THE PREVENTION OF SYSTEMIC DISEASES ARISING FROM MOUTH INFECTIONS AND THE PURPOSE AND PLAN OF THE RESEARCH INSTITUTE OF THE NATIONAL DENTAL ASSOCIATION

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This title implies that pathogenic infections of various organs and tissues of the body may have their origin in peridental and periapical infections of the teeth. While we do not deem it necessary to present arguments here to substantiate this inference, we realize that there are many physicians who do not yet appreciate the significance of mouth infections. The writer remembers all too vividly an incident in his own life that happened just twenty-two years ago when two prominent physicians of a western city stood beside his hospital cot, one on either side, when he was prostrated with typhoid fever, and almost came to blows in their all too heated argument as to whether or not typhoid fever was caused by micro-organisms. The fact that many hundreds had been prostrated with the disease, amounting to an epidemic, and all within a few days of each other, did not have great significance to the doubting practitioner of the older school. The sewage from an infected town had polluted the water supply. The evidence today is as overwhelming for establishing the role of mouth infections, and for those who are interested in looking it up we would refer to the large number of reports of internes and research workers. Among these some very comprehensive and convincing ones will be found in the reports of special researches on these problems conducted under the auspices of this Research Department of the National Dental Association, by Doctors Thomas B. Hartzell and Arthur Henrici, which include both studies from a clinical standpoint and the production of the definite and typical lesions experimentally. (See references Nos. 1 to 7; also papers by leading internists, 8 to 13.) Probably one of the best certifications of this presumption is found in the fact that the leading hospitals all over the country are adding to their staffs skilled dental specialists to assist in the interpretation of these dental relations.

The diseases that have been demonstrated to be more or less frequently caused by mouth infections include the following: Rheumatic Fever; Muscle and Joint Rheumatic Infections; Arthritis Deformans; Iritis, and

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other eye disturbances; Focal and Diffuse Kidney Infections; Blood Vessel Coat Diseases; Endocarditis, Myocarditis and Pericarditis; Stomach, Duodenal and Intestinal Ulcers; Appendicitis; Colicystitis and Gall Stones; Various Skin Diseases, including Erythema Nodosum, Boils, etc.; Nervous System Infections, including Neuritis, Neuralgias, Ticdouloureux, Sciatica and Herpes Zoster; Glandular Infections, including the Thyroid and Pancreas; Lung Infections, including the Pneumonias; and Anemias. These are mostly embolic in their initial planting and a majority are due to the specific selectivity or trophism of varying strains of Streptococci.[8 9 10] In addition to the infections produced by blood stream planting, those entering by way of the lymph stream and the alimentary track, the latter due to swallowing bacteria, there are also serious disturbances produced as the result of imperfect mastication, due to faulty dental organs. Indeed, there is much evidence accumulating to demonstrate that the specific strains, which possess the remarkable power of selectivity for certain organs and tissues, may not only develop their very specific qualities in special infection areas of the mouth, but may be transferred by that patient to drinking cups, by kissing and other means to other individuals, and by finding suitable areas for growth in their mouths produce in them their characteristic disturbance or disease. Just as the organism of mumps, which is so definitely infectious, selects the parotid glands, so possibly Colicystitis, Peptic Ulcer, Herpes Zoster, Erythema Nodosum, Appendicitis and Rheumatic Infections may be proven to be transmissible. This means that the individual's infected mouth may not only be a menace and source of danger as a source of infection, for various organs of his own body, but he may plant those infections, directly or indirectly, in the systems of other individuals of the community, just as streptococcus sore throat and pneumococcus infections are planted. (See No. 11, recent work of Rosenow.)

The lesions of the mouth which produce serious systemic infections are (a) the pyorrhetic pockets due to a progressive degenerate infectious process of the tissues surrounding the teeth, (b) the masses of culturing bacteria in decaying teeth, and (c) the infections surrounding the apices of the roots with putrescent root canals. The mechanism of planting from pyorrhea pockets is probably chiefly by the passing of the organisms through the defenseless open intercellular spaces of the denuded and suppurating area about the teeth. Few people realize that a pyor-

rhetic pocket around each tooth of only one-eighth of an inch in depth would make a total of three and one-half square inches of defenseless suppurating surface, which, if it existed in any other part of the body, would greatly alarm the internist. When the infection passes into the quite defenseless tissue, the process of mastication or of biting the teeth, makes a pumping motion and spreads it. Though the exercise tends to increase the circulation and thereby nourish and strengthen the resistance of the parts, it also tends to distribute the organisms. This mastication pressure amounts, in twenty-four hours, to a ton in the average adult mouth. Having gained entrance to the tissues, the organisms are rapidly transferred by the blood and lymph streams to various parts of the body. Periapical infections are practically always due to either a dead and putrescent pulp or a lowered resistance of the tissue surrounding the apex of the root, due either to the irritation of an infected apex above an imperfect root filling or an unobliterated infection surrounded by epithelial cells. These drain usually quite directly, either continuously or recurrently, into the blood and lymph streams.

The best method of preventing or correcting the infections from each of these types is the elimination of the cause, which does not necessarily mean the elimination of the teeth, for many of the greatest and most helpless sufferers of the community are those who have lost their own teeth and cannot have substitutes that will be adequately serviceable. The apical infection, due to a putrescent pulp or irritating infected masses beyond the apex, can all be treated and eliminated by proper surgical skill. The culturing mass of bacteria in the cavities of decay in the teeth can be entirely eliminated by the proper mechanical and surgical filling of these cavities. The gingival infections, however, are very much more difficult to eliminate—many of them, however, are readily corrected by the removal of the primary irritant consisting of deposits and the increase of the circulation by massaging, which condition produces the lowered resistance of the tissue. As yet the cause of Pyorrhea Alveolaris or Rigg's Disease is not known, though there are very many theories and some good guesses. It is practically demonstrated that it is not caused by endamebae, nor has it been demonstrated that emetin is a cure for it.[6,7] The beneficial effects of emetin seen in a small proportion of cases, can be accounted for on another basis than its amebacidal action. Pyorrhea Alveolaris can be prevented in almost any

mouth by adequate care and attention and can be held in check in most mouths even after it has been established. It is not necessary to remove the teeth to control and prevent its progress, except in extreme cases.

There are two great primary lesions which precede and virtually cause the mouth infections which ultimately can produce the serious systemic infections. They are the decay of the teeth, with the subsequent infection or death of the pulp or nerve and resulting apical infections and the peridental infections arising as slight gingival irritations, usually the result of deposits, the packing of food between the teeth, malposed teeth, and in most cases influenced by defective circulation of the gingival tissues. The peridental tissues are very susceptible to degeneration processes, being rather more predisposed than most any other tissue of the body. This is illustrated by the common procedure of examining the gums of patients to identify systemic poisons, such as those of lead, mercury, etc. The alveolar bone surrounding the teeth is really a transitory structure—it does not exist in babyhood and but slightly in old age, and just as the hair falls out often prematurely, so there is continually the predisposition for this tissue to degenerate and break down. The all-important factor to prevent this is nutrition, which can only be supplied by circulation, dependent, in a large part, upon exercise. The normal exercise for our teeth is denied them by the methods of preparing our food. The cliff-dwellers, for example, who ground their fibrous roots with their teeth, as also their coarse-grained breads, had neither pyorrhea nor dental caries. They had what we are pleased to call an immunity. At times many or all of us have immunity, but it is not a constant condition, though it should be. If we will prevent systemic infections from mouth infections, we must prevent these two primary lesions. With our limited knowledge of today, we could, if we would, go far toward their prevention. That this is an important duty of every individual for his own safety and of the community in behalf of those individuals who cannot care for themselves, is amply demonstrated by the various institutions and legislations tending to this end. For example, the German Government makes it compulsory for every child to have his teeth kept in repair in order that he may grow to be a strong man and remain free from systemic infections.

In our own country The Forsyth Dental Infirmary for children, in Boston, costing three-fourths of a million and endowed

with one and one-fourth million, has been created to provide the best known care for the mouths of the children of the poor. A similar institution has recently been given to Rochester by Mr. George Eastman. In our own city a most creditable effort has been made to accomplish this result, though the task is far too large for the resources. Six dental clinics are being operated, one in each Marion, Fowler, Murray Hill, Stanard and Lawn schools and one in the Carnegie West Branch Library. There are six different operators serving in these clinics, each with an assistant. Signed petitions have come from six other schools begging for clinics, which there are no funds to establish. It is estimated that not more than one in ten children needing this care can receive attention in these clinics. That this is a great economic problem for every community is demonstrated by the fact that probably fifty per cent of the grown men of the United States would be refused for service in the United States Army on the ground of insufficient capability of mastication, if for no other cause. The British Government returned 13,000 men from the Boer War as useless because of defective teeth. There are few, if any, conservation opportunities and duties so impelling upon the government of every community as the care of the mouths and teeth of those who cannot afford to do it for themselves, and yet even our splendid municipality of Cleveland leaves this great economic problem to the processes of charity and philanthropy. The splendid work being done in this city in caring for the teeth of poor children is under the direction of the Cleveland Auxiliary of the National Mouth Hygiene Association, with the money secured by a popular public appeal.

The entire medical and dental professions and all other institutions for health preservation should combine their efforts to secure municipal care for the mouths of the indigent poor, including the regular examination and necessary dental care of every child in the community. This should be done by the municipality, purely as an economic project. It would probably add years, if not decades, to the useful period of thousands of lives of the citizens of the community. The fact that 95 per cent of all the citizens of every community have or have had one or both dental decay and infection of the gums means that a terrible price is being paid in inefficiency and ill health, and largely because we do not know adequately how to prevent the two primary lesions, namely, gingival infections and dental decay. It is estimated that

there is more total suffering in the world from dental decay and its sequences than from any other disease, because so many more people have it than have any other disease. This, together with the fact that the normal condition of life is one of immunity to both these infections and not one of susceptibility, has impelled the National Dental Association to plan exhaustive researches to ascertain, if possible, the fundamental causes and etiological factors underlying these diseases.

Their Research Department has been in operation for several years and many very important contributions have already been made toward the solution of these problems. Researches are, at the present, being conducted in eight different cities under grants made by this Research Department. They have also organized and established a national institution for research known as the Research Institute of the National Dental Association, to carry on adequate and exhaustive researches on these and other fundamental dental problems. Cleveland has been selected as the location for this National Institutional work. These intensive studies will be carried on in addition to the work that is being conducted under grants.

The plan of organization is that the corporation has a membership of sixty, twenty-seven of whom are selected by the Trustees of the National Dental Association and known as Commission Members, and thirty-three are Permanent Members and are selected by the corporation. The Board of nine Trustees has the chief responsibility for the conduction of the work in the institution and carried on under grants. They are assisted by an Advisory Board of eighteen, composed of leading men of research in their various sciences and of leaders in business and philanthropy. The Trustees have purchased, as a temporary home until adequate buildings can be erected, the large residence of Mr. S. T. Wellman, at 8803 Euclid avenue, Cleveland. Up to the present time the work of the Research Department of the National Dental Association has been supported almost entirely by voluntary contributions from the National Dental Association, which has sixteen thousand members. This has amounted to this time to about $60,000. Besides this they are also contributing most of the money with which the above property has been purchased. They are, however, expecting large assistance from philanthropists in providing ample endowments. This is the first institution of its kind in the world.

It is their purpose to place in the Research Institute the best

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prepared research workers, the finest equipment and most complete dental library in the world, and will carry on intensive researches on a large number of important problems. The two most important of these will be studies to find the cause and means for the prevention of peridental infections, such as Pyorrhea Alveolaris or Rigg's Disease, and of Dental Caries. These are the primary lesions for the serious subsequent infections and involvements. Studies are already being made on the relation of various systemic infections to mouth infections, and of means for the identification of this relation, and for locating and correcting the primary focus. There are many dental problems that are very serious but very little understood, as, for example, the brown stain occurring in many Southern and Western States. This consists in the deformity of structure and color of the permanent teeth and affects all the children born in certain communities. This may involve fifty per cent of the children, as in some large districts, or from five to one hundred per cent of the children in other districts, and strange as it may seem, is so definitely localized that the children of one community, of which one hundred per cent are affected, may be within four miles of those of another community in which none will be affected. It apparently is related to a minute trace of some chemical in the water which, as yet, has not been identified. It has frequently occurred that after young women had, with great sacrifice, secured an education and training to serve their community as a nurse or school teacher, that they have been refused positions because of the serious blemish to their appearance caused by this disease. Exhaustive researches will also be conducted on the pathogenic micro-organisms of the mouth. While much work has been done, it is exceedingly inadequate, for there are still many varieties that have never been grown on artificial media and regarding which exceedingly little is known. Comprehensive studies are also being made on the relation of baby foods, particularly artificial, to tooth structure. It is a serious fact that an increasing number of children in succeeding generations have serious defect of tooth structure, which is apparently due to the increased use of artificial baby foods. Special researches are being conducted on the relation of the glands of internal secretion to defective tooth structure, susceptibility and immunity to decay, facial deformities, irregularities, etc. Investigations are being made, and more exhaustive are being planned, on the most scientific methods of

filling roots and of sterilizing and treating infected areas about root apices.

Special research rooms will be available for visiting dentists to work on special dental problems. The temporary home for the Institute is shown on page 667. The Officers, Trustees and Advisory Board of the Institute are elected from the limited membership of sixty and are given below:

The Corporation membership of 60 is made up of 27 Research Commission members elected by the National Dental Association and 33 Permanent members elected by the Corporation.

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Part of the work of the institution will be the collection and distribution of information for educational work, particularly for the medical and dental professions, making available the adaptation of the most recent researches.