

# THE NEED FOR VITAMINS

By L. STAMBOVSKY

THE recent phenomenal disclosures in the field of nutrition are changing our concepts of health and disease. It can now be said that comprehensive nutrition is the keystone upon which is dependent the normal development and efficient maintenance of the skeletal, muscular, glandular and neurologic systems. Optimum function is manifest by well developed bodies, good muscle tone, youthfulness, stamina, longevity, freedom from disease and a full capacity for life in general. Inversely nutritional deficiencies and errors are, directly or indirectly, in a major degree, etiologic in the production of nearly all pathology—irrespective of whether such be evidenced as neoplastic disease, bacterial invasion, toxemia, functional disbalance, or just an untimely wearing out of one or more organs.

Admittedly the above statements cover a lot of ground and quite frankly are coldly received by many members of the medical fraternity. It is beyond the scope of this discussion to present even in briefest abstract the vast amount of existent clinical and experimental proof of the above. Convincing and amazing confirmation may be found in the thousands (8,000 up to October 1940) of nutritional references published in "Quarterly Cumulative Medicus," "Chemical Abstracts," "Biological Abstracts," "Nutritional Abstracts and Reviews." A review of this immense amount of clinical and experimental research cannot fail to imbue one with at least a dawning realization that herein lies the cause and cure of most of the ills of Man.

## Widespread Deficiency and Deterioration of Public Health

According to the U. S. Public Health Service, 40 per cent. of the country's population suffer from inadequate nutrition. Quantitatively, most Americans get enough calories in the form of carbohydrates, which incidentally constitute 50 per cent. of our food intake. But refined sugar and starch, while they are energy sources, provide little or no accessory or vital food factors. Much more important than mere calories are the proteins, fats, vitamins and minerals. Since half of our food intake consists of white flour and sugar, it is clearly apparent that the most vital phase of nutrition, i. e. the proteins, fats, vitamins and minerals have been in a great measure displaced by a non-vital dietary.

Neil and Bloomfield of the U. S. Public Health Service estimated that 350 million man-days were lost last year among industrial workers because of illness and accident. Certainly not more than 10 per cent. of this figure is attributable to accident—leaving a staggering number of days of unproductivity that may be laid at the door of colds, constipation, headaches, exhaustion and a number of other clinical and sub-clinical syndromes. This industrial loss becomes still more plausible upon focusing our attention on the common cold. Four hundred million colds annually cost America \$500,000,000 (Bruce Bliven, "New Republic," December 15, 1941). Even though this claim may be somewhat exaggerated, it must be remembered that colds are but one of a number of debilitating disorders that account for the industrial losses mentioned above. The colossal technical and medical literature is replete

with irrefutable evidence that these very pathologies which exacted such a grievous toll among America's workers can be prevented, mitigated and cured by comprehensive nutrition. Why shouldn't we employ *now* this forward march in the realm of preventive medicine?

McCormac, *Med. Rec.*, 152:439, conducted "in vivo" experiments along these lines with vitamin B<sub>1</sub>. Athletes in better than average condition were given optimum doses of thiamine a few days prior to the tests. In every instance there was a strong increase in physical output—even as high as 200 to 300 per cent., as evaluated by breath holding ability, swimming stamina and other forms of physical endurance. This reference is industrially significant. If these college athletes who unquestionably are in better condition than the average worker, responded so markedly to but one of a number of inter-dependent nutritional biochemicals—it is logical to conclude that the population in general and industry in particular would favorably respond to an increase in dietary adequacy—artificially or naturally supplied. Enriched bread is a feeble but none the less a forward step in this direction. Much more can be and should be immediately done.

## Further Evidence of Widespread Deficiency

Many general practitioners and even medical leaders in high places still ridicule the U.S.P.H.S. statistics regarding the prevalence of incompetent dietary. With decreasing intensity are heard the familiar echoes, "American diets are all-inclusive," "Vitamins are a transient fancy," "It is impossible for the rich American table to be deficient," etc. There is some justification for the above attitude. The practicing physician is so absorbed with the problem of diagnosis and treatment that he does not have the time nor energy to keep immediately abreast of developments in all fields of science, especially the commonplace subject of foodstuffs. We sympathize with the general practitioner. The mass of medical literature by itself, absorbs his few free moments and to expect him to wade through endless nutritional references is out of the question. However, the physician must increase his interest in nutrition or permit the public to seek elsewhere information on the subject. There are still other reasons for medical indifference.

Specific or acute avitaminosis such as scurvy, beriberi, pellagra, rickets, osteomalacia, and tetany are comparatively rare. Illustrative of their infrequency is the report of the U. S. Census Bureau wherein it is stated that the total deaths in 1938 from these causes was but 3,637. If the general practitioner judges the prevalence of nutritional disease from these rare cases, then naturally he is of the opinion that all is well with our diet. But what of the millions of sub-clinical cases—persons who are not sufficiently ill to require medical aid, yet who are really not well? This condition is aptly termed "sub optimum" health, and does not fall within the range of the physician. The reason therefor is very human—why go to a doctor unless forced to. Why not wait until sub-clinical symptoms eventuate into real distress or incapacity and then visit Dr. Jones. Such is the reasoning of the average person.

We list below in tabular form the mild and extreme deficiency symptoms of the more common nutritional bio-

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chemicals and essentials. It becomes obvious from this tabulation that everyone has at one time or another experienced or continues to tolerate some of these states. Combined or acute avitaminosis assists in the development of or results in the run-of-the-mill pathologies from alopecia to xerophthalmia. As we have already outlined, because of the cyclonic speed with which the science of nutrition has grown, and because of the inherent but regrettable tendency on the part of medicine to resist new and simple facts that did not emanate from the A. M. A., medicine as a whole is not yet sufficiently schooled or even willing to concede the possibility of a nutritional ideology for much of the disease with which its efforts are concerned.

### Deficiency Symptoms

	Mild	Extreme
Vitamin A	Retarded Growth. Gastro-Intestinal Disturbances. Low Resistance to Pathogenic Invasion. Keratinization of epithelial cells.  Cutaneous Eruptions Impaired Function of Visual Purple.	Xerophthalmia.  Loss of Weight.  Extreme Susceptibility to Infection through eye, tongue, alimentary, respiratory, urinary, tracts, sinus and bladder.
Vitamin B <sub>1</sub> (Thiamin)	Retarded Growth. Lassitude. Cardio-vascular Disturbances. Loss of Appetite. Gastro-Intestinal Dyscrasia. Nervous Irritability.	Nerve Degeneration. Beri Beri. Polyneuritis. Atrophy of Musculature. Loss of Weight. Gastro-intestinal hypotonicity. (Impaired Digestion, Constipation.)
Vitamin B <sub>2</sub> (Riboflavin)	Photo-phobia.  Granulation and redness of conjunctiva. Impaired growth.  Lack of Vigor. Seborrheic skin lesions.	Cheilosis (Lesions at corner of mouth). Sharkskin (Lesions of nose).  Conjunctival manifestations associated with vascularization of cornea. Cataract. Loss of Weight. Neurasthenia. Loss of Hair. Glossitis.
Vitamin B <sub>6</sub> (Pyridoxin)	Retarded growth. Muscular incoordination.  Edema.  Symptoms associated with pellagra.	Dermatitis. Impaired growth (experimental animals). Microcytic Anemia in dogs. Extreme nervousness.  Insomnia. Irritability.
Vitamin E (Alpha-Tocopherol)	Low Fertility.  Impaired placental-function. Muscular dystrophy.	Failure of Male germ cells to develop.  Sterility.
Vitamin K	Prolonged coagulation time.	Hemorrhage.  Anemia.

Vitamin P-P (Nicotinic Acid)	Nervous disturbances. Soreness of Mouth. Indigestion. Constipation. Anorexia.  Nausea. Headache. Loss in weight. Dizziness. Confusion. Insomnia.	Pellagra.  Skin eruption. Soreness of mouth.  Severe neurasthenia leading to insanity. Redness of tongue.
Vitamin C (Ascorbic Acid) (Cevetamic Acid)	Retarded Growth.  Defective teeth.  Defective bone repair. Headache.  Low resistance to infection. Digestive disturbances. Restlessness. Delayed healing of wounds and weak repair.	Scurvy.  Superficial hemorrhages. Lesions of gums.  Bleeding from nose and mouth. Soreness of joints.  General weakness.  Emaciation. Edema.  Loose teeth. Fragile bones. Gastric ulcers. Delayed and poor healing of wounds.
Vitamin D	Poor assimilation of calcium and phosphorous. Bow legs. Predisposition to dental caries.  Restlessness. Lack of vigor. Poor growth.	Rickets.  Misshapen bones. Beading of ribs. Hypertrophy of wrists and elbows. Delayed eruption of teeth. Spasmophilia. Osteomalacia. Delayed or non-union of fractures.
Pantothenic Acid	Deficiency state not proven in man. Presence in many foods suggests it as a supplement in deficient diet. Thought to be essential for growth and life.	
Paramino Benzoic Acid	Anti-gray-hair factor.	
Inositol	Anti-alopecia factor for mice.	
Calcium	Poor development of skeletal structure. Rickets. Dental caries. Bleeding. Nervousness.	
Copper	Anemia. Imperfect utilization of iron.	
Iodine	Sterility. Glandular disfunction	
Iron	Anemia. Pallid complexion. Retarded growth.	
Phosphorus	Poor development of bones and teeth. Retarded growth. Loss of weight. Rickets.	
Essential Protein	Poor development. Hypotonicity. Low muscle tone. Atrophy of musculature.	
Essential Fatty Unsaturates	Dandruff. Dry skin. Loss of dermatologic tone. Impaired resistance to infection	

### Further Demonstration of Widespread Deficiencies

The U.S.P.H.S. statistics covering the extent of malnutrition are very conservative. Overwhelming evidence to this effect may be found in the existence of the gigantic proprietary drug business or the business of self-medication. Non-secret and well-known medicines such as cascara, brown mixture, baking soda, etc., should be included in this classification inasmuch as they are usually employed without the advice of a physician. America's total drug bill for 1929 (Cost of Medicine, Rorer & Fischelis) was \$715,000,000. Only 27 per cent. of this total was spent for physicians' prescriptions. The balance or \$525,000,000 was obtained from customers who did not feel the necessity to seek medical aid. These persons, judging from the figures cited, must run into many millions. Consequently we have here a vast army of people who, while not acutely ill, are certainly not 100 per cent. well, that the physician never contacts and is therefore in ignorance of. Obviously, medicine is not qualified to state in any degree the absence or prevalence of sub-optimum health. It would be interesting to break down the expenditures for different types of medication but unfortunately such figures were not available. But any drug clerk knows that millions were spent for analgesics in the treatment of countless headaches. Many more millions are annually exchanged for laxatives and the treatment of not occasional but chronic constipation; still more millions were expended for cough mixtures, nasal preparations, throat lozenges and other products for the symptomatic relief of colds; tonics also get their share of America's income in an effort to get rid of that tired feeling; possibly the most important of all is the incalculable bill engendered by dental caries—which more and more are being viewed as of dietary origin—primarily carbohydrate excess; the gastro-intestinal tract is instrumental in the conversion of further millions into antacids, digestants and other acids.

The foregoing is not a tirade against the drug business or retail pharmacy. The correction of those maladies for which these patent and home remedies were sold, constitutes a public service of no little magnitude and of which the industry might well be proud. But the essence of this exposition is the question, "Why was it necessary for the American people to spend the unbelievable sum of \$525,000,000 for self-medication?" No one can say that the myriad daily headaches are normal or that man's sewage system was so imperfectly designed as to require constant outside assistance to function. Anemia with its telltale fatigue and pallor is certainly not a part of nature's design—nor are colds, coughs, coryza, impaired digestion, poor skin, nervousness, and other of the complex syndromes characteristic of health. It is admitted that the wear and tear of civilization with its perversions and distortions of natural laws is partly, but only in minor degree, accountable for some of our modern pathology. In the light of newer knowledge we now know that the real culprit is inadequate nutrition—more specifically excess of carbohydrates and insufficient fats, proteins, vitamins and minerals.

### Why Impoverish Food?

There is no longer the question of whether or not our dietary is comprehensive. We have briefly proven that it is not. To what factor or factors are attributable our inadequate dietary? Fundamentally, certain evolutionary changes are herein concerned. Man was born omnivorous. For those who are doubtful of same it is but necessary to point out that diabetes, an appreciably common disease, is merely the abuse and subsequent exhaustion of a comparatively limited property—the power to digest carbohydrates, which is the basis of all herbivorous foods. Man's ability to consume proteins and fats is within reasonable limits continuous throughout life. This seems to indicate a physiology that was constructed for omnivorous and not

herbivorous foods. However, as time went on a species of homo genus increased to such an extent that there was no longer enough animal food to go around. With characteristic ingenuity, Man turned directly to the earth for food, which was plentiful and easy to obtain. The birth of agriculture ensued—dating back about 7,000 years. But man's physiologic evolution has not kept up with this change in food habits. The herbivorous animals have large stomach capacity for the consumption of voluminous quantities of grains, fruits and vegetables. The capacity of carnivorous animals, including man, was geared to the relatively concentrated fats and meats of animals. On the basis of equal volumes unconcentrated nutriment of vegetable origin contains but half the energy value of animal fats, none of the structural value of animal proteins and on the average, but a fraction of the vitamin and mineral content of carnivorous foods in general. This changeover from carnivorous habits is a first step in the explanation of the modern paradox—malnutrition in an oasis of plenty.

### Why and Where Does Qualitative Depletion Occur?

American foods are the richest and most plentiful on earth. The factors responsible for impoverishment are manifold and complex. We have already discussed the transition from carnivorous to omnivorous habits. It becomes even more relevant in view of the following: vegetables, fruits and grains are at best as compared with foodstuffs of animal origin, an inferior source of minerals, vitamins, energy and repair substance. But vegetable foodstuffs under modern conditions are subject to still further depreciation. The time required for long-distance transportation necessitates the marketing of unripe fruit which, of course, does not possess the mineral and vitamin content of naturally matured fruit. Large scale distribution forces the employment of cold storage permitting oxidation and time to wreak still further destruction. Exhausted soil, the matrix of fruits and vegetables, cannot do otherwise than yield low vitamin and mineral content. Sun-dried fruits by virtue of heat, oxidation and actinic effects undergo high vitamin losses. Animal foodstuffs withstand deleterious conditions much better and are not subject to as many as the above.

Canning, a necessary phase of modern living, is another source of vitamin deterioration. According to Drs. L. B. Pelta and M. M. Cantor, Department of Biochemistry, University of Alberta, Edmonton, the following losses occur:

Vitamin A	10-50 per cent.
Vitamin B <sub>1</sub>	Appreciably destroyed in all canning and cooking. Loss in acid media 5-15 per cent.; alkaline media up to 80 per cent.
Vitamin C	Variable, stable in some foods, completely destroyed in others.
Vitamin D	Not important in canned foods.
Riboflavin Nicotinic Acid	5-15 per cent.
Calcium Phosphorus	Precipitate during canning. Lost through adherence to metal or insolubility in gastro intestinal tract.

These authors further state that increased destruction must occur inasmuch as the foods must be again heated before serving.

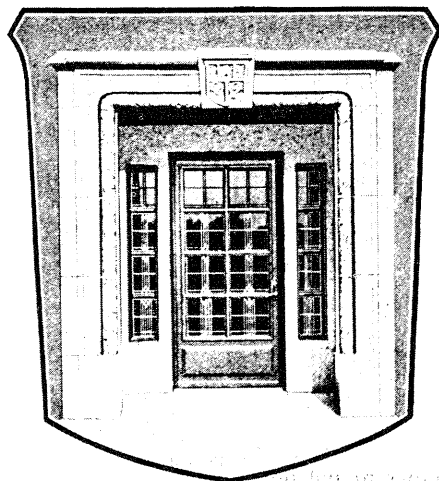
A limited economic status is worthy of a place in the dietary picture. Thirty-two per cent. of America's families have an annual income of less than \$750 (A Summary in Yearbook of Agriculture, U. S. Dept. of Agriculture, 1939). This means that three out of ten families do not have sufficient funds to permit the consumption of the barest minimum of protective foods such as visceral organs, meats, milk, eggs and vegetables. In the more favored

socio-economic strata, excess candy, pastry and other ultra-refined gastronomic temptations displace the more simple but fundamental foods. The substitution of natural fats, such as butter, corn oil and animal fats, by cheaper, synthetic, non-vitamin and non-assimilable fats. This is one of the main causes of fat starvation with resultant dermatologic repercussions. Destructive culinary practices are guilty of extensive damage to what was originally good food. Heat and the presence of alkali inactive vitamin C, B<sub>1</sub>, and B<sub>2</sub>. Fruits and vegetables cooked in water lose both through heat and solution in discarded cooking media. Frying and other heat treatments of meats reduces the B Complex content by about half. The multiple processes involved in producing dishes of ultimate visual appeal, and the creation of exotic concoctions divorced of any relationship to the original foodstuff, and in the constant striving for maximum taste stimulation, concertedly devitaminize and denature nutriment so treated. Modern milling practices and bleaching removes or destroys carotene, B complex and other vitamins and minerals contained in the cereals. Excess use of white flour and white sugar—as already stated, constitute 50 per cent. of America's caloric intake, are totally devoid of any mineral or vitamin content. Still other factors involved in the production of nutritional disturbances are personal idiosyncrasies, faddist diets, weight reduction, psychotic aberration, impaired digestion and a number of other syndromes such as pregnancy, fever, glandular disfunction, toxemia, etc. Another but recently recognized source of depletion is the common mineral oil habit. Vitamins A and D are more freely soluble in this hydrocarbon than in the bowel content—resulting in a transfer to the oil and subsequent loss. High carbohydrate intake throws increased demands for B Complex for its metabolism which serves still further to deplete the body of this factor—which should have been but was not supplied simultaneously with the carbohydrate ingestion.

### Elimination of Nutritional Diseases

We have briefly depicted the extent and cause of nutritional deficiencies and errors. What is the quickest and most feasible method of eliminating this insidious detriment to our national health? A thorough reform of those culinary practices accountable for destruction and removal of food accessories would eventually result in a substantial improvement. However, an appalling amount of education and time will be necessary to achieve much success along this line. The increased consumption of animal products would be a distinct advance but unfortunately economic limitations prohibit more than a minor relief by this means. Any appreciable transition from animal to other classes of foods becomes doubly difficult when it is realized that per calorie the cereals cost one-half to two-thirds less than any other source of energy. Wider consumption of vitamin-bearing vegetables would unquestionably be of worthwhile benefit. Authorities claim that a good diet should contain at least 200 grams of vitamin-bearing vegetables. This is impossible inasmuch as the present supply in the United States could apportion only 70 grams per capita (Stiebling, H. K. & Clark, F., Planning for Good Nutrition, U. S. D. A., Food and Life, Page 28).

Education as to more efficient food selection along the lines of figuratively less cake and more cheese, will be a powerful influence but again will require precious time. The present emergency has produced almost universal increased mental and physical stress which in turn are being manifest in the form of tension, gastro-intestinal impairment and other dyscrasia—all factors demanding increased vitamin intake. For the immediate present and as a national service supplementing the American dietary with those nutritional biochemicals and minerals of known deficiency is a positive necessity and would be a long step towards the rapid completion of our national defense.



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