they do play a role, which is to spare the essential amino acids. Unfortunately the only way of measuring the quality of a protein is by its effect on growth. Animals have to be used to determine whether their rate of growth is normal compared to growth when fed a good diet. If the protein will allow the animal to grow at a normal rate, it is said to be a high-quality protein, whereas if it does not do so, it is said to be a low-quality protein. Generally animal proteins are higher in quality than vegetable protein.

It is possible to improve the total protein quality of a meal by mixing together a high- and low-quality protein because the essential factor is the quantity of essential amino acids. If one protein has four essential amino acids and the other protein has the other four, the two can be combined into one meal to make a very nutritious meal. In this way it is possible for vegetarians who are careful with their diet to obtain a quality of protein as good as that obtained by non-vegetarians.

Generally too much protein is seldom a

problem, and this will become increasingly rare as the cost of protein goes up. An increase in protein may be harmful if it produces an allergy to a particular kind of protein. Recently I placed a patient upon the hypoglycemic diet which greatly increased his consumption of beef. He became much worse. Later it was discovered that he was allergic to beef. The diet increased his beef consumption and made him worse. When he went on a beef-free diet he promptly recovered. This suggests that it is a good idea, before placing anyone on a special diet which increases the protein content, to determine whether or not he is allergic to any of the proteins. I have found that several of my patients have become allergic to milk because the hypoglycemic diet as generally used urges these patients to consume large quantities of milk. I wonder how many patients with peptic ulcer have also become allergic to milk because milk has been a staple in the diets used for this condition.

Too little protein is of course much more dangerous. It has been shown that infants who do not receive enough protein will have defective brains and when they are grown will be retarded. They will also be stunted physically. Older children who are placed on a low-protein diet may have fully developed brains and be normally intelligent, but they also may be below their average height. Adults who receive too little protein begin to waste their own body and become very thin and emaciated.

2. Lipids

The quality and quantity of lipids also has to be taken into account in considering a balanced diet. The quality of lipids or fats is determined by the degree of saturation. What this means is that there are some fats which do not have any double bonds in them and are solid at room temperature. There are other fats which contain unsaturated bonds; that is, the molecule can still take

FOOD COMPONENTS AND SACCHARINE DISEASES

up hydrogen. These generally are liquid at room temperature. The more unsaturated bonds there are in the molecule, the more liquid will it be at room temperature. It is said to be unsaturated. By the addition of hydrogen to the molecule, the double bonds are taken away and the fat becomes harder or more solid; that is, it becomes more saturated. This is the process used in converting vegetable oil into butter-like materials like margarine. Generally it is considered that the unsaturated fats are qualitatively better than the saturated fats, although it is well known that there has to be a proper ratio of one to the other. I would guess that 20 percent of the total fat content of the diet ought to be unsaturated, allowing 80 percent to remain the usual kind of saturated fat. The quality of fat is also determined by the so-called essential fats which are the 18, 20, and 22 carbon fats; for example, arachidonic acid.

Over the past 10 years there has been a great deal of interest in unsaturated fats and their relationship to cardiovascular disease. The idea has become current that excessive consumption of fats like cholesterol and so on will increase the tendency for deposition of fats in the body and therefore leads to cardiovascular disease. There is no consensus yet, and a vigorous debate goes on since there is a poor correlation between fat consumption and the incidence of cardiovascular disease. However, it is also becoming clear that to switch entirely over to unsaturated fats might be dangerous since these fats are subject to what is called peroxidation; that is, they tend to oxidize quite readily to form highly toxic molecules or free radicals. One of the functions of vitamin E is to protect fat against peroxidation. Therefore when the quantity of unsaturated fat in the diet is greatly increased, there is a heavier demand upon vitamin E, and this may in itself produce vitamin E deficiency.

If too much fat is consumed, there will be an excessive intake of calories and that person will become obese. Generally it is difficult to over consume fats because they tend to cut one's

appetite so quickly. A person who consumes too much fat tends to fill up quickly and does not become hungry for a long time. If too little fat is consumed, this throws an increasing strain upon protein and carbohydrate to provide energy and also increases one's appetite, since the stomach empties so quickly. A person becomes hungry very soon after having had a meal. There must be a proper quantity of fat within the diet to look after these various factors. Probably around 35 percent of the diet as calories ought to be fat.

3. Carbohydrates

Carbohydrates may be classified as unrefined, that is, in its original form, for example, as potatoes or whole grain, and refined, which includes the starches, syrups, and the sugars.

The natural carbohydrates which are not processed contain long chain polymers which are slowly hydrolyzed in the body and from which sugar is released slowly. They are also mixed with fibrous materials which are not hydrolyzed in the body, for example, bran, and which provide an important framework for many of the digestive processes which occur in the intestines. In addition, since they are not refined they are in combination with protein and fats, minerals, and vitamins which are present in the natural foodstuff. These all provide distinct nutritional advantages to the unrefined food, but there is another advantage which has not been generally recognized. This is that the individual items are not overly concentrated. It has been pointed out that one apple will contain the equivalent of one teaspoon of sugar. It is not easy for a person to consume six apples, one after the other, within a matter of two or three minutes, but it is not a difficult matter to place six teaspoons of sugar in a cup of tea and to drink it within one minute. In other words, the tremendous concentration of one foodstuff has made it possible to throw large quantities very quickly into

the body.

The refined foods include the starches, for example, corn starch or wheat starch, which are used to thicken many of our foods. They include the syrups which are used for cooking. They also include the sugars of which the most common is sucrose made either from beets or from the cane. These are pure chemicals which are devoid of the other constituents of the diet and which can be consumed in great excess. Over the past 100 years there has been a massive increase in the amount of sucrose which is consumed per person, and today in Canada and the United States and Britain the average consumption of sugars runs around 125 pounds per person per year.

Since this includes infants who do not consume much food, it is easy to understand how certain people might consume as much as 200 or 300 pounds of sugar per year. I have no doubt that some of our young people are consuming up to 50 percent of their total caloric intake in the form of sucrose and other sugars. It is the excessive consumption of the sugars which leads to the saccharine disease which will be described later on. Generally, excessive consumption of sugar is toxic, whereas too little consumption of sugar does not appear to be toxic unless there is a total decrease in caloric intake. A deficiency of sugar in the diet can easily be made up by increasing one's fat and protein, and although this may throw an additional strain on the body, it does not generally harm that person. Too much sugar is much more dangerous than too little. This is in striking contrast to some of the other essential constituents, for example, proteins and vitamins, where too little of these nutrients is much more dangerous than too much.

If one were to produce a balanced diet by considering the various components of the diet, a computer would be necessary since the number of possible combinations is huge. In addition, the individuality of people would have to be considered since none of us are the same biochemically. We differ in appearance, in our fingerprints, in our blood type. Therefore we all

have individual needs and respond differently to different foods. For this reason there is no general guide which applies to everyone. One of the mistakes made by food faddists is to assume that a diet which keeps them healthy is necessarily the only diet everyone should consume. The same error of logic is made by nutritionists who ought to know better. They assume that a general set of rules will apply equally to everyone. The faddist is an individual who reasons from the specific to the general, and the nutritionist, usually anti-faddist, reasons from the general to the particular. Since nutritionists are better trained, they are more to be blamed.

Fortunately it is not necessary to use a computer if only we would use the one in our heads. The no-junk rule which excludes all food containing sugar, flour, additives, etc., leaves a residue of good, nutritious food. If a person eats a large variety of these foods in small amounts, every day, he will usually consume a good diet. Individuals with special needs will need to supplement this diet with vitamins and/or minerals.

Results of Unbalanced Diet

No one has enumerated the various conditions which result from poor or unbalanced diets, and I will not attempt to do so, but I do wish to refer to one major condition produced by an unbalanced diet, the saccharine disease (Cleave et al., 1969). These authors consider that the saccharine disease is a single condition with a large number of manifestations. It is true that many of these manifestations have been considered conditions or diseases, but this is argued against by these authors. They believe this condition is due to three factors: (1) excessive concentration of carbohydrates or sugars, (2) removal of the fiber from the foods, (3) removal of the protein. The symptoms arising from this condition may be divided as follows: (a) The Overconsumption of Carbo-

FOOD COMPONENTS AND SACCHARINE DISEASES

hydrates

This leads to diabetes, obesity, coronary thrombosis, and B. Coli of the bowel. Cleave et al. have shown that there is a direct relationship between the mortality from diabetes and the consumption of refined foods, especially sugar. They examined many countries where these statistics were available. The term "overconsumption" refers to the utilization or the introduction of carbohydrates beyond caloric need and also to the confusion of the palate which I have already referred to. It has been shown, for example, that Indians living in India where the annual consumption of sugar is about 12 pounds per year have a one percent incidence of diabetes. However, the same genetic stock, after they moved to Natal where the consumption of sugar is around 115 pounds per year, have an estimated 10 percent diabetes in their population. This is a ten-fold increase simply by increasing the amount of sugar normally consumed ten-fold.

The same statistics were found when other races of people were compared one with the other, that is, a race of people who normally do not have diabetes because they normally do not consume much sugar very quickly find a major increase in the incidence of diabetes once their sugar intake is up. The authors enunciated a 20-year rule, meaning that a body might be able to resist about 20 years of hardship by excessive consumption of sugar before many of the organs begin to break down. In other words, a race of people going onto a high-sugar diet might not show any pathology for at least 20 years, at which time it would become very apparent.

The second condition produced by overconsumption is obesity which has been referred to briefly. It is important to point out that there must be a balance between intake and output, but that the factors which control the appetite, for example, hypoglycemia or allergy, must be taken into account. I have seen several patients who were put on allergy-free diets who promptly lost their

craving for other foods, including sweets, and were able thereafter to lose weight very slowly and steadily without any great effort on their part.

The third condition, coronary thrombosis, is due to excessive consumption of sugar. It is generally believed that about 90 percent of people with high blood fats, that is, high blood cholesterol or high blood triglycerides, owe this to the excess conversion of carbohydrates into fat. There is scant evidence that this is due to the fat content in the diet. In fact the evidence suggests that this is not nearly as relevant as is the excessive consumption of sugar. Studies have shown that sucrose, for example, is very quickly taken up by the liver and converted into fat. The whole question has to be re-examined, but my own conclusion is that although it is important to have a proper level of fat, it is much more important not to increase one's carbohydrate intake if one wishes to protect oneself against having a coronary occlusion.

The final condition is the B.Coli infection due to the excessive content of starch and sugar in the gut, which provides a nutrient medium for organisms which we do not particularly wish to have in our body. These are called B. Coli conditions.

(b) Removal of Fiber This produces two main sets of conditions, (1) dental caries and periodontal disease, (2) colonic stasis leading to varicose veins, hemorrhoids, diverticulitis, appendicitis, and cancer of the bowel. There is a continuing debate with respect to the merits of the addition of fluoride to our water. There is slight evidence that it decreases the incidence of dental caries at least for a matter of two or three years, although there is no substantial evidence that there is a long-term beneficial effect if the studies are carried into adulthood. However, there is no evidence whatever that the addition of fluoride to water will have any effect upon periodontal disease

which to many dentists is a much greater evil. There is a good deal of evidence that periodontal disease and also caries is due to the excessive consumption of sugar combined with the removal of fiber which acts as a scouring agent. For example, if one sucks a candy, there is a film of sticky substance which clings to the teeth which provides a perfect media for bacteria to grow in. If, however, one were to eat an apple or some coarse food, this tends to scour the sticky material off one's teeth, and therefore decreases the possibility of attack by bacteria.

One of the problems with the fluoridation of water is that this lulls many communities into thinking that they have done what can be done for the health of their residents, and therefore they do not pay enough attention to the importance of adequate nutrition. The second set of conditions caused by lack of fiber are even more important, especially for adults, because an insufficiency of fiber in the diet leads to constipation or colonic stasis. Dr. Dennis Burkett, as well as Dr. Cleave et al., have shown that the time required for food to pass through the intestine is greatly prolonged for people who do not consume enough fiber. For some North Americans it may take as long as 72 hours for the food to pass through. Constipation is a very common problem. Among the best-selling medicines are the various laxatives, especially for people over 65. It is much simpler to deal with this constipation by increasing the bulk or fiber of the food. The addition of two or three tablespoonsful of natural or all bran provides the necessary fiber. Continuous and prolonged constipation leads to back pressure against the veins and directly is responsible for varicose veins in the legs and for varicosities in the rectum, called hemorrhoids. As a result of the straining and pressure on the intestine, diverticuli are produced and this leads to a condition called diverticulosis, generally characterized by alternating constipation and diarrhea. Eventually, if this condition is prolonged, cancer is the result. Dr. Dennis Burkett, a

world-famous surgeon, reports that cancer of the bowel is extremely rare amongst populations where they still consume whole natural foods, but becomes very common and may affect as much as 17 percent of any adult population where they have given up their fiber. This is not a racial problem because the same people who rarely have cancer on their own native diet very quickly begin to approach our own incidence of cancer when they adopt our diet.

It has occurred to me that one of the most effective ways the white races have had in destroying the colored races is to persuade them that our diets are the ones that they should be following. We have exported our bad nutritional habits to the Eskimo, the Indian, and I understand that we are now beginning to export quantities of sugar drinks to Russia. This might be one of the smartest moves that the capitalistic nations have made because this is certainly bound to decrease the strength and health of the nations who are happily beginning to increase their consumption of the same foods which have made all of us so sick. Dr. Burkett recommends that every person ought to eat only whole grain cereals and add two or more table-spoonsful of bran to the daily diet. This, I think, is an extremely important rule, (c) Removal of Protein According to Cleave et al. this results in peptic ulcer because foods containing proteins are not continually present in the stomach to absorb the acids which are released. It is well known that certain foods tend to increase the secretion of gastric juice which contains acid; for example, if one drinks a coca cola there will be an increase in the secretion of gastric juices. However, coca cola or other drinks do not contain protein, and therefore there is nothing there except the stomach wall to bind the acid. There are two factors involved. One is called protein stripping, that is, lowering the protein content of the body by special procedures, for example, in milling of wheat as the outer layer tends to be

FOOD COMPONENTS AND SACCHARINE DISEASES

higher in protein than the endosperm or white flour, and therefore white flour provides less protein to bind the acid in the stomach. However, by consuming large quantities of food that do not contain any protein, this protective affect of the proteins is lost. This suggests that peptic ulcer ought to be treated by a high-protein diet with less dependence upon milk that seems to have a propensity for producing addiction or allergy.

(d) There are other conditions, referred to by Cleave et al. including toxemia or pregnancy, various skin conditions, and renal stones.

There may well be a large number of other conditions as soon as enough physicians become interested in this nutritional approach and begin to examine their patients much more carefully.

Psychiatric Aspects of the Saccharine Disease

Although Cleave and his colleagues do not discuss the psychiatric impact of the saccharine disease, it has been evident over the past 50 years that the excessive intake of sugar does cause depression, anxiety, and tension. The term "relative hypoglycemia" has become popular. It is a manifestation of a serious disorder of carbohydrate metabolism rather than a disease, but as the term has become well known there is no harm in using

it. It must not be confused with a very rare form of hypoglycemia due to a tumor of the pancreas.

A large proportion of any psychiatric population have abnormalities in carbohydrate metabolism due either to the excessive consumption of sugar, to allergies, or to a combination of both factors. Hypoglycemia will be discussed by Dr. Harvey Ross. When present it must be controlled by a suitable diet. When this is done the response to treatment is quicker, better, and more enduring.

Summary

Supernutrition provides an optimum amount of protein, fats, carbohydrates, vitamins, and minerals for each individual. The no-junk diet is a close approximation to it. Individuals differ in their requirements. This must be taken into account. When these principles are violated, especially if the consumption of refined foods is excessive, a disease called the saccharine disease is produced. This has physical and psychiatric manifestations.

REFERENCES

- CLEAVE, T.L., CAMPBELL, G.D., PAINTER, N.S.: Diabetes, Coronary Thrombosis and the Saccharine Disease. John Wright and Son, Ltd. Bristol, England. 1969.