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THE NATIONAL MALNUTRITION*

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INTRODUCTION

Since the first use of the word "vitamin" the problem of nutrition has been more or less confused. With the discovery of new vitamins confusion increased. When minerals were added to the necessary articles required for good nutrition the bungling and muddling connected with pontifical pronouncements from supposed high places made it more difficult for anyone, doctor or layman, to get at the truth. The matter would not have been so hard to untangle had not the whole question been saturated with the poison of commercialism. The selling of bad food had become one of the biggest if not actually the biggest of business enterprises. The usual scientific discussions which always follow the introduction of new ideas in medicine were not allowed to proceed as usual in an unbiased way, but commercial interests began in a most insidious way to combat scientific fact with ridicule, endowed research (endowed in one direction), and other well tried and tested methods. As the purveyors of good food were practically unorganized and had smaller investments, errors were allowed to go unchallenged, the general confusion on the subject of nutrition increased and the sabotage on the health and well being of the American people proceeded apace. Under the stress of war the will to better health has been developed. The bad qualities of certain foods were admitted. It was conceded that white flour and sugar were producers of the most dangerous diseases. An unsatisfactory compromise was made and the false statements foisted on the people to allay general unrest. In effect the bad food purveyors now said: our product was bad but now it is good. As a matter of fact white flour has been improved very little, sugar not at all and canned goods have the same reduced amounts of vitamin B that they always had, (the B largely killed by heat).

The only good flour is whole grain flour and as this must be fresh, (it spoils in a few weeks) the white flour milling business would be affected in an adverse way if fresh whole wheat flour were to become universally used.

In human nutrition we must aim at the optimum as in the inevitable national conflicts which test the highest in physical and mental development, only the optimum will prevail. The profit minded individual who prates about the American diet being satisfactory as it is, digs his own grave as he opens the way for our enemies.

CHAPTER I

OUR DIETARY NEEDS (What do we need?)

The requirements for the maintenance of life in every living cell are to be obtained partly from the air we breathe, partly from the water we drink, and partly from the food we eat. There is the possibility of variations or changes in any of these three which may inhibit the optimum life processes in the living cells. Air may be contaminated with smoke or gas or dust. Water may be contaminated with typhoid fever germs or amebic dysentery. Food may be contaminated with disease germs, or may fail to contain the necessary elements for providing the highest type of resistance to disease germs.

In the life of the ordinary person, the most common disease-producing factors are from food deficiencies. In the past it has been thought that contaminated air and water have a good deal to do with the production of disease, and while this does occasionally occur, it is not to be compared in importance with the amount of disease that is produced by errors in diet.

In the past, before dietary principles were on a scientific basis, much theorizing was done as to the cause of some of the common diseases. Philosophical methods of thought ascribed disease to air, water, weather, evil spirits, changes in the moon, cold, wet, and witchcraft. Today we know that the average healthy animal will live out his life free from disease, retaining mental and physical faculties until near the time that death comes from old age, if the individual is properly nourished. These principles have been worked out on laboratory animals, and are now well established. The application to human individuals is much more difficult than to laboratory animals, but by accident or design, much evidence has been accumulated on individual human beings and in groups, in factories, armies, and persons in certain geographical locations.

The Japanese Army during the Russian-Japanese war suffered in a very great way from a deficiency disease. The Japanese Navy during the same war, properly fed, suffered very little from this disease. Some industrial plants have experimented with employees in the matter of a tendency to catch cold, and have found that the well-nourished individuals have a much smaller number of days absent from work on this account. The people of Labrador every winter suffer severely from scurvy and beriberi due to the fact that during this period of the year they are located in a somewhat inaccessible geographical location, and fresh fruits and vegetables are not available.

These instances are given to show the methods used to acquire information in connection with the human animal, and in order to show that in the main the principles that apply to rats and guinea pigs apply in the same way to humans.

A few of the sources of information in connection with human diets are studies made in the Loetschental valley in Switzerland, the Outer Hebrides Islands and the Indians of western Canada. These relatively inaccessible geographic locations permit the study of peoples who live on natural foods. Western Canada, in the region east of the Rocky Mountains, is hard to reach. The Indians in this part of Canada enjoyed long life and good health until a fort was established by the British government. The Indians who lived near the fort found they could trade their furs and fish for "the white man's food." The white man's food consisted mostly of white flour and sugar. The Indians took to this with as great enthusiasm as they did to alcohol; resulting in many cases of arthritis,

tuberculosis, and tooth decay, with a shortened life period, and with lessened ability to work. The Indians in the back country who did not have access to the white man's food kept their good health; had no tuberculosis or any of the other diseases mentioned.

In the Outer Hebrides--a little group of Islands in the north Atlantic west of northern Scotland--the natives were found to be healthy, strong, and long-lived. Their food was whole grain products, milk, milk products, and meat. There was no need for a doctor or a dentist. In time the Lewis tweeds from the Island of Lewis in that group came to be an important article of commerce. A brisk shipping between Scotland and the capital of the Islands sprang up. This shipping brought the English and Scotch, who in turn brought marmalade and other sweets, candies, cookies, and products made with white flour and sugar. Coincident with the introduction of these foods, the school children showed a large incidence of tooth decay, adenoids, diseased tonsils, arthritis, tuberculosis, and other diseases that go with deficiency diets. The people in the back part of the Island of Lewis and the people of the other islands who were not exposed to the diets of the more highly civilized English and Scotch suffered no deficiency disease. They continued to live to be near one hundred years of age without tuberculosis, arthritis, heart disease, diseases of digestion, or tooth decay.

The Loetschental valley in Switzerland is high in the Alps and is relatively inaccessible. The population of the valley is around 2200. The summer is short, but is long enough to provide for a crop of grass, greens, and vegetables. The people of the valley live on milk cheese, butter, whole grains, eggs and meat. Neither the Indians of western Canada, the people of the Outer Hebrides, or the inhabitants of the Loetschental valley ever had the benefits (or curse) of sugar. This Swiss valley, while supporting a rich and prosperous population, has never had a doctor or a dentist. There has been no need for either. The expected life period is around one hundred years. The persons are vigorous and well able to do manual work in the 80's and 90's. Deficiency diseases as we know them simply do not exist. The Swiss Guard which formerly was furnished to the Pope, and for which the Swiss government searches the country for the finest physical specimens, was largely taken from this valley.

The foregoing are given as illustrations in the human family which might in some measure parallel laboratory experiments made on animals. A larger and more convincing exhibit could be adduced from the experience of the Chinese, Japanese, and Filipinos in connection with polished rice. The eating of polished rice produced hundreds of thousands of cases of beriberi--a disease which paralyzes certain muscle groups, and in some cases produces insanity, and always leads to death. Our own southern states, southern Spain, Italy, and other Mediterranean areas furnished thousands of cases of a disease called pellagra. Persons affected with pellagra have red discoloration of the skin, with disturbances of digestion, and nervousness which finally becomes insanity. In the insane asylums of the southern states, over half of the inmates are there as the result of pellagra. Pellagra has been found to be a disease caused by diet deficiency. Beriberi in the orient and pellagra in America are still common, and the conditions producing the diseases in these different parts of the world can be duplicated in laboratory animals with the same result.

Our knowledge, then, in regard to diet does not depend altogether on experiments with laboratory animals, but every step and every conclusion may be backed up with facts that have been gleaned from human experience on great groups of people in various parts of the world.

Our purpose here is not to adduce in every case the proofs of what we are saying in regard to human disease. These proofs are to be found in every well-stocked library. In the medical journals for the last five years this subject has taken up more space than any other, and in medical papers presented at conventions this subject has been the principal topic for discussion. Newspaper and magazines have carried innumerable articles, and in some several such articles may be found in one issue.

The result of all the work that is being done in the universities and commercial laboratories throughout the whole civilized world is that certain chemical entities are found to, be necessary to life processes. Animal life demands certain minerals, certain vitamins, and certain fats and proteins in order that the body chemistry may be properly carried out. Never before in the history of the world has it been possible to say what these necessary things are. Always, up to the present time, diet has been a hit-or-miss affair. Experience has been the only guide. Success or failure depended upon accident. No guide was available except the likes and dislikes of appetite. Everything that contributed to the pleasure of eating was considered acceptable and good, just as anything that contributed to protection from the winter's cold and storm was thought to be acceptable and good.

Grains were known to be good food. Human teeth were not capable of properly crushing them. Artificial methods came into use. The crushing of wheat between two stones relieved the human teeth of much of their natural function. Elaboration on this principle led to the development of wheat flour as we know it today. Modern milling has robbed food of certain valuable ingredients. The sweetness of fruits was acceptable and valuable to our early ancestors, but chemistry concentrated the sweetness and cheapened it so that sugar became a universal food.

In the development of these two foods much was left out, and we now know that some of the things omitted were and are necessary to optimum functioning of life processes. In an effort to make foods more acceptable to the taste and to keep food supplies over the winter's season, sterilization by heat and the exclusion of microorganisms brought about the conditions which resulted in the canning industry. The factory production of sugar has robbed another class of food of valuable ingredients. Canning has also contributed to the deficiency picture by robbing certain foods of valuable chemical elements.

When these changes in food were first developed, no one believed that anything was being done which was detrimental to our food supply. But now it is well known that factory processes--heating, canning, and sterilizing--have a definitely bad effect, and that this bad effect is the removing of certain health promoting elements which formerly existed in the natural food. The question then arises--What are these elements, and what has their absence from modern food done to the average so-called civilized individual?

Before discussing the individual elements that are lacking in modern foods, we should understand that most of our thinking processes are on the basis of relativity. Do we know whether a child in school is a normal, healthy child or not? Do we know that a boy on a football team in college is a normal, healthy individual or not? Do we know a private in the army who has passed the physical examinations is a normal, healthy individual? Is the doctor who writes your prescription a healthy or a diseased person? Is your minister, your grocer, your secretary, a normal, healthy individual? It is quite obvious that the standards of the present time are wrong standards. We have been

afflicted by mass diseases for so many decades that the average layman and the average doctor, and quite obviously the average dentist, does not know what is normal.

The standards of the present time have been built up from population averages, just as the standards of the insurance companies have been compounded of groups of policyholders. Both of these are false standards, but standards of groups of human individuals "as is." In the future when the human family takes advantage of the scientific aids to optimum health now available, the standards will be quite different. A decayed tooth will be looked upon as a very rare disease. Persons will not be afflicted with arthritis or neuritis before the advanced ages. Most of the chronic diseases that afflict middle-aged persons at the present time will have disappeared.

CHAPTER II

WHY WE MUST HAVE VITAMINS

The young animal coming into the world receives a diet of milk. The milk contains fats, proteins, sugars, and minerals. With the exception of water, the needs of the young animal are completely supplied by this one food. After a certain time, in order to develop properly, the young animal must provide himself with other foods. One of the first needs is food that contains iron, as Nature supplies the young animal with iron enough to last only a few months. Milk supplies calcium for the growing bones of the young, and must also supply protein for building muscle, brain, and other bodily structures. The milk supplies certain elements which convey the ability to resist infections. The most common of these is vitamin A which is to be found in the fat in the milk. The protein elements in the milk carry all of the vitamins of the vitamin B complex. The milk contains some vitamin C and perhaps, if the mother has been exposed to sunshine during her period of pregnancy, the milk contains the bone-building element, vitamin D. The young animal, then, receives from his parents the vitamins necessary to life--the sugars constituting a good part of the solid material in the milk. The sugars are burned to supply energy.

In the early months and years of life, the young animal is exposed to various types and kinds of infections. The only way in which the organism is enabled to resist such infections is through the optimum functioning of the various glands, and the proper working out of body chemistry. It is a fact that well-fed animals survive exposure to infections which readily kill animals which are not thus well nourished.

While the functions of various vitamins and minerals overlap to a very great degree, there is to some extent a specific action, and this specific action has much to do with ability or lack of ability to resist infections. Vitamin A, for instance, has something to do with protecting eyes from infections. The person who is lacking in vitamin A may develop a mild or severe eye infection, depending on the degree of the deficiency. The severe infection will inevitably lead to such destruction of the eye tissues as to produce permanent blindness. Deficiency eye diseases are the best examples of infections built up on a deficiency basis.

For years the scientific men of the orient debated the question as to whether beriberi was a mild infection of the nervous system, or an outright lack of building material necessary for nerve tissue. It is now quite apparent that the symptoms are those of a low-grade infection superimposed on diet deficiency. In the case of scurvy, it is not the same problem as in the past. It was formerly thought that lack of vitamin C was a lack of actual building material. The person with advanced scurvy has for years had the symptom of leakage of blood vessels under the skin. It was thought that the leakage was due to the fact that the cement substance in the walls of the capillaries was lacking to such a degree that the blood oozed out between the poorly cemented cell walls. Whether or not there is some lack of building material we do not know. It is evident that leakage does take place, but it is also evident that low-grade painful infections run concurrently with the progress of the disease.

The most apparent of these infections take place in the mouth. The person with scurvy has infections existing in the gums, and the infections are those of the common pus-

producing types of microorganisms. In other words, here as in deficiency diseases of the eye, there are innumerable evidences of infection eagerly crowding in on tissues which have lost their defenses on account of certain vitamin starvation. Lack of vitamin A and vitamin B and vitamin C opens the door to the entrance of infectious disease of, the eye, the nervous system, and the mouth. Apparently the processes move up and down like the arms of a scale. As vitamin and mineral intake is up, infection is down. As vitamin and mineral intake is down, infection is up.

Vitamin D is the substance necessary to the proper building of teeth and bones. Whether a lack of vitamin D is accompanied by some sort of low-grade infection, we do not know. Apparently the disease produced by lack of vitamin D is purely a chemical reaction; but while vitamin D has been thought of as simply a protector of bone and teeth, its effect is apparent in other parts of the body. Undoubtedly there is a relation between this vitamin and protection from infections. This was one of the earliest facts discovered in connection with vitamins.

It is now well known that exposure to sunshine protects the individual from tuberculosis. Exposure to sunshine is the best way of getting vitamin D. The short waves of light from the sun acting on the ergosterol in the skin produce vitamin D. These short waves penetrate the cornea and the other transparent structures of the eye; impinge directly through the transparent blood vessels of the retina, and produce vitamin D by direct action on the blood stream in that manner. So even with the body completely covered up with clothing, a person outdoors in sunshine will receive some vitamin D through the eyes.

Tuberculosis is a virulent and stubborn infection. However, early cases treated with vitamin D alone (exposure to sunshine) may be cured. Apparently the only persons who do develop tuberculosis are those who are lacking in vitamin D. We must conclude, then, that the effect of vitamin D is not completely a chemical effect, but that it is also a highly infection-resisting life element.

In the breaking up of the vitamin B complex, several new vitamins have been discovered. The first of these is riboflavin. It has been found to be necessary for the existence of every cell in the body. Clinically, the reduction in the amount of riboflavin results in sores developing in and around the mouth. These sores are actually small ulcers, and are associated with infectious microorganisms. In other words, infections of the lips and mouth occur in the persons who are deficient in riboflavin. Some kind of a barrier has been broken down in the person who is deficient, which allows these germs to flourish and to produce ulcers and sores in this part of the anatomy. Here again is illustrated in a specific way infection intruding itself immediately when the general resistance is lowered.

Another part of the vitamin B complex is niacin (nicotinic acid) which relieves the symptoms of pellagra. The insanity is relieved; the digestive symptoms are improved, and the skin inflammation disappears. The person who is afflicted with pellagra and who has an inflammation of the skin has this infection as a result of the resistance of the individual's skin being lowered. His brain function is disturbed because resistance has been lowered. His digestive tract is diseased because resistance in this part of the body has been lowered. The taking into the body of a certain amount of niacin-amide raises the general resistance of the individual to this particular type and kind of infection, so

that the symptoms disappear. Here again is demonstrated in a spectacular way a lack of resistance to certain specific infections coincident with a lack of a certain vitamin.

For many years it has been known that the effects produced by yeast and liver extract can not be completely duplicated by giving the then known elements of vitamin B₂ along with vitamin B₁. It was apparent that there were undiscovered vitamins which had the ability to produce profound effects in the human organism. In dealing with laboratory animals, it was known that the combination of riboflavin, vitamin B₁ and niacin-amide would not provide the animal with as good health as when the whole B complex, as represented by yeast, was used. Drs. Jeans and Zentmeyer, of the University of Iowa, found that animals could be made so ill that their hair turned gray or that bald spots could be produced while giving all the synthetic vitamins and necessary minerals, but leaving out the undiscovered part of vitamin B₂ complex.

For a time this mysterious element in the vitamin B₂ complex which had to do with the color of hair (gray or not gray) and which also had to do with the glossiness and beauty of hair, in some cases producing baldness, was referred to as the filtrate factor (or factors). It was not known whether this was a single or a multiple vitamin. Recent work has shown the filtrate element to be pantothenic acid. In nature it is found associated with vitamin B₆, since identified as pyridoxine.

Apparently pantothenic acid has a relatively specific effect on the hair, nails, and the skin epithelium, and the integrity of the nervous system and brain. In the animals well supplied with pantothenic acid, the skin glands appear to remain in better health, and the skin does not take on the wrinkling and aged appearance which occurs in those who are deprived of this vitamin. In human subjects, the same thing seems to be true--that a good appearance of skin, hair, and nails is preserved in those who have a sufficient amount of pantothenic acid in the diet. It has been called the vitamin which prevents old age; but this statement is of course in error. No one vitamin prevents old age.

Earlier in our studies of vitamins, Sherman of Columbia University was convinced that the vitamin which we now call riboflavin was an important element in preventing old age. Only by a judicious combination of all vitamins, combined with sufficient minerals, do we have the answer to the problem of old age.

The vitamin which had first been called B₆ and is now referred to as pyridoxine has a pronounced effect on the nervous system. Animals who are deprived of this vitamin are unable to sleep; are extremely nervous and irritable. The same symptoms occur in human subjects in whom the amount of pyridoxine is restricted. In addition to these, the human subject has difficulty in walking, weakness, and abdominal pain. These symptoms manifest themselves in a decided manner in persons who are starved for pyridoxine, even though all of the other vitamins and minerals be given in sufficient quantities. The symptoms mentioned are very quickly relieved on taking sufficient doses of this vitamin.

In considering the substance formerly known as vitamin B, the first division was one which was thought to explain the chemistry of the vitamin, and the terms used were vitamin B₁ and vitamin B₂. Vitamin B₁ was later found to be an entity which could be manufactured in the laboratory. The accepted name for vitamin B₁ at the present time is thiamine. A vast amount of work has been done on vitamin B₂. It was broken down by

chemists into vitamins B₂, B₃, B₄, B₅ and B₆. Vitamin B₂ has come to be called riboflavin. It may be manufactured artificially in the laboratory.

Vitamin B₃ now bears the name of niacin. Niacin as a chemical entity is not new. It has been known for many years, but the identity of niacin as a vitamin is new. It also may be produced synthetically in the chemical laboratory.

Vitamin B₄, formerly called the filtrate factor or factors, now known as pantothenic acid may be artificially produced in the laboratory.

Vitamin B₅ is a still unknown factor, and may be single or multiple. It has to do with the health of the skin in chicks. This means that it has something to do with the resistance of the skin to infections.

Vitamin B₆, pyridoxine, may be produced in the laboratory.

A study of the chemistry of the vitamin B elements shows that all but one are now well understood, and this one may turn out to be plural instead of singular. We must depend on extracts from yeast, or liver, for this unknown substance. The administration of the synthetic elements as stated - thiamin, riboflavin, niacin-amide, pantothenic acid, and pyridoxine--does not give the optimum result in treating vitamin B deficiencies. Although the amounts may be measured with great exactness, there exists in extracts made from the wheat germ and extracts made from yeast a certain unknown factor or factors which cannot be disregarded in vitamin therapy, and which we must classify as one of the essential needs of the human organism. An attempt to provide treatment by simply using the synthetics in the vitamin B group cannot furnish optimum results. The unknown vitamins still have a dominating influence in the picture.

Pyridoxine is the most effective remedy in the rather common disease of old age--Parkinson's disease. This is the disease formerly called palsy or paralysis agitans. It is characterized by involuntary shaking of the hands, arms, feet, and in advanced cases, of the neck and head.

One of the needs of human beings, monkeys, and guinea pigs is vitamin C. This vitamin has to do with the integrity of blood vessels. It has something to do with the growth and function of bones. It has a good deal to do with the nutrition of teeth (dentine). Dr. Hanke formerly of the University of Chicago made experiments (Asylum at Moosehart, Ill.) on several hundred orphans in which he showed that tooth decay and pyorrhea were caused in part, at least, by a deficiency in vitamin C. The work of the Mellanbys in England showed that vitamin C has to do with the health of the dentine, and vitamin D has to do with the health of tooth enamel. Further work by the Mellanbys in London and Hanke in Chicago showed that the cause of tooth decay in children who were not properly nourished was associated with scurvy. "Mouth scurvy" might as well be used instead of the term "pyorrhea" or "tooth decay."

The commonest sources of vitamin C are the citrus fruits--oranges, grapefruit and lemons. This element does, however, exist in all the raw fruits and vegetables. Bananas are a good source of vitamin C as are also apples and melons. Since it has a profound effect on the health of the mouth and the health of the blood vessels, it must be considered one of the very important needs of those animals which do not manufacture it in their own bodies. It is probable that in the past all living animals produced their

own supply of vitamin C. We now know that birds, dogs, cats, and many other animals may exist and have good health with no source of vitamin C in the diet. Guinea pigs, monkeys, and humans have lost this function. They must receive their vitamin C from an outside source. This source must furnish the vitamins in sufficient quantities, or scurvy and its many associated disease conditions will result.

Vitamin C may now be produced synthetically in the laboratory. The dose may be measured accurately. We know the amounts needed to prevent any possible manifestation of scurvy. The need for vitamin C is very definite and well-established. Over 150 years ago, its need was recognized by English physicians, and lemon juice was issued as part of the dietary of the men in the English Navy. This gave them an enormous advantage over the men of other navies who all suffered more or less from scurvy. This advantage gave the English Navy a predominant influence in the affairs of the world and made England the Mistress of the Seas--a proud distinction which she still holds, and which was made possible by supplying a dietary element which her enemies did not have. Thus vitamin C, long years before its discovery, changed the history of the world in a very definite way.

Other vitamins are changing the history of the world at the present time in as equally a definite and positive way.

Vitamin D is contained in certain fats. It is usually found in association with vitamin A as in cod-liver oil. It exists in butter if the cows have been grazing in the summer sunshine and eating the summer grass. It does not exist in butter during the fall and winter months. It exists to a certain degree in eggs when the chickens have been exposed to spring and summer sunshine; but does not exist in eggs laid during the winter months.

Our main source of vitamin D is not food, but exposure to sunshine. It has to do with the building of bones and with the moving of calcium in the blood stream. Calcium must exist in a certain concentration in the blood, or nervous symptoms will follow. The nerves become hyperirritable. The muscles become weak and shaky. Intelligence is lowered by the absence of a sufficient concentration of calcium in the blood.

Calcium has to do with the clotting of blood. A person who does not have sufficient calcium will more easily bleed to death. Nature makes a very great effort to maintain the normal calcium concentration in the blood. This effort is so pronounced that in order to keep the concentration up to near what it should be, it will rob bones and teeth for this purpose. This explains the thin, eggshell-like bones in many middle-aged and old persons, who have existed on a calcium deficient diet over a period of years. It explains also the increase in tooth decay during pregnancy, for Nature always robs the mother to feed the child. Not only does the parasitic new individual called the fetus rob the mother of calcium, but the fetus also robs the mother of iron, and other valuable elements. Undoubtedly Nature's plan is to disregard the older life in an effort to do the best possible for the new individual coming into the world.

Vitamin D must be considered one of the very great needs, but a sufficient recognition of this need has not been apparent until, very recent times. The newer generation of babies being born at the present time are being dosed with cod-liver oil and other fish oils so that their supply of vitamin D will be better from year to year from now on. Experiments with rats have shown that a vitamin D deficiency not only produces

crooked bones, but a relative lack of normal intelligence. This seems to be borne out in human experience, and in the schools the children with rachitic heads, the deformed chests of rickets and the crooked legs, bowlegs, and knock-knees due to lack of vitamin D, are less intelligent than children of the same age who have good, strong, straight bones and do not have the rachitic head or chest.

The supplying of vitamin D by cod-liver oil and other fish oils is the makeshift way of solving the problem. All the needs of the individual for vitamin D could be very well met by exposure to sunshine. Some kind of a regime must be worked out in future years to allow more exposure, especially of children, to sunshine, as this is the physiological way to get vitamin D, and undoubtedly gives a better clinical result than our present dependency on fish oils. One of the objections to fish oil is that, along with the vitamin A and D, there also exists certain toxic substances. These substances are not harmful in the ordinary dose as taken, but when the human dose is given to a rat or other small animal, the toxic effects become quite apparent.

The crooked bones which result from a lack of vitamin D in childhood have the effect of distorting the pelvis. This becomes a serious matter in the case of females, for it increases the hazards of childbirth. Most of the need for instruments in obstetrical deliveries, and most of the necessity for doing Caesarian operations are the result of deformed pelvis produced by lack of vitamin D during the girl's growing years.

Rickets has been exceedingly common in all the northern parts of the United States, the percentage of school children suffering from this disease running as high as 70 to 80 per cent. As stated, there is hope that in the future this percentage will be materially cut down. But it shows that one of our greatest dietary needs (if a vitamin coming from the sun may be called a dietary need) is vitamin D. The vitamin exists in fish-liver oil, because it has been stored up by the fish in the liver for future needs. The same vitamin D which appears in cod-liver oil may have gone through the livers of hundreds of smaller fish or smaller forms of life, and originated in the algae floating on the surface of the water. The sun acting on these algae has produced the vitamin D.

The need for vitamin E in the human diet has been recognized for only a few years. It has a specific effect on the voluntary muscles of the body, ordinarily called the red muscle. The muscular tissue of the human body amounts to at least 50 per cent of all the body weight. The health of this relatively huge mass of living tissue can not be disregarded, even though the person is not using his muscles in manual labor.

Some of the most important work in connection with vitamin E has been done by Dr. Sergius Morgulis, of the University of Nebraska. He has shown that vitamin E is necessary to prevent muscular degeneration. He has been able to produce artificial muscle dystrophy in experimental animals by lessening the intake of vitamin E in the diet. Even after the muscles have been almost completely shriveled up and replaced by scar tissue, a good functioning muscle may be built up again in the same animal by supplying vitamin E.

Apparently the lack of a sufficient amount of vitamin E in human nutrition accounts for a good deal of muscle weakness as well as muscle atrophy in the human animal. Different degrees of weakness down to actual paralysis may occur. These results have been checked and found correct by workers in other universities. However, in the University of Copenhagen it has been found that voluntary muscles weaken and shrink

in the absence of vitamin E, and also that certain nerve centers in the spinal cord are weakened, and in severe E deficiencies completely killed, by depriving the animal of this vitamin over a sufficient period of time.

Healthy nerve centers in the spinal cord are necessary in order for voluntary muscles to function properly. Muscle shrinking in vitamin E deficiencies may be due primarily to the effect of the deficiency on the spinal centers, and the muscle effects may be secondary in nature.

Another need for vitamin E is much better known. This is the effect on the organs of generation. This was worked out some years ago by Evans, Bishop, and Barnett Sure. This work has shown that in the female who does not get enough vitamin E there is an inability to carry pregnancy through to full term. Abortions occur in animals or humans who do not get enough vitamin E. The effect of the vitamin is also well worked out in the male. Here it produces a lack of sperm. In the male the damage done is permanent. No amount of feeding vitamin E will restore the deficient male to fertility. In the case of the female, the ovary may lose its function so that it is practically useless, but this may be built up again by administering a sufficient amount of vitamin E.

When we consider the many-sided functions of vitamin E on ovaries, testes, spinal centers, and red muscle, we must conclude that this is one of the most important needs for good health and proper functioning of the human organism.

One of the reasons why this need has not been more universally recognized is that vitamin E is an element that is present in practically every kind of food. It exists in small quantities in vegetables and fruits, being in the greatest concentration in leaf lettuce and wheat germ oil. It exists also in meats, sea food, and dairy products. It stands the ordinary heat incident to cooking without destruction. The lack of vitamin E that occurs in human diets occurs because the amount present in the natural foods taken is diluted by the amount of non-vitaminized and nonmineralized carbohydrates which are consumed as sugar and white flour products. If 75 per cent of the food intake is composed of these sugar and white flour products, it will readily be seen that the amount of foods containing vitamin E is reduced 75 per cent.

This same principle of course applies to other vitamins. It also applies to minerals such as calcium, iodine, and iron. Nature having distributed this vitamin in many different kinds of foods, no ordinary food combination would ever produce a deficiency. It is only by the use of factory foods that vitamin E deficiencies are produced.

CHAPTER III

WHY WE MUST HAVE MINERALS

The ordinary student of nutrition has paid a good deal of attention to individual vitamins, but has paid little attention to minerals. There is no doubt but that mineral deficiencies exist as commonly as vitamin deficiencies, and that the mineral deficiencies stem from the same source--factory-made foods. In an article by Dr. Alice Bernheim in the journal of the American Medical Association of April 1, 1933, it was shown that the average diet of the average civilized person does not contain enough calcium. The calcium needs of a person of 150 pounds was shown to be from 7 1/2 to 10 grains a day (a grain = 60 mg). The ordinary diet, composed largely of white flour and sugar, does not contain this much calcium. The conclusion reached by Dr. Bernheim is that calcium deficiency is universal in all civilized countries. Another important point brought out by Dr. Bernheim is that different forms of calcium have different degrees of absorbability. Some calcium salts are readily absorbable and are used in the body. Others are not absorbable and pass through the gastrointestinal tract unchanged.

It is well understood at the present time that the best forms of calcium are those which have gone through some kind of animal metabolism. Ground bone is more easily absorbed than other forms, and is properly used a good deal in baby foods. The forms of calcium that exist in milk and cheese have been through the metabolism of the cow, and therefore have been metabolized and are easily absorbed by the human animal. Milk and milk products, then, furnish the best source of calcium. With a sufficient source of calcium, nerves are less irritable. Without a sufficient amount, pains may exist which completely disappear after a sufficient amount of calcium is taken. Some of the pains of advanced cancer may be completely relieved by giving calcium. This does not mean that the nerves of the cancer patient have been obtunded as they would be by some drug, but that the pain has been simply a cry of the diseased nerves for calcium.

Calcium is excreted from the body in the discharges which comes from wounds and open sores, and ulcers. Cancer usually exists as an ulcerated area. Much calcium is lost in the fluid that seeps from the ulcerated cancer surface. The small bodily supply is further depleted, therefore the giving of calcium by mouth or by intravenous use quiets the cancer pains.

As calcium deficiency is one of our most widespread deficiencies, it shows up also in the lack of resistance in our teeth. The mention of tooth destruction in pregnancy calls to mind the direct robbing of calcium-bearing areas to furnish calcium to the child. But old infections may also rob teeth and bones, as calcium may be needed to erect barriers against invading microorganisms. This takes place in the lungs in tuberculosis. A tubercular body being examined at postmortem will show many areas in the lungs which resemble small marbles. These densely calcified areas are simply Nature's method of trying to wall in the poisonous germs which are lodged in the lung.

Calcification may take place in other parts of the body. It is not uncommon to find calcified areas in fibroid tumors of the uterus, and in any old chronically infected area. In all such conditions Nature's first call is on the normal body calcium, in the hope that it may be used as a defensive mechanism in the area where disease is going on. Ordinary whole wheat bread, meat, fruit and vegetables contain some calcium; but the amounts in ordinary diets are not sufficient to give the optimum needed by the body.

There is no question but that calcium is one of our greatest body needs, as the bony structures of the body are perhaps the greatest in bulk and weight next to the voluntary muscles. The optimum calcium supply is a surplus and a surplus does no harm.

In order that physiological processes may be carried on in a normal, proper way, oxygen must be carried to each individual cell. The oxygen is carried to the cells of the body by a compound which is made up partly of iron. Oxygen enters the lungs, penetrates the wall of the air cells, and enters the blood. The iron containing hemoglobin exists in the red blood corpuscles and having combined with the oxygen, carries it to the cells, where oxidation takes place. Without iron, no metabolism and no oxidation would occur. The need for iron is constant, as much of the hemoglobin is being destroyed and excreted every day. As new supplies of calcium must be provided, so new supplies of iron must come in by way of the gastrointestinal tract in order to provide for new hemoglobin daily.

In the life processes of the ordinary individual, around 3 percent of the red cells are being destroyed every day. This means that a certain definite amount of iron must be provided to make up for what is lost. Iron must be supplied and absorbed in the amount of 10 to 25 milligrams every day. The dilution of iron-containing foods by devitalized carbohydrates makes this optimum impossible. We may measure the amount of iron in the blood by the amount of hemoglobin present (red coloring matter).* (* Much of the iron in the body is used over and over again but there is a steady loss of a few milligrams a day.)

In making blood examinations on large groups of individuals, it is very rare to find a 100 percent hemoglobin reading. This means readings on persons ordinarily considered normal--life insurance examinations, soldiers, and examinations for entrance into industrial positions, and of women entering hospitals for obstetrical work--all are found to be more or less deficient in iron.

Our best food source of iron is lean meat. The richest sources of iron among the various kinds of meat are liver, heart, and kidney. The muscle meats which are ordinarily eaten--steaks, chops, and cutlets--are also rich sources of iron and furnish this element in a greater degree than any form of vegetable or fruit.

One of the most important of the mineral needs is the need for iodine. Without iodine the thyroid gland does not properly develop. In diets which contain quantities of iodine below the normal amount, all the life processes are operating below par. The thyroid gland contains the largest amount of iodine of any of the organs of the body, and as all the blood in the body goes through this gland every 17 minutes, it evidently serves as a trap for the filtering out of toxic material, the iodine acting as an antitoxin. A good deal of the toxic material in the blood stream is living material--that is, low-grade microorganisms that gain access to the circulating fluids of the body. The iodine-containing thyroid undoubtedly inhibits the growth of these invading germs. In cases where the amount of iodine in the diet is definitely small, the thyroid undergoes a compensatory growth. It becomes many times larger than normal. This is evidently an attempt to furnish more thyroid cells to more effectively to filter out and use what little iodine there is in the blood stream. This function carried to excess produces the more poisonous types of goiter.

We may consider iodine, then, as a necessary part of the dietary intake for its beneficial effect in cleansing the blood stream. Dr. Plummer and other workers in this field have established the needs of the human body at around 10 milligrams a day. Iodine is to be found in grains, fruits, and garden vegetables. It is also to be found in meats, eggs, and milk; but it is found in its greatest concentration in sea foods.

The need for iodine is unquestionable. There is no doubt as to its value in providing the body with the ability to resist infections in general. In some parts of the United States, the soil contains larger quantities of iodine than in others, and these parts (South Carolina) show a greater amount of iodine in the wheat, barley, corn, vegetables and fruit. In parts of the country where there is a relatively small amount of iodine in the soil, the amount to be found in the crops is correspondingly less. In parts where the iodine is practically absent from the soil, on account of having been washed out, there is very little iodine in the grains and vegetables. In these parts, goiter and other thyroid diseases are very common. In such areas as South Carolina where the iodine content of the soil is high, goiter is very much less frequent. There is no question but that there is a direct connection between the lack of iodine in the diet and the frequency of thyroid disease.

The lack of iodine in ordinary diet was one of the first recognized universal deficiencies, and for several years iodine has been added to most commercial preparations of common table salt. The amount of iodine added to table salt does not change its appearance or its taste. The percentage of iodine is very small and much below the optimum requirements but it has undoubtedly served to decrease the number of cases of thyroid disease in the country as a whole.

There is no possible danger in the use of iodized salt, and it does help to maintain something nearer of physiological mineral balance, so its beneficial effect is not confined to the thyroid. The person consuming iodized salt will have better health and better resistance to disease in every way.

Another very important fact that has been learned in connection with vitamin and mineral deficiency is that where such a deficiency has existed over a long period of time, the dose that is given to correct the trouble must be several times larger than the maintenance dose. In connection with iron and iodine and some of the vitamins, the therapeutic dose is over one hundred times the maintenance dose. After a person has been deficient in one of these elements for many years, either his gastrointestinal tract loses the power to absorb it in the normal way, or the cells of the body lose to a certain extent the ability to assimilate it.

In medical circles, iodine is known chiefly as a treatment for goiter. This element, however, since it has to do with increasing the anti-bactericidal elements in the blood, is of value in every type of goiter, arthritis, and rheumatic disease. Some two or three decades ago many quack patent medicines were sold which had no medicinal value whatever except that the indicated dose contained a few grains of potassium iodide. As this accidentally supplied a very urgent body need, and partly corrected a universal deficiency in diet, such medicines were very popular. A change in advertising psychology has practically removed these remedies from the market. The need is now supplied in a much less efficient way by iodized salt.

The needs of the human body for vitamins have been well established, but one fundamental defect in medical thinking has been a failure to recognize that minerals are also needed. We have called attention to the need for calcium, iodine, and iron, but there are several other minerals that are also necessary to the optimum health of the human body, including magnesium, manganese, zinc, copper, sulphur, cobalt, nickel, and others. These are commonly grouped together under the head of trace minerals, as they exist only in quantities too small to measure accurately. They are to be found in all fruits and vegetables, and in meats and milk.

There is no positive evidence that any disease results from a lack of these trace minerals, as they are so widely distributed in nature, and the quantitative needs are so small that deficiencies from these sources probably do not exist. However, the last word has not been said on this subject. Subsequent investigation may reveal that trace minerals play a greater part in human metabolism than we suspect at the present time.

We do know that the person who has a sufficient intake of the three principal minerals mentioned--calcium, iron, and iodine--along with sufficient quantities of the vitamins, proteins, fats, and carbohydrates in the natural state, will have a resistance against ordinary disease far in excess of the average person. Such person will have more freedom from fatigue, and greater ability to work; will live with the retention of all physical faculties to a greater age, and will have a better mind than the person who suffers some single or multiple vitamin or mineral deficiency. The various vitamins and minerals mentioned are all necessary. No one can be omitted if an individual would retain good health. The trace minerals will be taken care of in the intake of milk, meat, fruits and vegetables.

CHAPTER IV

OUR DIETARY INTAKE (What do we get?)

In comparing our dietary needs with our actual dietary intake, we find that there are deficiencies which are widespread and more pronounced than the average physician recognizes. In the early work with vitamins, the relatively small amounts needed to make sick individuals feel better caused the workers in this field to lose sight of the quantitative side of the problem. All emphasis was laid on the qualitative side. When vitamin B was first used as a treatment for beriberi in the Orient, and concentrates from rye bran and yeast were used as a treatment, it was supposed that only infinitesimal quantities were necessary to bring about favorable results. The spectacular relief accorded by a small amount of yeast or wheat germ or rice polishings led the investigators of that time to believe that the patient who was relieved of his most outstanding symptoms was cured.

The same error has crept into our orientation of the effects of vitamin A in connection with eye diseases. Laboratory animals or children suffering from xerophthalmia (redness, swelling, pus discharge, pain and ulceration of the eyes) will be relieved of the most distressing of these eye symptoms by relatively small amounts of milk, cream, butter, or cod-liver oil. But in order to cure the patient of the underlying pathology of which the eye disease is merely one small part, we must give ten to 100 times as big a dose as that necessary to relieve the outstanding symptoms.

The same error has been prevalent in connection with the treatment of mineral deficiencies. Relatively small doses of calcium will afford complete relief to persons suffering calcium deficiency. This comfort and relief may be so great a change from the distress previously suffered that the person believes himself cured, even though he is only partially better. The distressing symptoms of exophthalmic goiter are relieved promptly and the patient is infinitely better after a few drops of a weak solution of iodine. The tendency to believe this is a cure is seized upon by wishful thinking of both doctor and patient.

A relatively small amount of iron will produce a very great change in the appearance and endurance of a person suffering an iron anemia; but he will be far from cured. The muddling and stumbling in this field of medical research have emphasized the benefit of these specific treatments, but as yet have failed to orient properly the complete physical needs of the patient, which, as heretofore stated, are greater than the bare maintenance needs. Acting on these false premises, physicians in the past have been content to prescribe for their patients a few leaves of lettuce, a few teaspoonfuls of milk or cream, a fraction of an ounce of butter, and a tiny bit of yeast--all of which might more nearly fit the requirements of a mouse or a small chick.

The factor of quantity is now the most important factor in all dietary study. Since we have found we must deal with vitamins and minerals in a quantitative way, we must examine the diets formerly supposed to be adequate and see whether these contain large enough quantities of the necessary vitamins and minerals for optimum health. In examining such diets, we must consider them first, from the standpoint of maintenance of the person who has existed for many years on a dietary deficiency.

From a practical viewpoint, the only persons who fit into the first class are the babies being born at the present time in the families of the more intelligent members of the community, who have the advantage from earliest infancy of the newer knowledge of nutrition. These babies will have, as they grow older, no previous deficiency to overcome. The persons who at the present time have attained youth, middle age, or old age have not had the benefit of the new facts in connection with diet. Their presence among the living at this time is merely a fortuitous accident. By some hit-or-miss happening, they have picked up enough minerals and vitamins to allow them to continue to exist. Their existence is that of a person below par, carrying one or more chronic diseases.

The small child on a deficient diet becomes afflicted with chronic tonsillitis. The school child may develop tuberculosis. The youth is pimply and anemic. All have bad teeth. Many have permanently crippled hearts due to rheumatic infections. Seventy percent have rickets. A large proportion have digestive diseases and constipation. All these handicaps are the result of errors in diet.

Drs. Williams and Spies made examinations of diets in various parts of the United States, and in their book, "Vitamin B₁" published in 1938, they said there is much sameness in diets all over the country. This sameness is largely in the enormous consumption of non-vitamin, nonmineral foods composed of white flour and sugar. The average diet furnishes a vitamin B₁ intake of from 200 to 300 International Units. This is just enough to prevent the development of the oriental disease--beriberi. The American population are quite evidently not getting enough vitamin B₁ and are existing on the edge of pellagra and beriberi all the time. In order to have the optimum benefit from Vitamin B₁ a person of 150 pounds weight should have from 700 to 1,000 units per day.

G. R. Cowgill, one of the outstanding workers in this field, states: "There are grounds for believing that American dietaries as a whole are unsatisfactory with respect to the content of vitamin B₁."

Dr. Cowgill follows this statement by a copy of the following menus:

	International Units of B ₁ per serving
<i>Breakfast</i>	
Orange Juice	18.1
Soft boiled egg	15.1
2 slices toast (white)	7.4
Butter and honey	0.0
Coffee	0.0
Sugar	0.0
Cream	3.1
Total	43.7
<i>Luncheon</i>	
Tomato soup	7.8
Broiled chicken	13.6
Mashed potatoes	10.0
String beans	8.8
2 slices bread (white)	7.4
Tea or coffee	0.0
Sugar	0.0
Cream	3.1
Pumpkin pie	1.0
Total	51.7
<i>Dinner</i>	
Fresh fruit cocktail	18.1
Roast beef	16.6
Spinach	9.0
Potatoes	10.0
2 rolls	7.5
Lettuce and French dressing	15.1
Cake	1.0
Coffee with cream	3.1
Total	80.4
Breakfast	43.7 I.U.
Luncheon	51.7 I.U.
Dinner	80.4 I.U.
Total	175.8 I.U. B ₁

Dr. Cowgill concludes with: "They do not supply even the minimum B₁ requirements!"

Dr. Burt Wolbach, of Harvard University, has shown that certain changes take place in the epithelium lining the windpipe and bronchial tubes of children who do not receive enough vitamin A. In making postmortem studies on a number of children who had died of other diseases, he noted that the majority of the children showed epithelial changes incident to vitamin A starvation. Postmortem proof, both gross and microscopic, existed to confirm the fact that these children did not receive enough vitamin A. The gross changes which indicated a lack of vitamin A were simply small abscesses in the tonsils, and the presence of pus in the accessory sinuses. The same changes occur in laboratory animals which are given inadequate quantities of vitamin A. Apparently these changes take place on a less severe vitamin A deficiency, than that which causes the gross disease of the eye. The changes in the throat and bronchial epithelium described by Dr. Wolbach are now known to be very common. The change is the reversion of the cell type from a secreting cell to one which is simply hardened and flattened, and has only the function of acting as a mechanical barrier, like a scale on a fish. Apparently this is an effort on the part of Nature to sacrifice function for mechanical protection. On account of the vitamin deficiency, the cell loses its ability to fight against invading microorganisms, so Nature sets up a whorl of flat, hard cells which serve as a mechanical barrier.

That this defense eventually fails is quite evident as the hardened, flattened epithelial mass finally separates; becomes a small hardened scale, and drops off, leaving a raw, undefended area which is immediately filled with invading microorganisms. The result is many tiny foci of infection, the result being chronic bronchitis, chronic tonsillitis, as chronic sinus disease. In our diets as they exist at the present time, it is quite evident that we do not receive enough vitamin A or enough vitamin B.

We have stated that vitamin C has the function of protecting the health of blood vessels, gums, and teeth. An examination of the health or disease of these parts of the body will furnish a good index of our success in achieving diets that are sufficient in this protective element. Do we have a population with good, sound, healthy teeth? Do these sound, healthy teeth have a sufficiently good vitamin and mineral intake so that they may carry their function on into advanced years? Is the health of the small children and the condition of gums and teeth as satisfactory as it should be? Is it right and proper that every school child in America suffers the handicap of having some diseased teeth, some infected gums, and should the child be swallowing pus constantly, which comes into his mouth from pyorrhea? The obvious presence of mouth and gum disease in school children and adults needs no further argument or confirmation. We do not need to make vitamin C determinations on the blood stream. The widespread and severe character of disease in this one part of the body shows conclusively that vitamin C deficiency is universal in all civilized countries. Our needs are not being met in this connection. What we get does not measure up to what we should have.

In connection with rickets, the disease caused by lack of vitamin D, no argument is necessary to sustain the truth of the statement that this disease is practically universal. The only question at issue is the degree of rickets that exists in any individual case. Here again the question of a right and proper standard comes into the picture. Four years ago at a Baby Show held at the County Fair in a western New York County, a certain fat, chubby baby won the prize as being the most perfect baby in the county. Within a

month after this prize had been awarded, the baby was in the hospital wearing artificial supports on the legs in order to straighten out the crooked bones due to a severe case of rickets! This baby had undoubtedly suffered from rickets during its whole life; but the lack of proper understanding of the disease and the lack of a proper standard caused the judges to believe this was a normal, healthy baby. The judges had seen so many rachitic babies, so many diseased babies, and had so seldom seen a normal, healthy baby, that they were misled.

Many doctors are deceived by fat and do not know the difference between a rachitic baby and a healthy baby. They do not know the difference between a healthy mouth and a diseased mouth, unless disease in the mouth is far advanced. Moderate degrees of tooth decay and pyorrhea are believed by the average laymen and the average physician to be normal. A lack of vitamin D and the subsequent disease, rickets, produces changes in the shape of the head, in which the forehead is high and broad. The head is wide above the ears and bulges out above the temples. This is the type of forehead that formerly was considered an indication of intelligence and brain power. The reverse is true. These high, wide foreheads which bulge not only sideways but forward are rachitic and contain brains which are less active than normal.

The type of chest known as "pigeon breast," which projects forward and comes to a point at the sternum, is another common physical deformity caused by rickets. The well known knock-knees and bowlegs have been known as signs of rickets for many generations. A child may have one or all of these stigmata. It is a disease to be feared, and should receive attention at the very earliest age.

The deformities mentioned are not the only bone deformities associated with rickets. Other bones of the body may also be softened and deformed by this disease. It should be remembered in this connection that while the disease is usually considered merely a lack of vitamin D, it is also in some cases a lack of calcium and other minerals. Bones, of course, cannot be properly built without the basic building materials, which are calcium and phosphorus.

The question as to whether or not the ordinary diet contains enough of the various elements contained in the vitamin B₂ Complex (riboflavin, nicotinic acid, pantothenic acid, and pyridoxine) has been a matter of controversy for several years. The fact that these go through ordinary cooking without complete destruction seems to sustain the idea that they do exist in ordinary diets in sufficient quantities. The chief sources of these vitamins are wheat germ (which is discarded in the flour mills), liver, heart, kidney and muscle meats, and yeast. That they are deficient in the ordinary diets is well proved by the prevalence of pellagra and pellagra-like symptoms, and the fact that the average person will have much better endurance, appetite, digestion, and freedom from aches and pains when sufficient sized doses of these vitamins are taken.

Subclinical pellagra exists in the north, while advanced pellagra exists in the south. The advanced pellagra does not escape detection, and so comes under treatment. The milder subclinical pellagra presents a varying complexity of symptoms; is the subject of many professional errors, and seldom receives the right vitamins and minerals in sufficiently large doses to be completely cured.

As pellagra is a disease which strikes at the skin, the lining of the digestive tract, and the brain, the symptoms of the subclinical varieties may predominate in any individual

case. Clinical tests on the nutrition of persons suffering neuroses, irritability and other forms of nerve and mental disease show that a great number of them may be improved by taking nicotinic acid, which is considered the specific treatment for pellagra. This indicates that many cases of insanity are on a deficiency basis, and that the persons who are insane from pellagra are not the only group suffering insanity because of inadequate diet.

The effects of vitamins are not as specific as might be concluded from what has been said so far. The effects of all vitamins overlap and interlace to such a degree that no disease can be cured by administering one vitamin, and no disease is caused by any single vitamin deficiency. The single cause and the single cure exist only in experimental animals in the laboratory.

The complexities of civilized life make it impossible that the conditions surrounding the laboratory animal could ever be duplicated in human existence. It is apparent that the pellagra cases which show insanity as the outstanding symptom are not suffering from just a lack of nicotinic acid, or a lack of even all the vitamin B group; but are suffering from a lack of all vitamins, the most extreme deficiency being in the B₂ complex, with emphasis on that part of it which we call niacin-amide. Such a patient undoubtedly also suffers from mineral deficiencies.

The concentration of minerals and vitamins in the diets of animals that eat both vegetable and animal foods (meat, vegetables, fruits, and milk products) is undoubtedly sufficient to meet the daily needs without setting up much surplus. The vitamins and minerals supplied to the body is very much like the coal supplied to the furnace. A continuous stream must be kept going in order that the mechanism may function at its best.

Some reserves of vitamin A are to be found in the retina and the liver. Some reserves of vitamin C may be found in the adrenal glands. Some reserves of vitamin D exist in fats, but these reserves are exhausted in a few days or weeks if a constant supply is not provided. In order to provide an optimum supply, every food taken into the body must be a vitamin and mineral containing food. Any part of the food intake which has been deprived of its normal, natural vitamin or mineral content dilutes the good food which is taken by the individual and cuts down his ability to resist infection in just the degree that such a deficient intake constitutes a percentage of the whole diet.

The studies made by the author of 2,707 cases of patients suffering with tumors, cancers, stomach ulcers, colitis, constipation, neuritis, arthritis, heart disease, chronic headaches, and high and low blood pressure disclose that fact that this group as a group was consuming 55 per cent white flour products (bread, cookies, cake, pastries, pancakes, biscuits, muffins, etc.). The sugar taken by this group represented by candy, marmalade, preserves, jellies, jams, and canned goods containing heavy sugar syrups added another 20 per cent to the deficient devitaminized, devitalized, demineralized foods. (Report by author to American Radium Society, Annual Meeting, Cleveland, Ohio, 1934.)

The "Food and Drug journal" keeps an accurate record of the export and import of food products. According to this journal, devitaminized wheat flour products imported into the city of New York constitute around 55 per cent of the whole food intake. The consumption of canned goods and sugar brings the percentage down to about the same

as the group of 2,700 Midwest persons studied. In other words, the clinical group suffering from definite disease was eating from 18 to 25 per cent vitamin and mineral containing foods. The imports of food into the City of New York showed that the food intake of the population of that city measured around 25 per cent vitamin and mineral containing food, and about 75 per cent devitaminized, devitalized, demineralized food.

The diluting of the acceptable food by foods which had been so changed as to render them nearly pure carbohydrate (sugar, white flour, candy, etc.) was the fundamental error in both groups. And the group presenting well-developed disease evidently represented only a more advanced stage of the same kind of vitamin and mineral deficiency. The seven million people represented in the New York group had, in the younger decades, a certain freedom from the diseases mentioned; but they were laying the foundation for the same serious diseases, as they were suffering from colds, sinus disease, tooth and mouth diseases, chronic tonsillitis, and other things which provide foci for the distribution of toxic material into the heart, blood vessels, brain, and intestinal lining. More slowly and surely, they were laying the foundation for the diseases of the glands of internal secretion--for a failure of function of the pituitaries, pancreas, gonads, liver, thyroids, parathyroids, and adrenals. The age group which we examined ranged higher than the group represented by the whole population of New York City. They represented the culmination of years of deficiency, chronic infections, repeated colds, of headaches, and disease of the mucous membrane.

The best evidence that we are not getting the things in our diet which we should get is the fact that persons in every one of these groups will be better physically and mentally when put on a high mineral, high vitamin diet, and given large amounts of multiple vitamin concentrates and minerals to make up for past deficiencies.

CHAPTER V

WHAT ARE THE RESULTS OF OUR DIETARY ERRORS?

When a baby is born into the world, it is born into a fight against infection. He is exposed to many different kinds of infection from the moment of birth until death. The best proof of the ever-present attacking microorganisms being everywhere in great numbers is the rapidity with which a body decays after death. As long as any life is present, some kind of a barrier is kept up against infection. The decay that occurs immediately after death is simply the result of the already present bacterial life attacking a now defenseless group of cells. The defenses in our body structures are something that are tied up with life. Life proceeds normally in the well-nourished cells with no danger from invading microorganisms as long as the bodily defenses are kept high.

There are varying degrees of life processes. The flame of life may burn high or burn low. In the well-nourished body the flame burns at its optimum, and the defense mechanisms which have come down to us through thousands of generations function well.

The mechanisms which protect us against the ever-present and varying kinds of infection may be lowered in various ways. The defense mechanism may be lowered by long-continued exposure to cold, by fatigue, and by bad diet. In actual experience, the one which must interest us most is that which has to do with diet. Since it is quite evident that the diets in use in every civilized country today are not the optimum diets, it is equally evident that we are all exposed to diseases which result from the barriers against infection being lowered.

Perhaps the most common infections are those connected with the upper respiratory tract--the diseases ordinarily known as colds, grippe, flu, and pneumonia. These diseases are largely diseases of the human animal, and undoubtedly affect humans because of the difference between human and animal diets. The diseases of the respiratory tract affect the nose with its accessory sinuses, through the bronchial tubes and the lungs. The acute stage of the colds passes off in a few days, but after acute colds there remains some sub acute or chronic disease of sinuses, tonsils, and bronchial tubes. This may persist for months or years, flaring up with each newly acquired cold and settling down to a chronic state between colds. These chronically affected areas become foci of infection for the distribution of disease germs to other parts of the body. Small abscesses may exist in the tonsils or between the tonsils and the pillars. Larger abscesses may exist in the sinuses, or the symptoms of focal infection may exist without abscess formation, simply from the absorption of toxic material from the infected mucous membrane lining the bronchial tubes.

In experimental animals, these symptoms and the certainty with which they take hold may be influenced by restricting the vitamin and mineral intake of the animal. There is very great similarity between the symptoms produced in the laboratory animal and the symptoms as they actually exist in the so-called civilized human existing on a deficiency diet. Experimental disease of the gastro-intestinal tract, stomach ulcer, may be produced by feeding the kind of diets ordinarily consumed in the average household. In India, experiments made by McCarrison and other British observers showed that the

soldiers living in areas where stomach ulcer was prevalent also developed many cases of stomach ulcer. This occurred when the soldiers were kept on a native diet. When put on a better diet, the percentage of stomach ulcers was reduced to that in ordinary army life. Experiments on animals, giving them the diets of the people of these ulcer areas, produced stomach ulcer in about the same proportion as in humans.

The first treatment for stomach ulcer which attained any great attention by the medical profession was the so-called Sippy treatment. This treatment consisted in neutralizing the highly acid condition of the stomach with chalk and other alkalines, but it also included hourly feedings of milk or cream and orange juice. Sippy knew nothing whatever of vitamins, and perhaps never thought of such a thing as mineral deficiency in this class of diseases, but through a fortuitous accident his treatment provided the patient with calcium and also with the vitamins contained in butter fat, milk, and orange juice.

This treatment supplies only a part of the whole deficiency needs of a person with this type of disease, but it was so great an improvement over the deficiency diets which produced the disease that many patients were temporarily cured. Sippy and the others of his time did not recognize the fact that the patient needed not a temporary treatment, but a permanent one. They did not recognize the fact the ulcers were due to dietary deficiencies, and that the patients must be put on a correct diet for the rest of their lives. They assumed that the patient was consuming a normal diet, and that the ulcer was due to some mysterious and unexplainable happening which in some way was connected with the production of too much acid in the stomach. We now know that the acid is the defense mechanism. It is the only mechanism the stomach has for fighting back against irritations from without. The person suffering with this kind of diseases always has some degree of scurvy. The scurvy has produced bad teeth and infected gums. The bad teeth and infected gums have caused pus to be swallowed into the stomach sometimes at the rate of about a teaspoonful every hour. The swallowing of pus produces local irritation. The irritation calls out the increased stomach secretion. Continuation of the irritation results in an increase of hydrochloric acid, leading eventually to ulceration. These happenings cover a period of years, and by the time the ulcer appears in stomach or duodenum the whole gastrointestinal tract is diseased and along with it the liver bile duct and gall bladder. The ulcer is a focal breakdown in a completely diseased gastrointestinal canal.

In connection with colds and other respiratory diseases, there is no doubt about the resistance being high in well-nourished persons and low in badly nourished persons. In connection with gastrointestinal disease of the type described, there is no question but that the evidence is just as well established. The chronic gastritis and hyperacidity and stomach and duodenal ulcers are deficiency diseases the same as scurvy, beriberi, and rickets, and may be cured just as certainly and just as permanently by diet and proper mineral and vitamin intake.

The study of what we need and what we get in the way of diet establishes the fact that diseases of the respiratory tract and diseases of the stomach are unnecessary luxuries. We may have them if we wish. We need not have them if we do not wish.

Every person who exists on a general dietary deficiency for a period of years, even though he may not develop chronic respiratory infections, or actual peptic ulcer, will have vague, indefinite stomach distress which is called indigestion. He will also have

some degree of constipation, and such person will have an abnormal colon. In the past, this disease of the colon has been called colitis. The fitness of this name has been questioned, as it is hard to establish an actual inflammation present in these cases. However, the mucous membrane of the colon does become diseased. It does fail in its function. The walls of the colon become thinner. In some cases these walls break partly through, producing diverticula. A diverticulum is a hernia of the lining of the colon. In the person who has such a diseased colon, ulceration occurs in the advanced stages of the disease. In some such diseased colons a widely distributed mass of warts grow up, and these warts may become ulcerated or cancerous (papilloma). The x-ray shows in advanced stages of colonic disease that the entire colon may be excited to contraction, thereby narrowing the whole organ. The contraction may occur only in certain sections of the colon; but whether it occurs in the colon as a whole or in sections, the disease is referred to as spastic colon. It is simply the old, long-continued chronic disease irritating the organ to the point where it is thrown into a chronic spasm. The spastic colon, the ulcerated colon and the atonic are of course painful. Nervousness has nothing to do with producing colitis but the colon disease and the nervousness are both the result of the same diet deficiencies. The same relationship exists in connection with overfatness and diabetes. They are both caused by the bad diet. One does not cause the other.

The many forms of colitis produce a more or less shifting and advancing and receding group of pains. These colon pains may appear in any part of the abdomen. Since the colon is a large organ, it is doubled upon itself, and sections of it may occupy any abdominal position. The pains of colonic disease are often mistaken for inflammation of the appendix, ovaries, or gallbladder. Since diet deficiency is almost universal, and different degrees of colitis or colonic disease are also widespread, colonic pains are the most common pains in both the male and female abdomen.

The colon bacillus is a normal form of germ life within the colon. It exists without doing any harm to the mucous membrane. However, in persons who have a lowered resistance on account of deficiency disease, or who have an old, chronic, constipation which causes stagnation within the colon, these bacilli lose their friendly attitude and become disease producers. They not only attack the lining of the colon, but make their way through, especially in the case of females, into the kidneys and bladder, setting up colon bacillus pyelitis and cystitis. They may filter through into the parenchyma of the kidneys, causing more or less severe nephritis. This is the commonest cause of bladder inflammation in women. While the disease may be temporarily relieved by giving urinary antiseptics, there is a tendency for the disease to recur until the colon is brought back to better health by vitamins and minerals and a better dietary intake.

The dietary deficiencies which promote the invasion of the nasal cavity, throat, and lungs by the virus of colds, which subsequently leads to establishment of abscesses in the sinuses, and which produce a lack of resistance to infections along the gastrointestinal tract, also affect resistance against infection in the deeper parts of the body. Every living cell in the body has an inherited ability to maintain its health in the face of a constant threat by microscopic enemies. These microscopic enemies have a very great degree of selectivity. They are the commonly known disease germs and the less commonly known disease-producing viruses. Viruses are much smaller than bacilli or bacteria or fungi. Viruses are so small that some of them are parasites on these other forms of life. Viruses pass through the finest filters. Bacteria do not. Since both bacteria and viruses produce disease, and since they have a very delicate selectivity, it is quite

apparent that virus disease as well as bacterial disease is encouraged by food deficiencies and discouraged by the sound, healthy cell that is properly nourished.

At the present time there are probably many diseases where the viruses attain entrance into the body by way of local damage which has been caused by bacteria. In other cases the reverse is true. Smallpox is a virus disease. The damage done admits the common pus-producing germs. The common cold is a virus disease. The virus causes enough destruction to admit the pneumococcus, streptococcus, and other forms of bacterial disease. Arthritis is undoubtedly due to infection built up on a deficiency basis, and may or may not have some connection with virus diseases. One of the common virus diseases is poliomyelitis (infantile paralysis). Here a fine degree of selectivity occurs, as the virus only attacks certain nerve cells. These are nerve cells deep in the body. Apparently the deeper parts of the body have a lower resistance in the person who is carrying a food deficiency. Disease of the brain is well known to result from food deficiencies as in the case of the insanity accompanying pellagra. The insanities following attacks of flu, and the insanities which have been known to be cured after the removal of abscessed teeth are low grade brain infections which have been made possible by nutritional deficiency.

In the case of brain disease, poliomyelitis, and arthritis, we are dealing with internal parts of the body far removed from body surfaces. The idea that the battle against infection occurs only in the mouth, nose, stomach, and other parts where infectious material actually comes in contact with body cells is therefore entirely erroneous. The point to be made here is that not only the body areas which come in direct contact with infection, but every cell in the body, even its most remote parts, is subject to the action of invading microorganisms in cases where nutrition is below normal. It is quite obvious that skin, eyes, teeth, gums, and tonsils do have a constant contact with infectious material from the outside. When the cells of these organs lose their fighting power by lack of certain vitamins and minerals in the diet, it is easy to see how such structures are invaded. The connection between bones and joints, brain and spinal cord, blood vessels and heart is not quite so easy to see; but that it does occur is quite evident. After the outer defenses are broken through the poisonous infectious material is carried by the blood stream to every inner part of the body.

In the mortality records, the disease which leads all others as the cause of death is heart disease. As the mortality records classify heart disease apart from blood-vessel disease, it does not give a true picture. Blood vessels and heart are all one organ. Brittle arteriosclerotic blood vessels are never attached to a healthy heart. The same general disease that produces heart failure also produces disease of the blood vessels. Mortality records should classify together heart disease and apoplexy. When we add together the deaths as given in the records, of apoplexy and heart disease, we find that they are far greater in number than any other kind of disease. Even in children rheumatic heart is very common, and the rheumatic hearts of children result in the heart deaths of young and middle aged adults.

It was formerly thought that the blood stream was an absolutely sterile area. Now we know that different degrees of blood-stream infection is not at all uncommon. The person who has an acute cold has showers of germs invading his blood stream. Typhoid germs are found in the blood stream in the first week or ten days in that disease. A person with diseased tonsils or gums, abscessed teeth, or other foci of infection in the body has occasional showers of microorganisms in the blood which come from these

foci. The person who harbors chronic infection in any form has an infected blood stream from time to time. The infected blood stream may produce thickening or hardening of the valves of the heart. It produces thickening and hardening of arteries. It eventually results in interference with nerve function. Such interference with nerve function may produce the diseases of the heart which are known as disturbances of rhythm (fibrillation, etc.).

In addition to the slowly poisonous effect of these showers of microorganisms in the blood stream, on blood vessels, heart, nerves, and nerve centers, there is a tendency for colonization of the microorganisms themselves in areas of the body that are poorly supplied with blood. These relatively bloodless areas are the thick layers of fasciae on each side of the spinal column between the muscle layers, the dense tissue of tendons and ligaments around joints, and the heavy, leathery connective tissue around the back of the neck and under the scalp.

The blood stream of even a person suffering food deficiency will soon cleanse itself. However, by hiding in the areas poorly supplied with blood, microorganisms may persist, and with each succeeding blood-stream infection they may multiply in number. This mechanism gives rise to the various manifestations of the disease known as arthritis, and when the connective tissue covering of nerves is the place invaded, the disease which occurs is known as neuritis. The disease we describe may select the fasciae of the back. The patient then has spondylitis or lumbago. It may affect the structures in the back of the neck and under the scalp. The resulting disease then is headache. It may affect the dense ligaments around the knee and ankle, or the sacroiliac joint or other joint. The disease is then known as arthritis.

The point here is that headache, neuritis, arthritis, lumbago, and other such painful conditions are not separate entities, but are simply various manifestations of the same disease, the disease being the invasion of a part by a lowgrade, old chronic infection, the infection being permitted to occur because the person is carrying a foci or abscess somewhere in the body. The foci or abscesses which give rise to these various manifestations of disease occur in persons who have been unable to cope with their microscopic enemies on account of their resistance being lowered because of inadequate intake of vitamins and minerals. The evil effects of vitamin and mineral deficiencies here depicted, involving as they do diseases of the digestive organs, lung, heart, brain, and blood vessels, present a truly depressing picture.

But this is not the whole story. The glands of internal secretion which preside over all life processes depend for their proper functioning on a continuous supply of good, rich blood. The pituitary, which has the seat of honor in this chain, situated at the base of the brain, is like the driver of a 20-mule team. It directs the activities of all the other glands. It stimulates or depresses according to the needs of the individual. It pours out adrenalin from the adrenal glands when the person is about to engage in a physical struggle, and pours out insulin from the pancreas when sugars arrive in the stomach which must be burned.

It controls the moving of calcium and the building of bones through the activities of the parathyroid. It controls the functioning of the gonads, the regulatory mechanism of menstruation, and protects the fetus until time for delivery. The chain of endocrine glands may also be compared to the keys of an organ. The organist is the pituitary. The growth of hair, the health of skin, the secretion of various glands in the body--digestion,

assimilation, metabolism--all are under the control of this endocrine chain. The very thoughts that are produced by the brain are also under its control.

We may see how the accidental interference with circulation may influence some particular gland activity. For instance, the adrenal, which has to do with keeping up the normal blood pressure, may have tiny clots develop in some of its vessels. This may be due to scurvy of the vessel wall, or to microorganisms causing disease of the vessel wall. This strangles the cells normally fed by such a blood vessel.

One such accident may perhaps cause little trouble. However, the tendency is for such accidents to recur (spontaneously). The piling up of many such accidents will seriously cripple the function of the organ. After much adrenal tissue has been thus destroyed the person now has Addison's disease. The supply of adrenal secretion continues to decrease until death occurs. Due to the specific attraction between certain microorganisms and certain organs, colonization of germs from the blood stream may occur in any part of the body, and the process may go on even to the formation of small abscesses. The effects here described may be mechanical or toxic but are usually a combination of the two.

These biological reactions may produce alteration in any organ that decreases the normal secretion of the organ. The instance given in the case of the adrenal may be duplicated in the thyroid (hypothyroidism), pancreas (diabetes), ovary (sterility), etc. In most cases we assume that the effect of the strangulation of cells or the atrophy of cells has been due to a poisonous, depressing effect on the substance of the gland in question. In some cases, however, the dose of the toxic substance is smaller or less potent, and instead of depressing it may excite the gland to increased action instead of having the depressing effect. In such cases the physiology of the process is reversed. In the case of the thyroid, the patient becomes afflicted with hyperthyroidism. In the case of the pancreas, there is an increased secretion and an increased amount of sugar must be furnished to counteract the increased amount of insulin produced. In the case of the ovary, continuous bleeding may occur instead of normal menstruation. The ultimate effect in the cases which are stimulated rather than depressed is to wear out the over-stimulated cells so that eventually the life of the organ is terminated, and a condition of atrophy ensues.

The diseases of this type which produce the hyper effect on the glands of internal secretion are relatively small in number as compared with those that have, from the very first, a depressing effect. As a rule, the depressing effect on glands of internal secretion from toxic material circulating in the blood is not an effect on one gland alone, but is an effect on all the glands, with special emphasis on the one which gives the predominant symptoms. For instance, the adrenal may produce outstanding symptoms which calls the attention of the physician to the adrenal, but all of the other glands are being depressed in a similar way, but not in the same degree.

The failure of one of the glands of internal secretion means not only the failure of all the other glands in a lesser degree, but also means the relative failure of the pituitary. Failure of the glands of internal secretion has been likened to old age. It is an error to say that it may be likened to old age. It is old age. This is the mechanism by which old age occurs. In a person who has existed for many years on a deficiency diet, the signs of old age may appear at the age of thirty to thirty-five. Women who are poorly nourished cease to menstruate at a relatively early age. This is not because the ovaries are

exhausted, but because the whole endocrine chain is exhausted. There are plenty of ova left in the ovaries, but the stimulus from the pituitary necessary to bring the ova into activity is lacking. Women who are well nourished continue to menstruate well beyond 50 years of age.

CHAPTER VI

HOW WIDESPREAD ARE DEFICIENCIES

The author has had much experience in examining young men for service in the Army and young women for service in the Red Cross. In those exhibiting the symptoms which go with dietary deficiency, those who have the peculiar symptoms of scurvy and pellagra so commonly seen, the hair turns gray at a relatively early age; the teeth are decayed or lost; the skin becomes wrinkled and sallow in appearance; the facial expression becomes less animated, and the eyes lose their luster. Along with these we find a failure of acuity. The eyes lose the power of accommodation; the ears are unable to distinguish the higher vibrations. The person no longer appreciates the aroma of good food, nor does he get the full flavor of the taste. Memory fails, and fatigue occurs on lesser physical exertion.

Of all these signs and symptoms, the most outstanding is the peculiar wrinkling of the subepithelial tissue. This shows plainly in the face of the person who has begun to take on old age--fine wrinkles around the eyes, nose, and mouth, with the structures drooping and the lines sloping downward. This, with the development of the sallow color of the skin and the distorted shape of the lips due to loss of teeth, or the replacement of natural teeth with crude efforts of the dentist, presents a typical picture of advancing age.

These signs are to be seen in the pictures of many of our most news-worthy men. It is not uncommon in newspaper and magazine pictures and in news reels of the moving pictures to see men who exhibit these signs, along with tortuous blood vessels in the temporal region (arterial sclerosis), and in those who smile, decayed, discolored, irregular teeth and swollen, diseased gums. The persons exhibiting these evidence of old age are senators, representatives, judges, and other persons of importance in the affairs of the nation. It is not difficult to explain the bungling and muddling that exists in high places in the executive, legislative, and judicial branches of our government. The men who are at the head of our affairs are old men, no matter what may be their years. They are diseased men, no matter what false set of standards may classify them as normal.

A study of the requirements for normal nutrition and a study as to how well the average dietary meets these requirements leads to the conclusion that the average diet of the average civilized person of the present time is a deficient diet. Civilization has brought with it factory foods, and factory foods have in no way contributed to health. On the contrary, in every case where factory foods have been adopted, health has been very seriously impaired.

The small child who catches cold easily, and after repeated colds has diseased tonsils, is eventually brought to the operating room for relief. If the child had been properly fed so that catching cold was impossible, or if the colds were less severe, the necessity for removing certain organs from his body because they had become foci of infection would not occur. There is no question but that diseased tonsils do in some cases become centers for the distribution of microorganisms through the body by way of the blood stream. There is no question but that children in this condition are benefited by the removal of these putrid tonsils. The point of interest is that the well-fed child does not acquire the disease. The child on whom the operation has been performed is cured of

one of the effects of the disease. He is not cured of the disease itself, or the condition which brought it about.

The Dionne quintuplets were subjected to a wholesale tonsil removal. The newspapers record at times the incident of whole families having tonsils removed on the same day.. Some years ago a certain column of the *Journal* of the American Medical Association recorded the big-heartedness of the Kiwanis Club of a certain western city, the occasion being the invitation for a certain group of families of the town to bring the children into the hospital on a certain day and have their tonsils removed at the expense of the Club! The doctors and the laity have been educated to tonsil removal as a proper way to meet a certain emergency. Apparently no one ever raised the question as to why these tonsils need removal, or what could be done to prevent the tonsils from becoming diseased.

In the case of the Dionnes, the situation is more interesting because these famous children were supposed to be given every possible attention, and the feeding problem was managed by university professors who specialized in the care and feeding of children. In spite of the formulae devised and the protective barriers thrown around the little girls, they did catch colds; they did develop chronic disease of the tonsils, and they did have to have their tonsils removed. The fundamental principles of good nutrition evidently had not extended as far as Callendar, Ontario.

The largest diseased group in school children in the grade schools is that group which have severe colds, rheumatic fever, and rheumatic heart disease. In the high school group, the greatest disease producer is tuberculosis. The heart disease victim is the victim of some chronic focal infection. The victim of tuberculosis is also a victim of lowered resistance against disease, due to dietary deficiency. The problem of these diseased children is simply a problem of right and proper diet.

No further proof need be adduced to prove the correctness of these statements than a visit to any school cafeteria. It will be found that candy bars, sweet drinks, pastries, cakes and other white flour and sugar products predominate. The teachers and the school boards evidently concur in the poisoning of the children by these deficient foods, while making an attempt to build some kind of an intelligent mind on these poisoned bodies and brains. The first effort of those in charge of education should be to build sound bodies, and since at the present time only one meal during the day can be under the control of the school board, that meal should conform in the best possible way to the demands for a high vitamin and mineral intake. The school cafeteria reflects a very low degree of intelligence in school management. The schools and colleges of the country could very easily become centers for the dissemination of proper information in connection with diets. The best possible way to start on such a campaign would be the restriction of foods sold in school cafeterias to natural health-producing foods.

In the group of young men who are being inducted into the Army, the examining physicians and the induction boards are rejecting around 40 per cent. These rejections are for eye diseases, diseased teeth and gums, and heart disease. They also include rejections for other diseases which are produced by bad diets. It is quite evident that the two first-named are deficiency diseases. The young men show a large incidence of subclinical scurvy, pellagra, beriberi, and rickets. In no case do we find any of these diseases as a clear-cut entity. Those who are rejected show a combination of subclinical deficiency diseases, so we may conclude that errors in diet are the main reason for the

40 per cent rejections in this age group. (1941). (In 1942 physical requirements for army service have been lowered but rejects are still around 36%.)

The group that are accepted for Army service are not by any means physically perfect. Those accepted have many minor degrees of heart disease. Some have a history of having had operations for stomach ulcer or appendicitis or hemorrhoids. Many have had tonsillectomies, and many have varying degrees of rheumatic disease and arthritis. Chronic headaches and anemias are not uncommon in this group, as are lesser degrees of eye disease and defects of hearing. Acceptance into the Army does not mean a physically perfect specimen, but one who is in the upper 60 per cent as distinguished from the rejected lower 40 per cent of the diseased group.

The selection of men for the Navy is much more exacting. In the New York area, the rejections for application for service in the Navy run as high as 73 percent (1941). The requirements in Army and Navy for the relatively higher degree of health than exists among the population as a whole focuses general attention on these active members of our defense (Army and Navy) group. However, the need for good health among the workers in industrial plants at home is just as important in order that the machines with which to wage war may be put in the hands of the soldiers and sailors.

The factory must be equipped not only with tools and jigs, but with men who have expert hands, good eyes, and competent brains. The health of the army of workers who produce the munitions, the instruments of precision on airplanes, the chemists who manufacture the explosives, the engineers who work out the dynamics of engines, and all the other workers in the industrial army are the very root and foundation of our defense in a fighting world. The necessity for picking an army of men who will be free from disease and who have as great endurance as possible under the stress and strain of Army campaigns is obvious. All these qualities should be present in the same degree in the home army and in the group of agricultural workers who are producing the food.

In our loose thinking regarding war and the preparations for war, we have come to believe that the most important munitions are guns, battleships, bombs, tanks, and airplanes. However, there is one of the munitions of war which is of much greater importance than any of these. This one munition which should be put at the head of the list is food. Many years ago Napoleon said that an army travels on its belly. This is as true today as it was in the time of Napoleon or Caesar. No army travels well and no industrial home army performs well unless it is well fed. Attention to the production of good food means more in defense and offense than any other one thing. A well-fed man, like a well-fed dog, is aggressive and pugnacious. The poorly fed man or dog is weak and cowardly. This principle has been adopted by the ruling power in Europe at the present time (1943), since it has been made a crime punishable by death to spread information in regard to nutrition in Norway, Belgium, Holland, and all other conquered countries. The victorious Germans do not wish to have the conquered peoples well nourished. They wish them broken in body and spirit. They wish to keep them weak and cowardly. They wish to keep them in that state of malnutrition which is not too great, but which will make them serve better the purpose of their masters as slaves.

CHAPTER VII

CANCER--ITS TREATMENT AND PREVENTION

The problem of cancer has attracted more and more attention during the last few decades since it has been definitely known that this disease is on the increase in every civilized country in the world. There are other diseases that have increased. These are insanity, heart diseases, diabetes, and the anemias. Cancer has attracted more attention than these other diseases because of the fact the victims of this disease in its advanced stage are spectacular in the amount of pain produced by the disease, and the degree to which the cancer victims make themselves disagreeable to those who must live in the same house with them, on account of the stinking nature of the disease.

This disease was known to the ancients as the "stinking death." The bad odor is brought about by the fact that when the cancer attains a certain size, it begins to die. The dead part of the cancer is attacked by the microorganisms which are always present and ready to attack any dead flesh. The poison from this rotting material eventually kills the person on whom the cancer grows. As cancer is a dynamic growth which is eagerly pushing itself forward into the deeper structures in whatever anatomical location it may be, it becomes a parasitic invader whose head is burrowing deeper, while its tail is dying or dead. All different degrees of life exist between the invading front line of cancer cells and the zone which presents itself as a sloughing, stinking area, and which, being invaded by saphrophytes, is a rotten and decaying mass of cells.

Cancer, then, is feared to a greater extent than any other disease of modern times. Many millions of dollars have been spent on cancer research. The United States government conducts an institution for that purpose.

Many fraudulent cures are put forth. Some of these attract a good deal of attention before they are finally demonstrated to be frauds. A few years ago a well-known physician on the Pacific Coast convinced a great newspaper publisher that he had a cure for cancer. The supposed cure was widely publicized, but created untold misery for the victims who flocked to San Francisco from different points, only to be met with disappointments. Previous to this, a doctor in Toronto had invented a cancer cure from horse serum, and about this time a Detroit physician brought out a cancer cure which was some kind of an obscure chemical compound.

In these two later cases the intent to exploit cancer patients was quite evident, because of the fact in each case the little ampule containing 15 drops of the medicine sold at around \$300. Even with the mercenary and fraudulent nature of these quack remedies so obvious, the hope for some magic cure was so great that not only did the laity respond by demanding these medicines but many millions of dollars were sent by physicians for the magic ampules.

In any disease such as cancer which is painful and incurable, the desire and prayer of the wrong-thinking public have always been for a cure. In many of these diseases a more logical desire would be for prevention. Physicians and laymen alike desired a cure for malaria and for syphilis, for tuberculosis and for typhoid fever. In the case of syphilis and malaria, specific chemicals have been found that improve the condition of the person afflicted with the disease, but perhaps never effect a cure. In both these diseases, one can see if an effective method of prevention had been worked out, the

ultimate result for the race would be much better. Prevention would leave the individual and the race entirely free from the disease. The imagined cure leaves the individual with some parts of his body permanently damaged, and he still is a potential disease carrier, with only relative improvement in his condition. The great mass of humanity is still in a position where it may still get the disease.

In the case of tuberculosis, preventive measures have cut down the incidence of the disease. Each year the number of cases of tuberculosis is less. The disease has not been completely prevented, because even yet the idea of proper nutrition has not yet permeated to the masses. As far as the prevention of tuberculosis is concerned, an improvement has taken place. An increase in the amount of the particular food elements which contain vitamins A and D has contributed to this partial prophylaxis. A better appreciation of the beneficial effects of sunshine and fresh air has helped to furnish more vitamin D to growing children. The improvement in connection with tuberculosis has not been in any way related to specific cure. It has been only an improvement in one phase of nutrition--a building up of general resistance so that the tubercular bacillus does not find such a fertile field in children's lungs and glands as it formerly did. An extension of knowledge along this line would result in a complete disappearance of human tuberculosis.

Another factor which must be taken into consideration is the exposure of children to mass infection. A few years ago there were more tubercular cows, and therefore children consumed more tubercular milk. The improvement in nutrition and the lessening of exposure to infectious organisms have both contributed to improvement in the situation.

In connection with typhoid fever, another basic principle has brought about the disappearance of a very common and often fatal disease. In this case, the disease was eliminated by administering a specific vaccine. By injecting the vaccine, a person is rendered immune. The immune person will not contract typhoid fever even though he swallows contaminated milk or water which contains great quantities of typhoid germs.

The point we wish to emphasize here is that the good results obtained in ridding the human race of typhoid fever have been obtained by a method which is infinitely more valuable to humanity than would be a specific cure for the established disease. The methods used to bring about a reduction in the number of cases of tuberculosis have served a much better purpose than could possibly result from the discovery of a specific cure. Doctors and laymen formerly wished and prayed for a cure for tuberculosis and typhoid. The answer has been something better than a cure--prevention.

We may say that syphilis and malaria have been brought under control. They have not been prevented. The situation in regard to these two diseases is not as satisfactory as with tuberculosis and typhoid, where preventive measures have brought about the safety of the individual from the danger incurred by even the first stages or the beginnings of the disease. When we correlate these facts with the situation as it exists today in connection with cancer, we must conclude that much of the effort in the past has been wasted effort. We must conclude that the efforts now being made in research institutions, governmental and private, are largely wasted efforts. The millions of dollars which are being expended in the chase for some magic shot-in-the-arm cure can never, even though successful, result in the optimum situation as regards cancer.

The only solution of the cancer problem which will be satisfactory is the working out of means and methods of prevention. Discovering the case early and treating it successfully do nothing in removing the etiology which brought the cancer into being. The same person is exposed to the same cause again and may grow another cancer. The magic-cure solution of the problem would require constant follow-up. The doctor with the magic shot-in-the-arm cure must follow the patient and give him the shot whenever the same cause which produced the original cancer has caused a new cancer to grow. This kind of a solution of a medical problem is of course ridiculous, and yet this is the basis at the present time and in past times for all cancer research.

One of the few things we do know at the present time about cancer is that it is a disease which follows another disease. It is never primary, but always secondary. It never grows on healthy tissues, but always grows on previously diseased tissues. The part of a body on which a cancer grows has a special soil on which the invader finds a favorable environment. If the soil is not prepared in advance, the cancer simply can not and will not take root and grow. Cancer in this respect may be compared to a rotten log in a shady place where the rottenness and the lack of light conspire to bring forth a group of poisonous toadstools. A change in the soil or exposure to sunlight brings about conditions in which the toadstools cease to be produced. A recurrence of the toadstool growth may be prevented by preventing the rottenness in the wood which they found to be a suitable environment for their particular growth. Whether the immediate cause of cancer may ultimately be found to be a virus, a fungus, a bacillus, or a chemical compound makes little difference in the question of prevention, since the clinical facts show that previous local disease must exist before a cancer growth may be started. The important fact is that the diseased area on which the cancer finds its suitable soil must not be allowed to exist. *By the prevention of locally diseased areas in the body, we may prevent cancer.*

A study of the anatomical locations in which cancer occurs locally--the lip, eyelids, tongue, and other visible parts where the disease may be studied from its very beginning--shows that these parts have, before the development of the cancer, been the seat of old, chronic, low-grade infections. A clean lip, a healthy eyelid, a mouth free from infection, or clean skin never develops a cancer. Dr. Bloodgood, of Johns Hopkins, one of the most notable students of cancer, said that a good-looking woman never dies of cancer of the face. The reason for that is that a good-looking woman takes pride in her appearance, and any kind of dirt or disease appearing on the face in any form is taken care of promptly so that the soil for the development of a disease is not permitted to exist.

If we were able to inspect our internal parts and took the same pride in their good health, we would undoubtedly be able to prevent cancer in any part of the body. The vital point in this connection is that locally diseased areas which continue over a long period of time may become the seat of cancer growth. Efforts to cut down the incidence of cancer will be completely successful if we can eliminate these precancerous areas of local disease.

When we speak of a local diseased area, we mean but one thing--an area in which the disease referred to is a chronic low-grade infection. The steps in the development of cancer are plain. First, injury of a chemical, thermal, or mechanical nature which breaks down Nature's protective wall of epithelium (skin or mucous membrane). Second, a repetition of the same insult before the protective walls have a chance to heal. Third,

invasion of the injured area by microorganisms which establish themselves and continue to grow. Fourth, the continuation of the chemical, thermal, or mechanical insults. Fifth, the building up of a great wall of cells as a defense measure to shut out the invading organisms and the loss of inhibition in this mass of cells which permits them to grow indefinitely. This wild, anarchistic cell growth is the disease we call cancer.

The only difference between a cancer cell and the cell which is able normally to repair injury to tissue is that in the latter the stimulus to growth of new cells disappears when the repair is completed. In the case which goes on to development of cancer, the cells have been over-stimulated to such a degree that the urge to reproduce and build more and more cells is the only function left in the cell. Cancer, then, is an exaggerated healing response, and it is exaggerated because the insult to tissue has been continuous and long-drawn-out. The irritant is a living irritant and is therefore, through the process of reproduction, immortal.

The factors involved in the picture so far have been only local factors, but that there are constitutional factors as well as local factors can not be denied. The constitutional factors which have to do with the growth of cancer are the factors which let down the resistance against infection and permit old chronic infections, which in a wellnourished person would heal, to drag along for months and years without healing. A high ability to heal would undoubtedly overcome and destroy the infectious microorganisms which establish themselves in the precancerous area.

The problem of old chronic infection as related to cancer is a problem which involves anatomical locations and the normal physiology of these anatomical locations, as well as the other factors mentioned. A pipe may damage the smoker's lower lip. This may lead to the development of a chronic ulcer which in turn leads to cancer. Another man with the same kind of a pipe but with a higher healing power will have as much mechanical damage done to the lip, but healing being better, the lip will not break down and ulcerate, and the soil for cancer growth will not be produced.

Cancer of the uterus occurs at a point where the uterus has been torn. In a woman with good healing power, a good scar will be produced and healing will be complete. In the undernourished woman, the uterus is less elastic and the childbirth tear is greater. This increases the likelihood of nonhealing in the badly nourished woman, and in her case the soil for the development of cancer is favorable.

Cancer of the eyelid usually occurs in a spot where old chronic eczema of the lid has existed for years. Eczema is a bastard word used to designate all chronic nonspecific skin infections. To say cancer of the eyelid develops on an eyelid which has had eczema means to say the cancer has developed in an area of the lid which has carried an old, chronic, lowgrade infection. The mention of mechanical or chemical insult to tissues as having to do with precancer infers these may be causative factors, but they are causative factors only as they destroy natural local defenses and allow the entrance of infection. The real immediate cause of the cell multiplication which we call cancer is the presence of some kind and degree of irritation produced by invading microorganisms. If this were not true, we would find that cancer would present itself clinically, springing up from clean, sterile locations. Since this never happens, either in man or animal, we must conclude that the irritating agent which produces the growth is virus, fungus, bacillus, or some other form of microscopic life.

If it be a virus, the causative organism could be carried on in each generation of new cells, as viruses are very small as compared to cells in virus diseases the viruses exist within the cells not between the cells as in most other kinds of infection. It would be easily possible for each of the new proliferating cells to contain new virus, and this would serve to irritate the cell in such a way as to keep up the crazy growth impulse in this crazy mass of cells which we call cancer.

If we apply the principles herein set forth to a cancer of the stomach, which is the most common form of cancer, we find that the behavior of the disease fits into the picture very well. The stomach is subjected to irritation and overstimulation. Ulceration takes place, the ulcer is followed by cancer. The invading microorganisms are provided by pus swallowed from the diseased mouth. The diseased mouth has been provided by scurvy. The scurvy comes about as results of errors in diet.

On the clinical side, many internists and some surgeons have come to consider vitamin C as a cure for stomach ulcers. Here they are recognizing a truth, but only a part of the whole truth--lack of vitamin C is undoubtedly one of the predominant causes of stomach ulcer (and stomach cancer). A complete treatment would mean a treatment with all other vitamins and minerals lacking in the individual's diet, as well as with vitamin C.

When we consider cancer of the internal parts of the body which are not exposed to external invading agents as are the lip, the mouth, and the stomach, we have further confirmation of the deadly effect of localized infections in producing cancer. In spite of the fact that during the last ten years many external cancers have been cured by radium, surgery, and x-ray, and that there is an enormous increase in the interest of the public in this disease, and an increase in willingness to attack the disease, the gross mortality from cancer has increased year by year. We have cured many more cancers each year, but the death rate from cancer has gone higher and higher. The reason for this apparent paradox is that while we have brought local external cancer under partial control, internal cancer has increased at a rate which not only offsets the cured cases, but has nearly doubled the whole mortality from the disease in the last twenty years.

Cancer of the brain, which fifty years ago was a very rare finding at autopsy, is now one of the commonest forms of cancer. Some brain surgeons rank it as third in anatomical location. Internal forms of cancer, then, must have the soil in which cancer may grow. This brings up the results of postmortem examinations and the findings in early symptomless cancer. They are always found to be growing in an area which has been previously infected. The infections which provide the cancer soil in these internal parts--kidneys, liver, pancreas, ovaries, brain, glands, muscles, bones, etc.--must necessarily come from the outside through the blood stream.

As previously explained, showers of microorganisms frequently spread through the blood stream. This occurs when a person catches cold, and it may occur in intermittent showers or as a continuous stream in cases where there are abscessed teeth or badly diseased mouths, or abscesses such as occur in sinus or tonsil disease. In the cases where a small continuous stream of microorganisms flows into the blood stream, the bad effects may manifest themselves as rheumatism of joints, or neuritis. Rheumatic pain--pain due to colonization of microorganisms in the fasciae--is usually referred to a muscular rheumatism. In these cases, the pain is not in the muscle, but in the thick sheaf of fascia around the muscle. Muscular movement is painful because the movement

disturbs and brings pressure on the infected area. Muscle tissue itself is very poorly supplied with sensory nerves. It is practically insensible to pain. Physicians and laymen alike have been prone to give undue importance to the areas in which pain is present. It must be remembered that the same blood stream which deposits microorganisms in the structures around joints, thereby producing pain, is at the same time bombarding the heart, the blood vessels and the glands of internal secretion with the same chronic, low grade, slow, poison. These are each responding in their own peculiar way, not by pain, but by alteration of function.

The continuous bombardment of vital centers--brain, joints, heart, and endocrine glands--produces a disease which is not just a call for aspirin or codein to numb the nerves crying aloud for relief. It is also lessening the life processes in every vital center and every body cell, and the bringing about of premature old age. The fact that cancer may develop in one of the areas in which microorganisms have been so deposited from the blood stream simply shows that in a completely diseased organism one area has been so irritated that a certain group of cells have proliferated as a response to the invading infection.

We should expect that this chain of circumstances would sometimes produce multiple cancers, or that cancers of different types and kinds may be produced in the same individual. The finding of such multiple cancers is becoming more and more common. In one case four different kinds of cancer inside of the skull were found in one individual. (Dr. Sachs, of St. Louis.) It is quite probable that in the past multiple tumors and cancers in the same individual were not found with as great a frequency as they now are because at post mortem examinations they were not suspected and not looked for. There are many kinds of tumor growths that are not cancerous which undoubtedly spring from the same or nearly the same factors as cancer. These benign tumors are much more common than malignant tumors (cancers). In the case of the benign tumor, there is in the beginning a distinct urge to grow. This urge to grow is undoubtedly brought about by irritation from locally deposited microorganisms. The benign tumor reproduces cells of the organ or tissue in which the growth starts. It grows for a time and then stops; or it may not have completely stopped, but continues at an exceedingly slow rate of growth. This distinguishes it grossly from cancer, as cancer continues to grow steadily and with relative rapidity. In benign tumors the cells become mature before dividing. In cancer they divide while they are still baby cells.

Since the internal forms of cancer follow exactly the same pattern as the external forms, in that they must have a suitable infected soil on which to grow, the disease may be classed as one of the forms in which infection may terminate. The pathologist teaches us that infection may terminate as scar tissue or as calcification. We must add to this that infection may terminate as tumor or cancer.

CHAPTER VIII

NUTRITIONAL TREATMENT OF ANEMIA

Diseases of the blood which are definitely deficiency diseases are the iron anemias and pernicious anemia. Pernicious anemia is due to an unidentified food factor which is supplied by eating liver, but which undoubtedly exists also in other foods. A lack of this factor interferes with the proper manufacture of blood. Before the discovery of liver as a remedy, these patients ran a typical course which always resulted in death. At the present time, the use of liver in the diet will bring the blood-making organs up to a relatively better condition. The patient is never cured, but by the use of liver and liver extract he is permitted to continue his life in a rather subnormal way.

The person with pernicious anemia gets along on this regime for a few years. The liver treatment has had the effect of somewhat extending the life period, but this is the best that may be said for it. The sufferer from pernicious anemia is suffering from a lack of more than one food factor. The usual medical treatment followed considers only one single deficiency and pays no attention to other subclinical deficiencies which are also present but in a lesser degree. In the usual treatment of this disease one outstanding function which has caused the alteration in the blood is treated, the others are neglected, and the neglected parts of the problem eventually cause death at an earlier time than if the whole problem were properly considered.

This same principle is true but in a much more obvious way in connection with the iron anemias. The person suffering with an iron anemia has the anemia as an outstanding symptom of a multiple symptom complex. A lack of iron carrying the oxygen in the blood stream has caused symptoms to build up which throws all other signs and symptoms into the background. It is really a multiple deficiency but the doctor sees only the need for iron, and gives only iron as a therapeutic measure.

The result of this is that many persons go about with partial disease, relying for relief only on iron. The only point considered by the average physician is, which kind of iron should be given in this particular case? and which kind of iron is most economical for the patient to use? Volumes have been written on the relative merits of different kinds of iron in treating the iron anemias; but no attention whatever is given to the associated deficiencies that afflict patients with iron anemias.

In some cases physicians have departed in some degree from treading a narrow path in these secondary anemias, and discovered that the patient who refuses to get better with just iron alone will immediately become much better if vitamin B is added to the iron. The blood picture and the general condition will improve. Other physicians have noted that the patient who has ceased to respond and whose blood pictures does not get back to normal will be much better and will recover something approaching a normal blood picture does not get back to normal will be much the average internist and the average general physician are concerned, here the matter rests in a fog. The main group believe in giving iron alone. One group is sold on the idea of giving iron with vitamin B. Another group believes that the best results are obtained by giving the iron with vitamin C. Apparently on none has the true situation dawned that these patients who are deficient in iron are deficient in all the vitamins and also in the minerals calcium and iodine. *[Editorial note from soilandhealth.org: there is an incomprehensibility about*

this paragraph which does not seem resolvable. Obviously there was a major, overlooked typographical error here.]

An examination of the food intake of anemic persons will disclose the fact that the sick person has been living on a diet which is largely composed of devitaminized and devitalized carbohydrates, and this has cut down in his diet not only iron, but all vitamins, calcium, iodine, and the trace minerals.

The person suffering with pernicious anemia has very much the same kind of an etiology. In his case the deficiency is a multiple deficiency, but by some freak the thing in which he is most deficient is the so-called extrinsic factor which has to do with the manufacture of red corpuscles, and which may be had in its greatest concentration in liver.

As an example of the failure to evaluate properly the causative factors in the anemias among presumably well informed physicians, a certain faculty meeting may be cited. This was a meeting of the faculty of one of the class A medical colleges. The subject for discussion at this meeting was the Iron Anemias. Specialists in internal medicine, surgeons, neurologists, general practitioners, and pathologists joined in the discussion, which continued over two hours. During the whole evening, not one word was said about the needs of the patient suffering with secondary anemia for any other therapeutic item except iron. The discussion took up matters concerning what preparations of iron should be used; what dosage should be used; how the dose should be given (by mouth or hypodermically), and the economic side of the question--which kind of iron was best and cheapest for the patient.

This kind of iron treatment for secondary anemia was in practical use in the Hospital connected with this medical school. Treating such patients with iron alone would, of course, only temporarily restore the patient to some degree of improvement. In many cases it would do no good whatever. In no case would it give the optimum treatment to the patient, as all these patients were suffering from a deficiency in other minerals as well as iron, and all were suffering multiple vitamin deficiency.

CHAPTER IX

WHAT MUST BE DONE

Since the most important thing in connection with medical practice is not treatment of the person's illness, but a clear understanding of the causes which brought about the illness, this same thing is true when applied to the population as a whole. If the population of a town, state, or nation suffers from some particular kind of disease, the fact the disease is so circumscribed is a great help in working out the cause. In connection with the diseases incident to diet deficiencies, there is no such aid or assistance. The deficiencies cover our own nation and in different degrees affect the population of every civilized country in the world. Diet deficiencies, contrary to general belief, also are a serious problem with savage and uncivilized peoples. In the islands of the Pacific Ocean, varieties of food are not easily accessible. Where the geographical limitations make it necessary for the persons living there to subsist on the products of their particular island, no great variety is possible. Such populations are always badly nourished.

This same thing is true in connection with the savages of Australia and Africa, and the low-class populations of India and Siberia. While these peoples suffer geographical limitations, they are also subject to tribal limitations. Their area of activity is limited on account of hostile neighbors. Their food supply is therefore limited as to variety. The healthiest and strongest of the North American Indians, before the white man completely dominated the country, attacked and routed their weaker neighbors and stole their food. They enjoyed a better diet. It is difficult to say whether the aggressive Sioux tribes were more fortunate because they conquered their neighbors and were therefore better fed, or whether the good food produced in their particular areas gave them a better diet, and therefore stronger muscles and better nerves and brains, which in turn gave them dominance over their neighbors. At any rate, among the savage peoples of the world, food supply has determined domination, and lack of proper food supply has caused the enslavement of those unfortunates who had the lesser degrees of nutrition.

In order to attain the optimum, all the scientific assistance available should be brought into the problem, in the same manner that the best engineering skill is brought into play in building guns, tanks, and airplanes. Without great physical endurance, good eyes, nerves, and brains, the tanks, guns, and airplanes are of no use. The world struggle for power will undoubtedly go to the group which possesses the highest degree of nutrition. This has been demonstrated plainly in the history of England. It is being demonstrated at the present time in the world war now going on.

The ordinary person who has believed that savages were always well-nourished also had another delusion and that is that our primeval ancestors were marvels of physical perfection owing to their having a proper and right diet. This idea is also a fallacy. Those of our primeval ancestors who did attain great physical and mental prowess were those who were accidentally well fed. The great masses, for economic or other reasons, were not well fed, the main reason for this being that they did not know what constitutes a good diet. They, like the animals of the fields, were entirely creatures of their own capricious appetites. They liked sweets, and were therefore eager to get sweets. They liked the effects of alcohol; therefore they overindulged in alcoholic drinks. Those of us who have come down to the present time should be thankful that we have come through times of stress and strain and starvation and bad dietary surroundings, but we should

also realize that we have not come through in the optimum manner. The bad diets of former generations have left their imprint on the nervous systems, brains, bones, and other bodily structures.

There is, therefore, a hereditary stigmata which must be corrected in the future by several generations of proper and right diet. A perfect race is not going to be manufactured all at once, even though the best scientific diets are at once adopted by all civilized countries. The change that might be brought about by the adoption of scientific diet would be a very spectacular and decided change. Somewhere from 70 to 80 per cent of the disease that now afflicts the human animal would be eliminated. The average age of the average human being could be extended from somewhere around sixty to well over one hundred years. No one has yet known what the upper age limit could be under optimum conditions; but from work with animals, in which it has been demonstrated that the life period may be doubled, we have reason for believing that this might also be achieved in connection with human existence.

At no time in the history of the human race has there been any nation or any group that existed on optimum diets. At no time in the history of the human race up to the present time has it been known what constitutes a normal, scientific dietary intake. In no period or time in history have we understood the physiology or dietary action of even one mineral such as iron, iodine, or calcium. Since vitamins are a recent discovery, of course nothing has been known in a scientific way about them. As has been shown here, even the persons who have devoted a good deal of time to nutritional affairs have not had any proper conception of the nutrition of the population as a whole. Individual workers and individual universities have concentrated on individual parts of the problem.

Williams and Spies have concentrated on vitamin B₁; McCollum and Johns Hopkins on vitamin A; Steenbock has focused on vitamin D; Sure, Bishop and Evans have given much of their attention to vitamin E; Sherman has devoted his attention to vitamin G; Hanke, of Chicago University, worked with great enthusiasm on vitamin C; Plummer did a good deal of work on iodine. Dr. Alice Bernheim worked long and patiently on calcium. Various workers too numerous to mention have worked on iron. In no case has a right and proper correlation of all this work been achieved, not even in any branch of the government where such correlation should take place.

The only possible correlation of all this new knowledge of nutrition is in the hands of the man who is engaged in the clinical practice of medicine. The data emanating from the laboratory worker who has no clinical experience are not only likely to be wrong, but are almost sure to be wrong. An example of this is a new book by an author who is a Ph. D. but not an M. D. He gives some interesting information in regard to vitamins, but the book is guilty of many omissions; makes wrong statements in regard to the relation between proper nutrition and heart disease, and in the relation between proper nutrition and catching cold. This is an example of a scientist venturing beyond his proper field.

At the present time some men engaged in the clinical practice of medicine are still using single synthetic vitamins in the treatment of disease. The synthetics have potentialities for danger. Since the nature of our dietary sins makes single vitamin deficiencies impossible, there is never any indication for prescribing any one synthetic vitamin alone. There is never an indication for prescribing thiamin or niacin-amide or pyridoxine or pantothenic acid by itself. If the natural sources of these elements are used

instead of the synthetics, it would be impossible to prescribe them alone, as they do not exist alone in nature.

There is no question but that in a well-nourished body the vitamins and minerals exist in a certain optimum balance. For instance, a body may be well nourished in every other respect, but the person may be thrown into a condition of water-logged overweight by taking too much common salt. The taking of salt in excess of the body needs permits too much sodium in relation to potassium and calcium. This allows the body to become permeated by water. In such a case the excretion of water is not properly balanced with intake, and serious disease results. In clinical work, it is not uncommon to see these water-logged overweight women whose chief dietary sin is too great an intake of sodium chloride (common salt).

The number of persons who may be benefited by the so-called no-salt diet is enormous. The same beneficial results may be brought about by giving these persons a salt mixture instead of plain salt, the mixture containing the same relative proportions of mixed alkaline salts as Ringer's solution. This salt compound, while it contains 70 per cent sodium chloride, also contains calcium, potassium, and magnesium, so that it can be taken without the mineral balance being disturbed.

The pathological condition known as acidosis is due to a reduced alkalinity in the body. The opposite condition--alkalosis--is not at all uncommon, and is due to too much alkalinity in the blood, or a preponderance of some particular alkali such as sodium, calcium, or potassium. In persons eating natural foods, these disturbances of mineral balance never occur. A diet composed of meat, milk, eggs, cheese, whole wheat, honey, and sea food will never produce either alkalosis or acidosis. It is only by the taking of artificial factory-made foods that these conditions are brought about.

Since the preponderance of any one mineral puts the mineral supply out of balance and disturbs metabolism, it is undoubtedly true that this same sort of a diseased condition may be brought about by an out-of-balance preponderance of any one vitamin. Physicians who have prescribed extra large doses of thiamin have noticed muscular weakness and nervousness afterwards. The author was one of the first to notice that toxic conditions and disturbance of rhythm of the heart may result from administering vitamins A and D together and alone in too large a dosage. It was found that large dosage of A and D could be continued in the same patients with complete freedom from the same symptoms previously experienced if the vitamin B complex were given also in a large dose along with A and D. Dr. Agnes Fay Morgan of California University has shown that symptoms of pellagra may occur when large doses of thiamin are given. This is because the B₂ complex is put out of proper relation to the amount of B₁. A relative B₂ deficiency (pellagra) is produced.

In the use of ordinary cod-liver oil, excessive dosages are not common, owing to the bulk of the dose necessary to produce results. However, since the advent of concentrates, there has been a tendency to over-dosage. This over-dosage when not accompanied by the vitamin B complex undoubtedly produces some bad effects.

To illustrate the increase in the understanding of basic facts in connection with the problem and the failure in the application of the new facts to the fullest extent in human nutrition we cite from a recent book which is supposed to be a digest of the new facts on nutrition.

In "Vitamin Therapy in General Practice," by Gordon and Severinghaus, on page 52, the statement is made that beriberi is not a thiamin deficiency, but that there exists also a lack of other factors. (True: but does not go far enough.)

On page 54 it is stated that heart pain, rapid heart, and difficulty in breathing are very often cured by the use of vitamin B, if the disease has not gone on to an organic change. Since the term "vitamin B" is used, we may suppose that the author means the whole vitamin B complex. The description fits that of a beriberi heart and should be treated with B plus other vitamins.

On page 55 the statement is made that peripheral neuritis is caused by lack of vitamin B. The author has found that these cases are more permanently benefited by a combination of vitamin B with the other vitamins and minerals.

On page 56, under a discussion of the polyneuritis of pregnancy, he states that this is a deficiency condition identical in many ways with beriberi. This statement should be changed to say that the disease is true beriberi, and that the optimum treatment is not vitamin B alone, but the whole vitamin group, with special emphasis on vitamin B.

On page 57, discussing the vomiting of pregnancy, he states that one should think first of a vitamin deficiency. This statement is true but it does not go far enough. It is practically always a vitamin deficiency, and is a multiple deficiency having to do with both vitamins and minerals. The woman who has vomited a good deal has lost in the liquid vomitus much of her physiological minerals. In this she loses particularly calcium, and sodium chloride. There must be some replacement of these minerals along with vitamin treatment in order to handle these cases properly. It should be remembered, and it is emphasized in this book, that the pregnant woman's needs for vitamins and minerals are much greater than the non-pregnant woman's because of the requirements of the fetus.

On page 61 the statement is made that there is dependable evidence that a lowering of the intake of vitamin B₁ is associated with a general lowering of resistance to all kinds of infection. This should be changed to read "vitamins and minerals" and not B₁ alone.

One of the widespread fallacies connected with the introduction of vitamin treatment has been the oft repeated statement that niacin-amide is a cure for pellagra. On page 87 of the book the statement is made that niacin alone can not be considered a cure for pellagra. It must be supplemented by the use of riboflavin, thiamin, vitamin B₆, and some of the unidentified principles of the complex, as well as by vitamin C and vitamin A. This statement shows that some improved thinking has been going on in connection with vitamin treatment, but the statement is not complete. The victim of pellagra also needs attention to the deficient mineral intake. The author has known victims of pellagra to go to their grave dosed with enormous doses of niacin, or enormous doses of vitamin B₂ complex, the disease being only partially improved in the beginning of the treatment, the patient going on to death because of starvation for other vitamins and minerals.

On page 101 the statement appears that vitamin C is important in maintaining the integrity of immunity to certain infections. the same error exists here. While it is quite evident that vitamin C does do much to keep up the integrity of specific immunities and general immunities to infection, only one part of the optimum immunity is achieved by the use of vitamin C alone. The statement that vitamin C exists in high concentration in

the pituitary gland, in the adrenal, in the corpus luteum and other parts which have much to do with keeping the flame of life burning at its optimum is true only if the vitamin C here mentioned is supported by the other vitamins and by proper mineral balance.

Another reference to vitamin C is its connection with some anemias that do not respond to treatment with iron. In this the author is agreeing in a small way with our previously expressed principle that iron in these cases does not give the best results unless other minerals and all the vitamins which have been removed by food processing are put back into the food intake.

On page 111 the author mentions the vitamin C intake in connection with stomach ulcer. There is no question but that vitamin C is indicated in stomach ulcer, but all other vitamins and minerals are also indicated. The relief afforded by vitamin C is only a partial and temporary relief. Stomach or duodinal ulcer is as surely a dietary deficiency disease as is scurvy or pellagra.

On page 112 vitamin C is discussed in relation to its building up immunity against all chronic infectious conditions, and the benefit it may confer on patient suffering with toxic conditions of the thyroid gland. There is no question but that both of these points are well taken. The toxic diseases of the thyroid are undoubtedly the result of old, chronic, long-continued, low-grade infections. The fact that the principal material (iodine), required in fighting such infections, is present in insufficient quantity contributes to the compensatory overgrowth of the gland and the manufacturing of a toxic secretion (toxic adenoma).

Since basal metabolism is very much increased in toxic conditions of the thyroid, and since the increased metabolism burns up vitamin B₁ in a very decided manner, the most urgent need in all cases of exophthalmic goiter is for thiamin. The need for thiamin is even greater than the need for iodine. Of course other elements are also necessary. Operating on such patients or destroying a part of the gland by radiation reduces the rate at which thiamin is destroyed, and while on ordinary diets, no new thiamin is furnished, it allows the organism to get along better with what little iodine and thiamin there is in the food. There is relatively more thiamin in the blood because with lower basal metabolism there is less destroyed. By this process the relative amount of vitamin B present in the blood is increased, so the patient feels better. The patient of course is not cured until he is provided with sufficient amounts of iodine and other minerals and vitamin B and other vitamins to make up for his past deficiencies and to provide the maintenance for daily bodily needs. Certain thyroid patients become "iodine fast" during treatment with iodine. This means that progress toward recovery has stopped with treatment by iodine alone. If these patients are given large doses of vitamins and minerals along with the iodine they will continue to improve.

In the *Journal* of the American Medical Association of May 3, 1941, Dr. Clarence A. Mills, Professor of Experimental Medicine in the University of Cincinnati, College of Medicine, calls attention to the danger of prescribing of single vitamins, since such prescribing may be the means of upsetting the vitamin balance in the body and inducing other forms of disease. He called attention to the fact that Wilder produced artificially deficiency symptoms in adults kept on a thiamin intake of 0.15 milligrams daily. It is usually considered that one to three milligrams daily is the optimum for the normal adult. He cites the case of a woman aged 47 who had been taking large doses of thiamin

for two and one-half weeks. The symptoms resembled those of over-dosage with thyroid extract--headache, increased irritability, insomnia, rapid pulse, weakness and trembling. This cleared up two days after the treatment was discontinued. After one week's rest, the patient returned to the use of thiamin, taking one-half the former dose, and the same toxic symptoms returned. She obtained relief only by discontinuing the use of the thiamin.

He states that on a recent visit to the tropics he encountered many cases where large doses of vitamin B₁ taken alone caused similar symptoms, accompanied by tremors of the hands and nervous irritability. In all these cases a reduction of the dose or giving up the vitamin altogether resulted in relief from the distressing symptoms.

Dr. Mills also calls attention to the work of Dr. Agnes Fay Morgan of the University of California reported in "Science," March 14, 1941, "The Effect of Imbalance in the Filtrate Factor of the Vitamin B Complex in Dogs," that shows that unfavorable results may attend the administration of any single one where many elements are lacking. He states that studies on rats in his own laboratory show the same effect. He brings out the very interesting observation which at the present time is of very great interest, that the addition of thiamin to bread and other commonly used foods without control over the intake level carries a potentiality for harm. He states that this is particularly true in the middle temperate regions where metabolic disturbances are already prone to occur. The medical profession should recognize the need for greater conservatism in the use of this vitamin, and its distribution through nonmedical and medical channels should be placed on a more scientific and controlled basis.

In the above mentioned article Dr. Morgan warns that there is possibility of danger in the food program planned to improve national health by adding one or two vitamins to staple foods when these foods are deficient in many other vitamins. She states that health may become worse instead of better because of the vitamin balance being upset. Whole-wheat bread contains iron, all the various components of the vitamin B complex, vitamin E and trace minerals. To attempt to compensate for all of these valuable elements by putting thiamin, niacin, and a small amount of iron in the bread is utterly ridiculous. It is harmful from another standpoint, and this is the fact that the average person reads in newspapers that the government has taken note of the inadequacies of white bread and has now decided to do something to correct the existing deficiencies. A person who has been getting along well on whole-wheat bread is now induced to eat so-called enriched white bread, believing that it is not only as good, but better, is badly deceived. The enrichment provides only a small fraction of the elements which have been removed in milling. By promoting a condition of unbalance it may encourage another form of disease.

Dr. Morgan's work with dogs was with several different vitamins. All dogs that received no niacin and no pantothenic acid survived; grew moderately well; but the hair turned gray and they were sedate and elderly in behavior. Giving either niacin or pantothenic acid to these dogs, while deficient in other vitamins, resulted in a gradual loss of neuro-muscular control and sometimes sudden death. She thinks that giving large amounts of any one vitamin, particularly niacin, which is frequently done in pellagra, to persons subsisting on diets having multiple deficiencies is exceedingly dangerous.

If any food is so bad that it needs to be "enriched" or "fortified" with synthetic vitamins it is so bad it should be rejected as the artificial enrichment corrects only a part of the evil.

Dr. Morgan states that fortification of foods with thiamin or niacin may precipitate conditions worse than the subacute deficiency state produces; that the usual ordinary diet, while inadequate, is more nearly properly balanced. If we are to have improvement in these deficiencies, general improvement is essential. The steps that must be taken to correct the bad health conditions due to diet deficiencies at the present time are mainly steps in the education, first, of the medical profession; and second, of the laity.

That the doctors suffer equally with the lay public in deficiency diseases is quite evident. Mortality records show that doctors die from heart and blood vessel diseases in as great numbers as does the general population. The average doctor has as much pyorrhea and tooth decay as the average layman. The average doctor is as often crippled by neuritis and arthritis and has as much appendicitis, gall bladder disease, stomach ulcer and cancer as the layman. The need for educating doctors is very great. The reception of new ideas such as these is slow in the medical profession.

It must be remembered that an appeal to a lay organization such as the Rotary Club, a church group, a chamber of commerce as to a professional group such as the Bar Association, or the county medical society for improvement along dietary lines is an appeal to a diseased group. Following a lecture by the author in a Midwest town, a cartoon appeared in the newspaper of a fat, misshapen woman talking in her kitchen to another fat, misshapen woman standing in the door. The first woman was saying to the second, "I always go to these lectures on diets; but I always come home and cook the same things."

An appeal to the group at the Rotary Club or woman's club or chamber of commerce who are suffering from tooth decay, scurvy, blood vessel disease, etc., is very much like an appeal to a group of persons who are habitually taking morphine or codein. They are habitues. Their habits have weakened their physical resistance and their will. A large proportion of these persons are physically and mentally incapable of adopting radical changes in their diets. They are urged to eat green salads and drink milk. This often results in raucous laughter and has often called to the mind of the author the raucous laughter which greeted the Vicar of Wakefield in his attempts to better the conditions of the miserable and criminal peoples to whom he preached.

Educational lectures addressed to the physicians might seem to meet a better reception, as physicians are very eager to make a better record than their competitors. They are anxious to cure diseases in which their competitors have failed. But even with such urge in the background, the doctor looks with a cold, fishy eye on all changes in his own dietary habits. He believes he has done pretty well. He fails to recognize his own deficiencies because his standards are wrong. He knows and treats marked departures from normal, but subclinical departures from normal meet no recognition as these correspond too closely to his own and to his family's physical condition. His own children need treatment for pyorrhea and tooth decay, St. Vitus' dance, and rheumatism. They have diseased tonsils and only partially functioning eyes. They have rickets and constipation.

The average doctor may be looked upon as a factor standing for the status quo. He has been taught certain therapeutic measures to use as he would use splints on a broken arm. He has had nothing to do with the breaking of the arm. His work is only to fix the arm after it is broken. He pays little attention to the prevention of deficiency disease. He only thinks of doing something about the coronary diseases, the cancer, the ulcer, or the mouth disease after it has occurred.

The editorial policy of the leading medical journals has been to play down everything connected with vitamin deficiencies for fear that vitamins will get too much in the hands of the laity. In spite of their attitude, this has occurred. The layman has recognized that there is something valuable to be had along this line, and in a dumb, muddling way he has reached for it. Around half a billion dollars is spent in the United States every year for vitamin preparations. This is mostly on a nonintelligent basis. But these remedies have undoubtedly helped in some small way, but not in a way that could be achieved if the remedies were intelligently used.

This applies to vitamins bought over the counter, and also to vitamins prescribed by physicians. The physician has been educated mostly by salesmen who represent commercial houses. The salesman gauges his instruction by the profits to be made in the particular product he may be selling. Since the medical colleges pay little attention to this subject except in an adverse way, and the editorial policy of the medical journals is to consider it a minor part of medical practice, the field is left open for the physician to be educated and exploited by the clever salesman.

The hope for improvement along the lines of education is, then, a hope for something to be done after many years of long, painful effort. If we are to receive the necessary help and receive it in the shortest possible time, changes will have to be made by legislation. The feeble and bungling attempt made along this line in connection with white flour and bread, and the eagerness with which millers and bakers came into line, after years of stoutly claiming that their flour and bread were right and perfect as they were, shows that legislative or other authority coming from a sufficiently high source may change everything in a few weeks or months in connection with food products.

We shall probably never be able to educate the population of the United States to the value of health-producing foods, but by law or decree we may banish the deficiency foods and substitute optimum foods in a few weeks' time. One of the obstructions in the past to a proper information of the public has been the commercial interests at stake. These commercial interests have been able to influence research favorable to them in some universities. They have been able to influence some eminent physicians and some editors of medical journals to acclaim the merit of their goods both in lectures and in public prints. They have been able to keep their deficiency products in the stores and on the kitchen shelves by plausible speeches on the radio and in the common widely read magazines.

The foods which have carried the greatest threat against the health of the state and the individual are sugar, white flour, and canned goods. The sugar is a concentrated carbohydrate containing no vitamin or mineral of any kind. Every ounce of sugar that is taken into the human economy reduces the ability to resist infection, as it furnishes only calories and none of the elements which protect against infections. The importation and manufacture of sugar should be prohibited as the drug heroin is prohibited.

All this is true for white flour, as it is nearly pure carbohydrate. White flour does contain, however, around 7 per cent protein. This makes it a somewhat better food than sugar. But neither the protein nor the carbohydrate in white flour contains any appreciable amount of minerals or vitamins. By legislative enactment both sugar and white flour should be banished from the American diet. As a substitute for sugar, honey may be used. Honey contains all of the ordinary food minerals and valuable enzymes. It is not probable that anyone will overeat on honey, as the appetite for sweets is very quickly satisfied after a fraction of an ounce has been taken.

The only proper replacement for white flour is whole-wheat flour. The same principle holds true in connection with other grains--rye, rice, corn, etc. Any grain flour should be consumed only as whole-grain flour. Any attempt to separate and discard either the germ or the bran or both removes valuable minerals and vitamins. As whole-wheat flour does not keep, the milling should be done by the baker. The law in regard to milling and baking should provide that none but whole-grain flour be used and the wholegrain flour used in any bakery in any day should be ground by suitable mills in that same bakery on the morning of the same day in which the baking takes place. The procedure should be to provide clean wheat or other grain early in the morning; putting this grain through the mill; taking the fresh flour and making it into bread or other bakery goods immediately following the milling. For home use the fresh flour could be delivered daily as milk is distributed. In England at the present time the milling of white flour is prohibited. They tried the addition of synthetics to white flour and found it to be unsatisfactory.

This would not only provide better nutrition, but better flavor. The flavor of freshly milled wheat is very delicious, whether used in porridge, pancakes, biscuits, muffins, or other foods. It is incomparably superior to the flavor of aged white flour or relatively old whole-wheat flour.

Small mills for grinding wheat and other grains could formerly be obtained from Montgomery-Ward & Company, and these mills were of various kinds and sizes. They could be obtained for home use, resembling somewhat the old-fashioned coffee mill; or they could be obtained for restaurant or hotel use in a somewhat larger mechanism. Such mills used in the home provided good food of excellent value. In restaurants and hotels they should be in demand because of the superior quality of the food they produce.

The author first found out about the delicious flavor of freshly milled grain on a lecture trip to Seattle, Washington. At breakfast in the Olympic Hotel in 1931, he immediately noticed the extremely fine flavor of the wholewheat bread and biscuits. An inquiry as to the kind of material used in making this bread brought out the fact that the hotel was using its own mill and grinding its own whole-wheat flour fresh every morning.

This sort of an arrangement would completely change the milling industry. The revolution in dietary affairs would put all milling into the hands of the bakers. This would undoubtedly work an advantage for the bakers, but to the disadvantage of the millers; but it would be returning to somewhere near the conditions that existed before the days of the big mills, when a farmer took his grist to the neighborhood flour mill to be ground.

The canning industry is one of the largest food industries. Up to the present time canned goods have been accepted as good food for either children or adults. Since we have known more about the chemical characteristics of the various vitamins, it has been found that some are destroyed by heat. Those most easily destroyed by heat are the water-soluble vitamins. Vitamin C, which has to do with the prevention of scurvy, is destroyed by ordinary cooking temperatures in the presence of oxygen. Therefore heat canning or any canning in the open air results in the destruction of vitamin C. Much canning is in heavy sugar syrup which further relatively reduces vitamin and mineral content.

Canners are now avoiding open vessels, and are canning in the absence of oxygen, which preserves a major portion of the vitamin C. This fact gives all the advantage to factory canning. Factory canned foods contain good quantities of vitamin C if it is originally present in the food. Home canned foods are deficient in this element. Vitamin B₁ is killed by ordinary cooking temperatures if the temperature is kept up for a long enough time. Short cooking kills a relatively small amount of vitamin B₁. Long continued cooking kills practically all vitamin B₁. Vitamin B₁ is destroyed also according to the temperature of the cooking. A relatively low temperature--220 degrees--may be kept up for a longer time than temperatures around 400 or 500 degrees. If subjected to exceedingly high temperatures, as are most goods put up in packages, such as breakfast cereals, the food is practically devoid of vitamin B. In most such so-called cereal foods the empty package has more intrinsic value than the contents.

The presence of acid helps to preserve the integrity of vitamin B₁. Foods that are highly acid go through canning with very little such loss. Canned tomatoes are almost as good food as raw tomatoes. However, few foods have the acid protective qualities of tomatoes, so we may say that non acid canned fruits or vegetables are to be condemned.

Vitamin B₁ does not exist in any great concentration anywhere in nature. Its richest sources are the germs of seeds, yeast, and liver. Throughout all nature, every living thing--plant and animal--is in a constant struggle for more vitamin B₁. The first part wild animals eat of their victims is the vitamin rich liver. Birds eat seeds containing the germ, while rejecting the polished seeds from which the germ has been removed. Rats and other laboratory animals will fight to get a solution of thiamin (B₁) while rejecting tasty concoctions containing sugar, meat, or honey. Plants that are injured immediately move the thiamin contained in the plant to the injured place, evidently in an effort to promote better healing. Horticulturists have found that the addition of small amounts of thiamin to growing plants very decidedly stimulates their growth. We may consider thiamin, then, as a scarce, very precious natural element. It exists only in sparse quantities in ordinary foods. Living things constantly struggle to get more of it. It is suicidal that the human animal should throw this valuable element away as is done in milling white flour or destroy it by the heat incident to cooking and canning.

Any person eating canned meat, fruit, or vegetables should remember that he is eating a food which formerly did contain vitamin B₁, but in the process of canning, this precious element has been largely destroyed. He must look forward to some lowering of his resistance against infection, and to the development of some kind of disease, along with a lessened ability to do work and a greater liability to fatigue and shortened life, if he persists in eating canned foods of any non-acid kind.

It must not be inferred that canning destroys all of the vitamin B₁ in ordinary foods; but it reduces the vitamin B₁ to such a degree that the infection-fighting elements in the food are very greatly reduced. The canning of foods is therefore to be condemned, and all civilized persons should be encouraged to eat their meat, fresh vegetables and fruits in a fresh or previously frozen state. Frozen foods do not have the vitamin deficiencies to be found in canned foods; so in any case where fresh food is not available, frozen food should be the choice of the individual.

There is one class of canned foods that may be eaten without fear in cases where the fresh food of this type is not available. This is sea food. The main benefit from sea foods (oysters, lobsters, shrimp, and salmon) is from the iodine they contain. The iodine is present in the canned as well as the fresh sea food; so while it is desirable to eat fresh sea food, no great harm will be done if the canned article is substituted.

All canned goods and packaged foods, with the exception of the canned acid fruits and vegetables and sea foods, should be condemned as food unfit for consumption by civilized communities. Other classes of food such as meat and milk should, if possible, be consumed fresh; but apparently meat does not suffer any great loss in ordinary refrigeration, and milk does not suffer much loss in pasteurization. Some kinds of meat, such as pork, carry parasitic disease. In these cases, the harm done by cooking is not so great as that which might be done by eating the meat rare. Cheese, cream, eggs, and butter are good, acceptable foods, and their consumption should be encouraged. Pastries and desserts of all kinds should be prohibited, since these are mostly composed of sugar and white flour. Ordinary cake is perhaps the most pernicious food of all. The argument has been brought forward that cake contains eggs and milk; but the quantities of these are so small that they amount to nothing. Ice cream would perhaps be very much improved and would become an acceptable food if sweetened by honey instead of sugar. As long as it contains the large amount of sugar it now contains, it must be considered an unacceptable food except in relatively small quantities. Ice cream could be prepared with honey, the honey to be put in after all cooking or heating is over.

The regime we set forth as acceptable would provide all the need of the optimum in civilized diet. Fresh, whole grains, meat, honey, milk, eggs, butter and cheese are fundamental foods elements. As the population of the United States and every other civilized country which has consumed large quantities of sugar, white flour, and canned goods, is a definitely diseased group, having a history of years of subnormal living, something must be done to make up for past deficiencies. A return to normal food alone will never bring health up to a normal standard. A return to normal food will improve the condition of any person suffering from years of food deficiency, but will not give him the optimum. In order to reach the optimum, he must have a well-balanced mineral and vitamin intake, and to provide for past deficiencies we must resort to so-called drug store vitamins (concentrates).

A proper mineral intake may be supplied by milk and cheese for calcium; a plentiful supply of fresh meat for iron, and sea food for iodine.

To make up for past dietary sins, concentrated vitamins should be taken for six months to two years, in order that the individual may reach a point where, with his reserves restored, he can carry on with a balanced diet.

The vitamin intake essential for the treatment of a deficiency disease is naturally higher than the requirement for preventing a deficiency. For this reason it is impractical, if not impossible to adequately treat a deficiency disease by merely correcting the diet.

In the selection of a concentrate, it is important to remember, first, that the original deficiency is invariably multiple in origin. The diet has usually been deficient in not one or two, but in many or all of the vitamins. This is being further established every day, in both the research laboratory and in clinical practice.

It is essential that the concentrate contain all of the vitamins, both known and unknown. Undoubtedly many of the vitamins essential in human nutrition have not as yet been identified or synthetically reproduced. For this reason no synthetic preparation can completely replace the vitamins in which the average person may be deficient. Such foods as yeast, liver and wheat germ are excellent sources of not only some of the known vitamins, but also many of the unidentified naturally occurring associated factors which are just as important in human nutrition as the fractions already known. A millionth of a milligram of biotin may be as important in the daily diet as three milligrams of thiamin. In the selection of any vitamin concentrate bear in mind the need for its containing as many of the vital vitamins as are found in our foods. Only natural sources of the vitamins should be employed for synthetic mixtures alone cannot afford a complete complex of the required factors, and without the so-called "unknown or unsynthesized" factors, few if any deficiency disorders can be cured. A new condition more serious than the one being treated may develop as the result of imbalance. The great mass of people suffering from digestive disorders, heart symptoms, rheumatic pains and aches, and fatigue will notice improved health conditions very soon after the beginning of such a regime. A reversion in appearance to a younger age group will soon be apparent. The skin will be brighter; the hair more nearly like the hair of a well fed animal, with a richer luster than before, and the ability to do physical and mental work will be greatly enhanced. Those cases where actual organic change has taken place, of course, need further medical or surgical attention. This means crippled hearts, distorted and misshapen colons and scarred stomachs, the actual incidence of tumors, loss of teeth, etc. A badly nourished person is never beautiful. The well nourished person cannot escape some degree of beauty, as health and beauty are inseparably bound together.

There is also need for a better, clearer understanding of how to judiciously choose a diet which will contain the factors the body so desperately needs. Diet is a scientific subject. An appeal to nothing but taste is a wrong approach to one of the most vital problems in health. Normally we tend to overeat on carbohydrate foods, for they have no selflimiting action on the appetite. A rich, natural food, such as honey will be tolerated only in reasonable quantities, and is self-limiting. Several general types of food, such be avoided, since they fail to carry their share of the nutritional load.

1--Remove from the diet any food which has had the basic chemistry altered by the removal of those elements essential to human nutrition. This would eliminate the use of white flour with most of its vitamin and mineral content removed; white sugar, which is actually a fine food which has been stripped of all nutritional value except calories; and corn syrup and other sugar syrups which are devitalized, devitaminized sugar solutions.

2--Any food subject to an artificial ripening loses some of its normal vitamin content. Artificially ripened tomatoes, oranges and lemons are three such products.

3--Excessive storage causes vitamin destruction. Coldstorage meats are a case in point, where there is a slow loss of the vital food factors. Orange juice may lose some of the vitamin C in as little as half an hour if it is squeezed and allowed to stand before being drunk.

4--Artificial processing also has a harmful effect on foods. Pasteurization causes destruction of some of the vitamin C and some precipitation of calcium, and also has some effect on the vitamin A and B content. This does not justify the use of carelessly produced raw milk. The milk which is produced under carefully controlled sanitary conditions (Certified Milk) is nearly as free from disease germs as pasteurized milk, and has the vitamin content of raw milk. Pasteurized milk is better than average raw milk but is not as good a food as Certified Milk.

5--Canning does markedly reduce the vitamin content of foods. Whenever possible foods should be fresh. For off season fruits and vegetables, fast freezing is far more satisfactory than canning.

6--In the home avoid long time storage of foods. Eat as you buy. Long boiling of fruits and vegetables, meat and even potatoes may cause a destruction of vital food factors. The use of soda to preserve color of vegetable should never be tolerated as any alkali destroys Vitamins.

7--Any synthetic concoction which is supposed to replace a natural food, is at best unsatisfactory. Oleomargarine is no substitute for butter. Any attempt to fortify it with vitamin A, is answering but a small part of its shortcomings. It totally lacks the vitamin D, E, and unsaturated Fatty Acids (Vitamin F) found in butter. It is also lacking in the minerals and phospholipids found in butter.

8--Avoid in baby foods, the soft mushy type of product designed to save the baby from the "strain" imposed by roughage in the diet. First the foods are no substitute for mother's milk, secondly they assume that roughage should be avoided, which is the exact opposite of the truth. The most common disorder among babies is constipation, due to a lack of bulk in the diet. No wonder, then that millions of people are bound to a laxative for the rest of their lives, when they have started off by a lack of normal intestinal physiology.

9--Don't depend on the "enriched" or "fortified" foods. These foods put back a small fraction of what commercial bungling has taken out. In each of these foods try to get it in its normal state, i.e., whole wheat instead of white bread.

Briefly then, the following might be a list of some of these foods which fall on the good and the bad side:

GOOD FOODS	BAD FOODS
Milk, eggs, butter and cheese.	Oleomargarine.
Fresh or raw fruits and vegetables.	Canned goods (exception: sea foods and acid fruits and vegetables).
Fresh meats and sea foods.	Cold storage meats.*
Whole wheat and other Whole Grain products. Made only from fresh ground flour.	Package foods.
Graham crackers, honey canned tomatoes and other canned acid fruits and vegetables.	Sugar, white flour pancakes, white crackers, white flour bread, white flour biscuits, white flour muffins, pie crust, etc. (All food made from white flour or containing white flour.)
* Cold storage meat is a good source of protein and while the vitamin B elements are reduced they are not destroyed. It is better than salt meat but not as good as fresh meat.	

The danger that comes with a failure to put diets on a sensible basis is clearly seen when one recognizes the relationship of many of the diseases which are so common to dietary deficiencies.

We have discussed the inability of artificial preparations spiked with imbalanced synthetic vitamins to satisfactorily replace mother's milk. Deeper into the problem one asks, why wasn't mother able to nurse the baby in the first place.

The secretion of milk goes on in a normal manner in the well nourished mother. The mother who cannot furnish milk for the child may in rare instances be suffering from some uncorrectable bodily dysfunction, but in the vast majority of cases the inability to supply milk to the child is due to a lack of the proper nutrition on the mother's part. In these cases the child starts off with inadequate nutrition. The mother's adequate care of her diet might well have prevented it. Step 2 is that of placing the child on the squeezed, mashed, mushy canned baby foods which have become accepted as the "natural" thing to give the baby. Not only do such foods give the baby a flying start towards a life of chronic constipation through their inability to provide essential roughage, but one again we are faced with foods which have had a pronounced vitamin loss in the canning process. To suggest that a baby can take fresh vegetables and whole wheat along with meat sounds impossible to the person who has had the need for giving baby "gentle" foods drummed into them. Actually children thrive on it if they are started on small quantities and their tolerance is not exceeded. If the infant is able to tolerate the strained, canned, embalmed products fortified with crudely balanced synthetic vitamins, he will do much better on the fresh substances themselves. Unless the infant is seriously ill, there is no need for sterilizing the food (with its accompanying vitamin loss) for the gut must at the same time accommodate itself to the friendly and unfriendly organisms that will eventually make it their habitat.

Then comes the school period with its sinus disease, children's febrile diseases and tonsilitis. The major part of the school child's diet is composed of refined carbohydrates, sugar and white flour. Remove them from the diet, and the incidence of sinus disease and tonsilitis will decrease to the vanishing point. Putrid tonsils and rotten teeth are

logically removed. The cause is left. The result is a child who will grow to adulthood accumulating the usual mass of such diseases as Tuberculosis, Rheumatic Fever, Peptic ulcers, Heart diseases, susceptibility to every infection that comes along, fatiguability-- ALL CONDITIONS WHICH WOULD BE NON-EXISTENT IF THE DIET WERE CORRECT.

There are a number of mental and nervous diseases which can be treated successfully by adequate attention to nutrition. Even the treatment of venereal disease can be improved and painful conditions like arthritis and neuritis are more successfully treated if nutrition is made a first consideration. Preference must be given to the NATURAL SOURCES of the vitamins such as Certified milk, eggs, whole grains, sea food, liver, heart, kidney, fresh, raw or frozen vegetables, yeast and butter.

Surgery becomes a much simpler matter if the patient goes to the table with a body so well nourished that every mechanism of the body can recuperate with normal efficiency.

I have treated all cases of stomach and duodenal ulcer since 1928, with the high vitamin, high mineral diet. If necessary, (allergy), tobacco was forbidden for life. In every uncomplicated case, cure was complete, and the disease never recurred as long as the patient adhered to the high vitamin, high mineral regime. Clinically this refutes the theory that once a person has peptic ulcer nothing under the sun can prevent them from recurring. It may be repeated that they can never return to the diet composed of devitalized, devitaminized, demineralized carbohydrates that produced the disease.

The physician or layman who fails to realize that vitamin and mineral deficiencies are rampant had best look about. Everywhere one turns, people are seen who are missing the fullness of life that comes with optimum nutrition.

If they could be made to realize the need for treating their past dietary errors by the use of concentrates and placing themselves on a full rich diet, many of the nation's health problems would cease to be problems.

The average person's diet is much below the optimum. The average grocery and the average table indicate too much carbohydrate and too much salt, with a relative lack of calcium, iron, iodine and vitamins. The time has come to do something about it.

The successful outcome of any war may depend on the question of optimum nutrition. Any commercial interests who aid and abet and give comfort to the enemy by hampering the campaign for better nutrition should be dealt with as saboteurs. We must not aim at minimum requirements in these questions of nutrition but at optimum requirements. If we do not achieve the optimum some other nation will and they will be the masters, we the slaves.