VITAMINS AS AN ADJUNCT IN THE TREATMENT OF PERIODONTAL DISEASE

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THE mere absence of disease does not imply buoyant health. Health has many gradations, extending from buoyant or maximum health all the way down to the borderline of disease. Optimum nutrition can assure buoyant health if no anatomic or functional limitations are present.

Commenting on the importance of nutrition, Russell M. Wilder, chairman of the Committee on Food and Nutrition of the National Research Council, writes:

> When the story of the control of malnutrition can finally be told it may not be quite so dramatic a tale as that of the eradication of cholera and typhoid, but the advantages to the public health from such control will, in my opinion, match in importance what has been accomplished in sanitation. Typhoid either kills or ultimately relaxes its hold. Nutritional deficiency saps vitality in so insidious a way that the victim may be unaware that enough is wrong to call a doctor. . . . The milder degrees of nutritional deficiency, although they are neither fatal nor completely incapacitating, constitute the nub of the problem of malnutrition. They interfere with sleep, so that rest is disturbed. They wreck courage. They undermine the will to do. They seriously depress resistance to other diseases, and, in women, contribute to the occurrence of complications during pregnancy. The prevalence of milder degrees of malnutrition, in the opinion of those who are best informed, accounts for . . . a considerable part of the relief rolls. The undernourished are unable to hold jobs if they find them; they become unemployable.

A person may be apparently well. He may go to business, do a hard day's work, and yet not have buoyant health. Fatigue may be part of his daily life. He accepts manifestations of atrophic changes because he has adapted himself to such common complaints as headache, backache, pain in the arms and legs, poor appetite, toothache and bleeding of the gingivae. True, these conditions exist in a majority of the population, and yet they cannot be accepted as normal. They are the complaints of average people existing on a subsistence level maintained by an average diet. Average diets have been shown to be deficient in essential minerals and vitamins, with too high an intake of refined carbohydrates (sugars, candy, cakes and pastries).

Health to the nutritionist today means buoyant health: better eyesight; better hearing; freedom from aches and pains; greater resistance to infections, such as the common cold; reduction in the rate of atrophic changes such as arteriosclerosis, and an increased life span, with extra years added in the prime of life.

Dentistry has up to the present failed to fulfil its full obligation as a health service. There are many reasons and logical explanations for this fact. One of the most important is that 70,000 dentists cannot adequately correct the dental diseases of even 25 to 30 per cent of the people. It is also a known fact that only a small portion of the 30 per cent receiving adequate dental care are enjoying the benefits of modern dentistry.

How can we cope with this problem?

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The best answer by far was given by the Scandinavian countries before the Nazi cloud engulfed them. They learned that even minimum remedial operative procedures would be a colossal, if not an impossible, undertaking. The problem was approached by educating parents on dietary principles.

The "Oslo breakfast" was instituted in order to insure a daily intake of optimum minerals and vitamins in the diet. Along with this diet, the dental defects of all school children were corrected. The improvements produced in general and oral health are indisputable, as must be recognized by the dentist. The discovery of nutritional deficiencies by means of routine oral examination and the institution of vitamin therapy and improvement of dietary intakes are important responsibilities of the dentist.

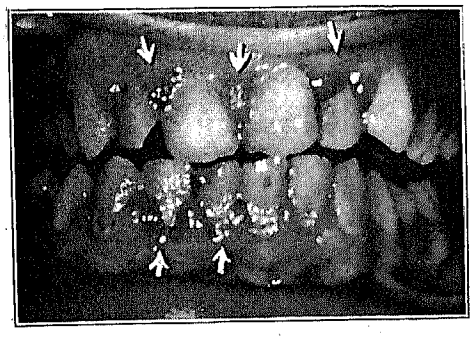

Fig. 1.—Condition before vitamin therapy. Hypertrophy, edema and congestion are present (severe chronic scurvy).

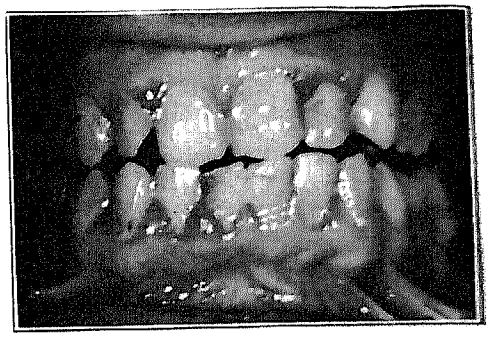

Fig. 2.—Condition one month later. (Compare Fig. 1.) Ascorbic acid, 300 mg. daily, was given. There is reduction in hypertrophy, with a tendency of the tissue to return to normal. Vitamin therapy is to be continued for at least a year, along with local treatment for gingival disease.

Physicians and research workers consider the tongue, teeth and gingivae the mirror of physiologic activities. Dentists are much better equipped to interpret aberrations of the gingivae and thus recognize systemic disturbances reflected therein.

According to Miller,[1] the dietary causes of caries and periodontal diseases can be divided into two general classes: (1) local, or extrinsic and (2) systemic, or intrinsic.

The local conditions may be influenced or corrected by alterations in the daily diet. Such changes can be accomplished readily by eliminating the non-detergent, acid-producing foods, such as candies, cakes, pastries and white bread, which lack essential vitamins and minerals, and replacing them with detergent, alkali-producing foods containing essential vitamins and minerals, such as raw salads, whole grain breads and cereals, milk, fruit, eggs, organ meats, potatoes and raw and steamed vegetables in the daily diet.

The systemic conditions may be influenced by all the conditions that affect the teeth and supporting structures, in addition to the local physical effects of food on both the hard and the soft structures of the dental apparatus.

Deficiency states may be caused also by the following conditions (modified from Jolliffe)[2]:

1. Indigency or low incomes.
2. Erroneous dietary habits and food idiosyncrasies; e.g., excessive use of refined sugar, candy, pastries, cakes, chocolate flavors and soft drinks.
3. Excessive consumption of alcohol, refined starches or mineral oil.
4. Diseases altering nutritional requirements:

(a) Hyperthyroidism.
(b) Fever, especially of long duration.
(c) Gastrointestinal disturbances, colitis, achlorhydria, vagotonic spasms.
(d) Pregnancy.
(e) Rapid growth.
(f) Increased excretion; diarrhea; polyuria; lactation.
(g) Nervous states.

5. Food fads.

6. An edentulous state or wearing of inefficient dentures.

It is because of these conditions, in addition to inadequate consumption, soil depletion and unsatisfactory transportation, marketing and cooking, that most of the population is in a state of malnutrition. A problem presents itself when virtually all our patients (three-fourths of the population have some form of "hidden hunger" or malnutrition) fall into one of the foregoing categories. Kruse aptly says:

> More properly, the term "deficiency disease" should connote a deficiency in the bodily tissues rather than in the diet. Indeed, its meaning should be even broader: it should include not only a deficiency but also any metabolic disturbances of the essential in the tissues. The causes may be complex. They may be conveniently classified as external and internal. Dietary deficiency is the most common external cause. Any bodily condition interfering with digestion, transport or utilization, prompting destruction or excessive excretion, or raising the requirements of the dietary essential is for example an internal cause. Almost every non-nutritional disease affects nutrition. A cause comes about through a combination of circumstances. For example, assuming a satisfactory internal mechanism, a deficiency disease from insufficient intake relative to age, activity, exposure to light, storage, state of tissue and probably other factors.

Kruse has shown that apparently well persons manifest some form of deficiency state. Most of the significant changes were observed with the aid of a biomicroscope. The changes brought about in the gingivae and the tongue with the aid of vitamin therapy were reported by him in two excellent papers.[3, 4]

Tongue changes were effected by giving 200 mg. of niacinamide daily for

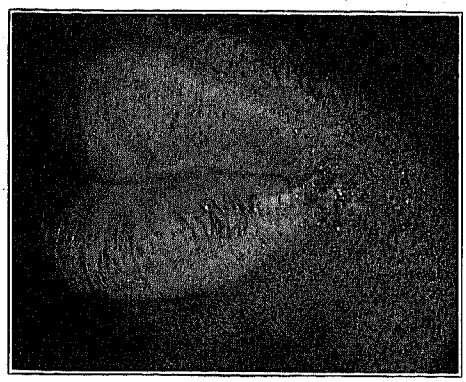

Fig. 3.—Condition before treatment; cheilosis, or perlèche. The patient came in for periodontal treatment, with a "sore" in the corner of the mouth, present for a year. There is a urea-like frosting of the lower lip at the mucocutaneous junction. The cracking, or fissuring, at the angles of the mouth is an advanced ariboflavinosis.

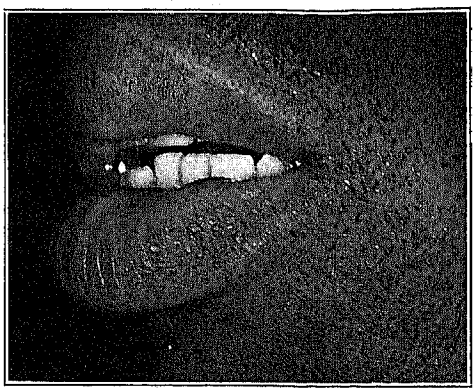

Fig. 4.—Condition after vitamin therapy. (Compare Fig. 3.) Riboflavin, 5 mg., plus two yeast tablets three times a day was given after meals from September 25 to October 16, approximately three weeks. The fissuring at the angle of the mouth and the urea frosting of the lower lip have disappeared. A pain in the right forearm disappeared at the same time.

TABLE 1.—VITAMIN THERAPY EMPLOYED IN PERIODONTIA DEPARTMENT, NEW YORK UNIVERSITY COLLEGE OF DENTISTRY*†

Deficiency Vitamin	Oral Signs as Seen by Dentist‡	Prescription (Refilled as Necessary)
A	Keratinization and hypertrophy of gingivae	Vitamin A (25,000 I.U. tabs) No. 100, 6 tablets a day after meals for six months to a year.
Niacin (nicotinic acid)	Scarlet tongue; smooth atrophy of the lateral borders and tip of the tongue; painful, sore, fissured and corrugated tongue; may influence redness of gingivae along with avitaminosis C; stages from mildly acute to severe chronic may be seen	Niacinamide (100 mg. tablets) No. 100, 1 tablet 3 times a day after meals.
Thiamine B	Neuralgic pains in and about the mouth; dry socket; aphthae	Thiamine hydrochloride (10 mg. tabs) No. 100, 1 tablet with 1 yeast tablet and 100 mg. of ascorbic acid 3 times a day after meals; usually used in conjunction with riboflavin, niacinamide and ascorbic acid.
Riboflavin (B_2)	Purplish red or magenta tongue; cheilosis; cracking at corners of mouth	Riboflavin (5 mg. tabs) No. 100, 1 tablet and 1 compressed yeast tablet 3 times a day after meals.
Vitamin C (ascorbic acid)	Gingivitis; easy bleeding of gingivae; edema of gingivae; slow healing; may also be used preoperatively and postoperatively to hasten healing and in treatment of necrotic gingivitis	Ascorbic acid (100 mg. tabs) No. 100, 2 tablets after each meal 3 times a day for six months to one and one-half years.
D	In adults, red marginal gingivitis (S. C. Miller); in children, as result of deficiency in infancy, poor tooth formation (tooth structure cannot be improved by vitamin therapy; for gingivae signs and alveoloclasia and to preserve ridges under prosthetic appliances, use in conjunction with high calcium diet)	2 tablespoons of cod liver oil every day; 3 glasses of milk taken at mealtime for at least a year for adults (vitamin D potency of product should be checked on label).
Mild polyvitamin and mineral deficiencies	Poor oral health in general, tissue bloated and coated; alveoloclasia active in general	6 brewers yeast tablets and 1 teaspoonful of cod liver oil daily; balanced diet with minerals and vitamins in abundance (for maintenance dose, commercial vitamin products may be used).
Subclinical	Any of the foregoing symptoms in moderation or as voted by capillary microscopy or slit-lamp technic; vague, confused, indefinite complaints or complaints of unknown etiology in and about mouth	Ascorbic acid 75 mg., riboflavin (B_2) 5 mg., thiamine HCL (B_1) 10 mg.; niacinamide 50 mg. ft., capsule or tablet, 1 tablet or capsule 3 times a day after meals for ten days, thereafter once a day until all symptoms disappear

*Miller, S. C.: Oral Diagnosis and Treatment Planning, Ed. 2. Philadelphia: P. Blakiston's Son and Co., Inc., 1944.

†Caution: Specific vitamins are to be used for definite clinical conditions, only U.S.P. and C.P. products accepted by the Council on Therapeutics of the A.D.A. being used. Vitamins are best taken immediately after or with meals. It is safe to use the foregoing doses unless the patient complains of unusual symptoms or the prescription indicated is contrary to the advice of the physician.

‡Local causes in addition to the systemic conditions are usually present even though not mentioned in this outline.

from one to one and a half years. The changes in the pattern of the tongue were recorded by kodachrome photographs.

The New York University Periodontia Research Group made tests on the gingivae. Many improvements could be achieved only by giving 500 mg. of vitamin C daily to patients for from one to one and a half years. Some changes can be seen only with the aid of the biomicroscope. However, many of the macroscopic changes in the gingivae can be seen by dentists. In acute cases, quicker reactions may be expected. These changes are demonstrated in the accompanying illustrations.

Patients in the Periodontia Department of New York University College of Dentistry who apparently had gingival disease were given 500 mg. of vitamin C daily. Photographs were taken before and after administration. Marked changes were noted in tone, color and consistency. A purplish red, bloated, edematous, swollen condition of the gingivae was converted to a pink, firm even tone without edema. Gingival hemorrhage also was reduced, in most cases. (Figs. 1 and 2.)

The same procedure was followed in the treatment of cheilosis and cracking or fissuring of the corners of the mouth. Patients were given 5 mg. of riboflavin (B_2) with two tablets of compressed yeast three times a day after meals. Definite healing resulted. (Figs. 3 and 4.)

Figures 5 and 6 show the results of treatment with 100,000 units daily of vitamin A.

Figures 7 and 8 show the effects of administration of 1500 mg. of vitamins C daily for two days in a case of acute necrotic gingivitis superimposed on hypertrophy (resulting from dilantin therapy). Vitamin therapy was instituted after failure to respond to three weeks of routine treatment for necrotic gingivitis.

TABLE 2.—VITAMIN VALUES

VITAMIN A

The international unit of vitamin A is defined as the vitamin A activity of 0.6 microgram of pure beta-carotene. The U.S.P. unit is equal, in growth-promoting and antiophthalmic activities for the rat, to one international unit. The U.S.P. reference cod liver oil contains at least 850 U.S.P. units of vitamin A per gram.

THIAMIN HYDROCHLORIDE (VITAMIN B_1)

The U.S.P. Unit of vitamin B is defined as the vitamin B_1 activity of 3 micrograms of the U.S.P. reference standard thiamine hydrochloride, and is equal in value to one international unit of vitamin B_1. One U.S.P. or international unit of vitamin B_1 is approximately equivalent to two Chase-Sherman units; 0.5 Smith-curative unit; 20 Cowgill mg. equivalents. One milligram of vitamin B_1 contains 333 U.S.P. or international units.

RIBOFLAVIN (VITAMIN B_2)

The Bourquin-Sherman unit is equal to that amount of source material which, when fed daily to a standard test animal, will support a growth rate of 3 gm. per week. Investigators have reported that 2.5 micrograms of pure riboflavin will support this growth rate. There is no international unit for riboflavin. Pure riboflavin may be used as the reference standard and, according to assays, 1 mg. contains approximately 400 Bourquin-Sherman units.

ASCORBIC ACID (VITAMIN C)

The U.S.P. unit of vitamin C is defined as the vitamin C activity of 0.05 mg. of the U.S.P. reference standard ascorbic acid, and is equal in value to one international unit of vitamin C. One milligram of vitamin C equals 20 U.S.P. or international units. One cubic centimeter of fresh lemon or orange juice has a potency of approximately 10 U.S.P. or international units of vitamin C.

VITAMIN D

The international unit of vitamin D is defined as the vitamin D activity of 1 mg. of the international standard solution of irradiated ergosterol, which is equal to that of 0.025 microgram of crystalline vitamin D, or calciferol. The U.S.P. unit of vitamin D is defined as equal, in antirachitic potency for the rat, to one international unit of vitamin D. The U.S.P. reference standard cod liver oil contains 95 U.S.P. units of vitamin D per gram. U.S.P. cod liver oil contains at least 85 U.S.P. units of vitamin D per gram. Viosterol is frequently labeled 250 or 150 D, which means that it contains 250 or 150 times the vitamin D content of U.S.P. cod liver oil. Activated ergosterol in oil U.S.P. (viosterol) contains not less than 10,000 U.S.P. units vitamin D per gram.

The following replies are made to commonly asked questions:

1. *Can high vitamin doses in any way harm the patient?*

There is no evidence that doses even 100,000 times greater than those advocated in this paper will in any way harm the patient.

2. *Are parenteral injections better than administration of vitamins by mouth?*

There is nothing in the literature to indicate that the parenteral route is better than the oral route. Only in rare cases, such as intestinal disorders (e.g., colitis), is the parenteral method indicated. Giving vitamins by mouth may even enhance the absorption of certain vitamins because of the phosphorylization that takes place in the alimentary canal.

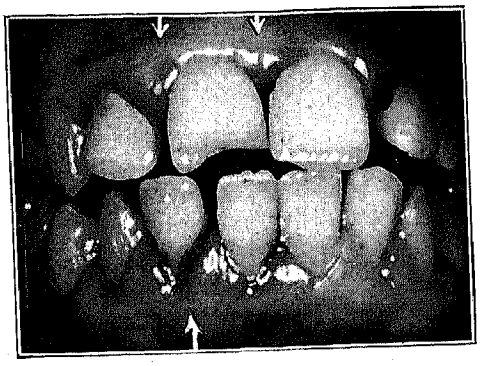

Fig. 5.—Condition before vitamin therapy; showing edema, congestion and hypertrophy (possible avitaminosis A). Calculus was not removed nor was toothbrushing taught.

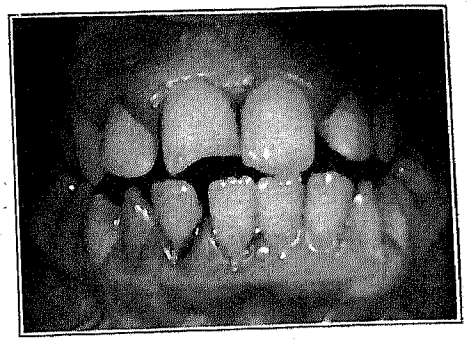

Fig. 6.—Condition after treatment. (Compare Fig. 5.) Vitamin A, 100,000 international units, was given daily from July 21 to November 2, with reduction in edema, hypertrophy and congestion. The acne on the patient's face disappeared in two weeks.

3. *Should a dentist prescribe vitamins?*

For the following reasons, it is obligatory for dentists to be prepared to advise dietary changes and prescribe vitamins.

(a) The medical profession sees in the mouth signs of nutritional deficiencies; e.g., pellagra, tongue and mucous membrane changes; scurvy, gingival changes, and tongue and lip changes (riboflavin deficiency).

(b) A large majority of the population have some form of malnutrition.

(c) Patients coming to the dentist are apparently well and usually are not under the care of a physician. A large majority of these patients need some form of dietary advice. Many may need vitamin therapy.

(d) When prescription by the dentist interferes with medical prescription for specific diseases, the physician should be consulted and his recommendations allowed to take precedence.

4. *What are the reasons for failure in vitamin therapy?*

(a) Failure to give sufficient dosage of vitamins for a long enough period of time; e.g., 500 mg. daily of vitamin C for a year.

(b) Attempts to treat long-standing vitamin deficiency diseases by ordinary dietary means.

(c) Failure to take into consideration conditions that may interfere with the absorption of vitamins by the tissues; such as colitis, alcoholism and excessive ingestion of mineral oil.

(d) Administration of vitamins before meals. Vitamins act best in an acid medium and should be taken after meals.

CONCLUSIONS BASED ON CLINICAL EXPERIENCE

1. The majority of patients have some form of avitaminosis, usually of a multiple nature.

2. Vitamin C should be given in sufficient dosage to reach the gingivae as well as other tissues of the body.

3. Vitamin C, 500 mg. daily, will improve and maintain the health of the gingivae to a better degree than local treatment without vitamin therapy. Administration over a long period, e.g., a year or a year and a half, is beneficial and will do no harm.

4. Because of the many conditions present, 500 mg. of ascorbic acid (vitamin C) was found to be the dose required to alter the condition of the majority of the chronically affected tissues.

5. There is a possibility that vitamins have a special affinity for certain tissues, such as vitamin C for the gingivae; niacin for the tongue, and riboflavin (B_2) for the lips.

6. Treating gingival conditions by dietary means alone is not adequate, if one is seeking the optimum nutrition and health of tissues.

7. Removal of calculus subgingivally and supragingivally as well as elimination of pockets, equilibration of occlusion and stimulation of the gingivae by correct massage cannot be replaced by vitamin therapy. All etiologic factors must be eliminated if success in the treatment of periodontal disorders is to be achieved.

Fig. 7.—Condition before vitamin therapy; acute necrotic gingivitis superimposed on dilantin hypertrophy. All the classical symptoms were present and failed to respond after three weeks of the usual treatment for necrotic gingivitis.

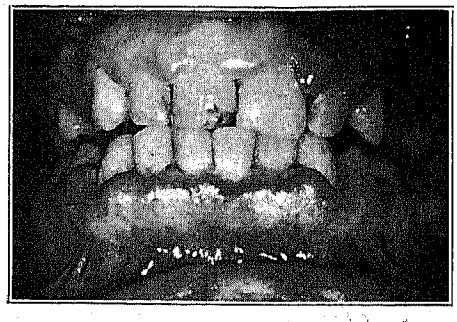

Fig. 8.—Condition forty-eight hours later. (Compare Fig. 7.) Administration of Vitamin C, 1,500 mg. daily, dissipated the subjective symptoms. Reduction in hypertrophy, congestion and edema is evident.

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