

Thoughts On the Etiology and Control of Dental Caries

Scientists in medical and dental fields are apparently still baffled by the almost universal incidence of dental caries in civilized countries. Sweden reportedly has an incidence of 100 per cent. The United States comes close to that figure with about 95 per cent. To our knowledge, this is also typical of England.

Such widespread oral pathology—which reaches 100 per cent when pyorrhea is included—constitutes a major health problem. In this age of scientific advances, the situation is disgraceful—particularly when knowledge is available to permit practical control.

ETIOLOGY

Enough facts exist to enable us to make a significant number of educated guesses as to the etiology of dental caries. Obviously sound tooth structure is fundamental. Some of the more important factors involved may be postulated as follows:

- Optimum intake of all essential elements is necessary for the formation and maintenance of sound enamel and dentine as well as for the development and preservation of structures supporting the teeth. Necessary mineral nutrients include calcium, phosphorus, magnesium and trace elements such as iron, copper, zinc, vanadium, cobalt and molybdenum. Others may be important. As yet, there is no satisfactory evidence that fluorine is one of these. Naturally, an adequate intake of the essential amino acids together with plenty of vitamin B-Complex, Vitamins A, D and C is vital. So is an adequate supply of unrefined carbohydrates and fats—including essential polyunsaturates. The importance of tocopherols is not yet proven but seems logical. Obviously these nutrients must be present in, and available from, food raised on adequate soil. Supplements may be necessary.

- Unimpaired genetic inheritance. This presupposes an excellent nutritional state and vibrant health in both parents before and at the time of conception. The importance of this, which at present can not be separated from adequate nourishment of the mother, fetus and child from that time on, is suggested by the observations of Dr. Weston A. Price. Except for complete vegetarians, he found that natives in all parts of the globe, in spite of greatly varied diets, had perfect dental arches and almost no dental caries—until they encountered civilization. At that time both adults and children who forsook their native culture and partook of canned goods, patent flour and sugar, promptly developed rampant caries. Children born to parents under these conditions were not only subject to caries,

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but had narrowed malar bones and dental arches with crowded teeth, so typical of most children in the United States. However, if the same parents returned to their native diets, not only was their caries controlled (without benefit of fillings), but their children no longer showed the above stigmata of physical degeneration: Dental arches and teeth were again perfect. It is thus obvious that deformed jaws are an acquired characteristic due to nutritional deficiency and therefore not transmitted according to Mendelian laws of inheritance.

- Avoidance of stress is important in maintaining dental health. This stress may be emotional, the result of chronic illness, the abuse of alcohol and tobacco, or due to insufficient rest and exercise. Focal infection is a factor and the biochemical trauma of allergy can be extremely important. It is well to keep in mind, as Dr. Hans Selye has so effectively shown, that stress of any type at first increases resistance to all types of injury. However, if stress is severe and long continued, resistance decreases and exhaustion ensues. Resistance varies markedly from one individual to another. Any type of stress tends to stimulate the sympathetic nervous system, favoring vascular spasm and tissue breakdown rather than synthesis. Catabolism is thus predominant over anabolism. Endocrine depletion enters the picture. Biochemical changes are followed by tissue damage.

We recall one woman of 35 who was developing three to five cavities every four months. When her dentist advised her to increase her milk intake from one quart to one and one half, she developed marked nasal allergy traced to milk. Avoidance, without calcium supplements, resulted in a reduction of new cavities to zero at the end of eight months. This immunity continued for a follow-up period of 5 years. This suggests previous sub-clinical allergy interfering with cellular biochemistry.

- The acid fermentation theory of tooth decay has had much popular support, although Dr. Aslander in this issue raises serious questions regarding its validity. This theory postulates formation of acids in dental plaques, resulting from the fermentative action of numerous bacteria and fungi. Such acids are alleged to dissolve enamel and initiate the carious lesion. In caries-prone individuals, the oral lactobacillus count is high. Strict avoidance of readily fermentable carbohydrates such as white flour and sugar, honey—and in some instances even fruits and fruit juices high in natural sugars—lowers the L.B. count to near zero and controls active caries. When this has been accomplished, restrictions may be relaxed somewhat, but refined carbohydrates must be kept to a minimum in order to prevent a relapse. This is really no hardship.

- The above concept is bolstered by experiments with rats raised in a germ-free environment. Such rats, fed a cariogenic diet, do not evince caries until they leave their artificial surroundings and through contact with other rats, acquire the usual flora and fauna of the average rat oral cavity.

- The theory of chelation-proteolysis is interesting. This postulates the disintegration of enamel protein through the action of chelating agents such as

citrates, or substances produced by microorganisms in the mouth. Work at Radcliff in 1946 substantiated this thesis. Its importance, if any, remains to be determined.

- One important observation raises a serious question: Why don't children who chew *sugar cane* develop rampant caries? What are the protective substances? Do these act by inhibiting bacterial growth, by neutralizing acids, by supplying tooth nutrients, or by a combination of these, plus factors yet to be discovered? This area needs more investigation.

- Five per cent or less of North Americans can eat refined carbohydrates ad nauseam without developing cavities. It is thought their saliva contains protective substances. Work at Radcliffe in 1946 substantiated this thesis. Studies proved that the rate at which carbohydrates were hydrolyzed by saliva indicated caries susceptibility or immunity: Forty-four minutes represented rampant caries, whereas one minute was equated with complete immunity. Are such teeth more resistant to acids as well? At any rate this desirable state of immunity seems to be inherited. Why have not these suggestive findings been the object of massive research? What factors encourage an abundance of salivary amylase as well as other hydrolytic enzymes?

- Any condition interfering with the absorption of nutrients favors dental pathology. Examples include chronic dysentery, colitis, achlorhydria and inadequate pancreatic secretion of digestive enzymes. Depressed emotional states may be active primarily or secondarily. Decreased salivary secretion, of course, favors tooth decay.

- Dental hygiene is vitally important in this country, even though Dr. Price has shown that near perfect dental health can exist in some peoples who had never heard of either dentist or tooth brush. Most of our people are nutritional cripples to begin with and still subsist, as their recent ancestors did, on a diet high in refined carbohydrates and comparatively low in protective foods. They therefore develop caries, excessive calculus, periodontoclasia, malocclusion and gingivitis. All the marvelous advances in modern dental techniques, wielded by well-trained dentists, are essential to slow down the degenerative process and, when necessary, to construct prostheses to replace teeth that have been destroyed. Unfortunately, most dentists are still unaware of the vital importance of nutrition and thus fail to adequately advise their patients.

- Wild animals in their natural habitat are immune to caries. Domesticated animals however, such as dogs and cats, which are often fed cooked commercial food, including scraps from their masters' table, and whose exercise is limited, succumb to his oral troubles. Interestingly enough, human teeth, incubated in the saliva of a healthy dog, become sterile in a short period of time.

- It should be mentioned at this point that more teeth are eventually lost from pyorrhea than from caries. Are we not in this area also faced primarily with a nutritional problem? Does this not involve raising the resistance of gingival

tissue to insults of all kinds, together with working towards an optimum calcium and phosphorus balance to prevent, or greatly retard, the resorption of alveolar bone? Once again, minerals, vitamins and other factors mentioned before must be of paramount importance. It is also probable that the soft foods of our civilization do not provide adequate exercise for normal dental structures, thus acting as an accessory to the fact.

- In this day and age, civilized man is increasingly exposed to thousands of chemicals in air, food and water. He is also dosing himself—or being dosed—with a multitude of drugs. Most of these are coal tar products, their derivatives, or other chemicals completely foreign to the experience of man's biochemical make-up. Since most drugs and chemicals influence body chemistry by slowing down or accelerating enzyme systems, it is logical to believe that such contacts can only be harmful in the long run. Only time will tell the eventual damage to the human race of the cumulative effects on body cells of minute amounts of many different chemicals. It could be disastrous. At any rate, it behooves mankind to boost his intake of amino acids, vitamins and minerals in an attempt to support enzymatic reactions.

CONTROL

The picture painted above is rather a dismal one, and the concepts presented may or may not cover all the facets of the problem. Nevertheless they provide a positive and workable program for the control of dental caries and pyorrhea. Unfortunately, the ideas to be outlined necessitate a dedicated and knowledgeable physician or dentist, as well as intelligent and cooperative patients.

Anyone who questions the nutritive value of our foods, the vitality of the topsoil on which they are grown, the potential dangers of the newer insecticides and other chemicals used in or on our foods—as well as the suggestion that many of our ills may result from inadequate nutrition—is often indicted by certain authorities, as a charlatan or quack. (Dr. Frederick Stare of Harvard, for reasons known only to him, is one of these critics.) This renders the nutritional approach more difficult. Nevertheless, members of the College can attest to the unusually satisfactory results obtainable by the basic nutritional approach to prevention and therapy.

If the healing professions are not silenced and stifled by the bureaucracy and dictatorship of socialism, truth will eventually prevail.

Scurvy was cured by lemon juice, fresh fruits and vegetables long before it was scientifically proven that lack of ascorbic acid was causative. In the face of universal oral problems in civilized societies, must we wait for all the answers before instituting practical methods of prevention and control? *Res ipsa loquitur*.

Dentists and physicians interested in the vast problem—particularly members of the College—have devised their own practical approaches. The suggestions which follow have been useful in allergic states as well as proving helpful in the control of oral pathology:

1. Avoid sugar and bleached flours. Use only whole wheat, corn, rye, millet or other breads made from freshly ground cereal grains.
2. If available, fresh eggs from chickens raised on the ground and meat, as well as fowl, from sources not fed antibiotics, anti-thyroid drugs, stilboestrol or other chemicals, are desirable. Until recently, ocean fish were free from insecticide residues. Now, even some of these are contaminated. However, fish are an excellent source of protein, and are relatively free from such residues.
3. When possible, purchase vegetables and fruits raised without the use of modern insecticides. All other fruits should be peeled and vegetables thoroughly washed.
4. Concentrate on a diet of milk, meat, fowl, fish, animal organs such as liver, sweetbreads and kidneys; whole grain bread, green and yellow vegetables, potatoes (boiled or baked), salads and fruits. *Certified* raw milk is desirable.
5. Use *fresh* nuts: increase the intake of polyunsaturated vegetable oils: buy only unprocessed cheeses. Avoid hydrogenated fats and particularly any foods containing fats that might be rancid.
6. Increase your intake of ascorbic acid and bioflavonoids (500 mg. daily). Powdered yeast and raw liver provide important sources of B-complex and trace elements.
7. Take supplements of calcium, phosphorus, magnesium, trace elements and concentrated vitamins as prescribed.
8. Keep to a minimum, contact with chemicals such as cleaning fluids, paint thinners, lacquers, hair sprays, aniline dyes, drugs, preservatives, fluorides, insecticides, antibiotics, tranquilizers, detergents, etc.
9. Avoid specified foods and other substances to which you may be allergic.

After world-wide investigations, Dr. Weston A. Price analyzed the varied diets of natives who were resistant to dental caries and other degenerative diseases. He found that the intake of calcium and phosphorus varied from 2.1 to 8.2 times the minimum daily requirements suggested by the National Research Council: that of magnesium from 1.3 to 28.5 the M.D.R. All primitive diets provided a large increase in water soluble factors over those in modern diets. The fat soluble vitamins exceeded those of modern diets by a factor of 10 at least.

In the words of Dr. Price, "Almost all primitive diets studied, contained at least four times the minimum requirements, whereas, the displacing nutrition of commerce, consisting largely of white flour products, sugar, polished rice, jams, canned goods and vegetable fats have invariably failed to provide even the minimum requirements." The concepts and suggestions of Dr. Alfred Aslander, appearing in this issue, although they have produced dramatic results in Sweden,

seem too simple to be the universal answer to dental caries. Nevertheless, they deserve consideration and extensive study. It may be that deficiencies inherent in modern diets increase markedly the need for supplements of calcium, phosphorus, magnesium and trace elements, or that the M.D.R. has been set too low. We believe his concepts relative to mineral deficiencies in leached soils—long expounded by Dr. Albrecht—to be of fundamental importance.

The answer must be complex, for too many individuals today show evidence of abnormal calcium deposits in blood vessels, bursae, joints and along spinal vertebrae. The question of balance may be vital, including optimum relationships between calcium, phosphorus, magnesium, vitamins, amino acids and trace elements.

At any rate, the opportunity for control of dental caries is at hand for those who care to use it—without fluoridation of community water supplies. The Public Health Service and the officers of the American Dental Association have an important responsibility to the public. Millions of dollars and thousands of man-hours are being spent to advance mass fluoridation—which is not the solution. If they would only advocate and instigate a continuous educational program, together with practical research, aimed at the nutritional control of caries and pyorrhea, the immediate benefits to mankind would be incalculable.

Unless the compulsion of advancing collectivism inherent in the "Great Society" silences all critics, the public will soon demand to know why such a program was not undertaken long ago.

* NUTRITION AND PHYSICAL DEGENERATION, Weston A. Price, D.D.S., Am. Academy of Applied Nut., Suite 503, 234 E. Colorado Blvd., Pasadena, \$13.25.

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