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PRACTICAL APPLICATION OF PREVENTIVE DENTAL MEDICINE

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Practical Application of Preventive Dental Medicine

The author is fully aware that there may be and probably are other avenues of approach to the practice of preventive dental medicine. He offers this as one method worked out over the course of several years from the findings of many investigators in the field of prevention, both medical and dental.

The exposition of this method has been made as concise as possible with the idea in mind that the simpler the method, possibly the more general it's adoption. It has proved to be practical and what is more illuminating, desired by a sufficient proportion of the public to warrant it's practice as a means of making one's livelihood.

The writer is indebted to the many investigators in the field of prevention, Broderick, Bunting, Howe, Price, McCullom, Sherman and many others, also to Hoskins, Pende, Werner and especially to the Jarvis Group, particularly Wielage, Blackmar and more than any Dr. Jarvis himself, a great teacher.

Generalized Factors Predisposing to Dental Pathology

Practically all investigators into the causes of dental caries are agreed that nutrition is the primary causative factor. There is a great difference of opinion as to the immediate causes. Some favor the bacterial, while others say the bacterial invasion is secondary to certain other conditions which make

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this invasion possible. Again just what these certain other conditions are, causes great difference of opinions. Whether they are localized in the mouth or are systemic in nature.

The author is convinced that localized conditions have little to do with the causes of dental caries, except as they are dependent upon more generalized or systemic conditions. The practice of preventive dental medicine then necessarily is practically synonymous with the practice of preventive medicine.

Again among those who are convinced that dental pathology originates from a generalized systemic condition, opinions differ as to the condition predominately causative of this pathology. Some hold to the acid-base theory, others to the oxidation theory, others to the endocrine theory.

The author favors the nutritional theory as modified by the endocrines, for reasons which will be brought out later in this article.

Although nutrition is, in the author's mind, the basic fundamental factor in the causes of dental caries and other dental pathology, the state of efficiency of the endocrines will determine how well the food is assimilated and so exert a powerful influence upon the body nutrition. And although the endocrines themselves respond to an adequate nutrition, this response may be so delayed that our adequate nutritional

intake becomes inadequate by faulty assimilation.

Since the practice of preventive Dental Medicine is founded upon an adequate nutrition, it may be well to define an adequate nutrition.

McCullom states that there are now known thirty-seven essentials in an adequate diet. He also states that there may be others not yet recognized.

These essentials are listed as follows:—

1. Eighteen amino acids of which 4 must originate from animal proteins.
2. Glucose.
3. Eleven inorganic minerals.
4. At least 6 vitamins.
5. Linoleic acid.

The amino acids come from the breaking down of proteins in the digestive tract. They are composed chiefly of carbon, hydrogen and oxygen combined with nitrogen and sulphur and sometimes iron and phosphorus. Glucose, vitamins and fats are entirely composed of carbon, hydrogen and oxygen.

Little attention will be paid in this article to the diet except to state the general requirements and to draw attention to the fact that plant life is capable of transforming the inorganic to the organic, in which state it can be used by animal organisms, and to the fact that the plant can manufacture all of these food principles with the exception of certain of the amino acids, and these for the great part, from air, water, and the action of sunlight.

There remains the great class of inorganic minerals of which there are eleven known to be essential. With the exception of calcium and phosphorus and to a lesser degree sulphur and iron, the importance of these mineral constituents of the diet

is not measured by their bulk, for they, like the vitamins principally serve as catalysts. The importance of these so-called trace minerals in human nutrition is not widely known, but a great deal of work has been done as regards their place in animal and plant nutrition.

The author has found them to be equally important in human nutrition.

Soil, an Important Dietary Factor

Attention is drawn to the fact that these elements can not be made from air, water and sunshine by the plant, but that the plant must obtain what it gets of these minerals directly from the soil in which it grows. It is axiomatic then that there will be a deficiency of these minerals in foods prepared from plants if some of these minerals are absent or insufficiently available in our soils. Information as to the soils in each locality can be obtained from Government bulletins and from the State Colleges and County Agents.

Under the head of general requirements of the diet, comes the fact that these requirements differ for different people.

This fact is better known by the practicing physician and dentist than by some of our nutritional experts.

A diet adequate for one will not necessarily be adequate for another even in the same family. Between different races there is even greater distinction. In brothers of one family there will be marked differences in dietary requirements, especially marked if one is blue eyed and the other brown eyed. The incidence of dental decay is very apt to be greatly different in such an instance. In the south the incidence

of decay among the poor whites, is far greater than among the negroes, yet both live upon practically the same foods and in similar environment.

And why should there not be a difference? There are no exceptions to the laws of nature and heredity for man as from any other organism. We can readily see and admit that plants and other animals have adapted themselves to environmental conditions and that these same environmental conditions must be furnished these various organisms if they are to thrive and survive. Still some of our nutritionists insist that what is good enough for a guinea pig is good enough for us.

Racial Characteristics

Why is there a difference in individual and racial nutritional requirements? It isn't hard to understand if we will look upon ourselves as just another species of living organism, subject to the same laws as any other organism.

We don't have to take different races of people who have had extremely different environmental conditions to which to adapt themselves. A study of the three strains of the white race from which most of us had our origin, will show markedly different environmental backgrounds. Some of us are descended from one strain, others from another, and here in the New World a great share of us have blood from all three strains flowing in our veins.

We know from the laws of heredity that two sons of the same parents will not inherit the same characteristics unless they be identical twins. How different then must be the inherited characteristics of sons of different parents of the same race,

and yet more different the inherited characteristics of sons of parents of different races, to say nothing of sons of parents of different species of animals altogether.

It is possible to determine from physical characteristics the racial strains predominant in the individual and hence be able to state with some degree of accuracy the nutritional requirements of that individual. We can do this in the same way that we can with plants. When we see a plant with certain characteristics, we can say for instance that this plant is a cactus that has developed through countless generations, is immune to heat, has the ability to conserve moisture and that it will thrive best under just such conditions as its ancestors learned to combat and to use. Yet these conditions might be very unsatisfactory for a tomato plant or for water cress.

The three white racial strains of Europe are the Nordic, Alpine and Mediterranean. The Nordics lived in coastal regions in the north of Europe, which did not support vegetation for several months of the year. They therefore were largely fish and meat eaters.

The Alpines lived in central Europe and lived largely on meat which they procured from game or from flocks and herds, and upon grain and fruits in season.

The Mediterraneans living in a more favored climate than the others lived on all classes of foods, sea food, meats, dairy products, grains and fruits.

These racial strains are characterized by blue, grey or green eyes, blond hair and long heads in those of us having preponderately Nordic characteristics.

The Alpines are characterized by brown eyes, blond or brown hair and

round heads, while the Mediterraneans have dark hair and eyes and long heads.

It must be remembered that a great change has taken place in recent times in the dietary habits of nearly all peoples.

With the development of machinery and transportation, it became possible to multiply a thousand fold the land under cultivation and hence increased enormously the available food supply.

This in turn allowed a greatly increased population which increased the more rapidly because of advances made in the control of epidemic disease. It also changed the character of the food from protein to carbohydrate and from sea food to land grown food.

This was no change at all practically for the people of Mediterranean descent, and not so much change for those of Alpine descent, but was drastic for those of Nordic descent.

Today the United States, the mixing bowl of Europe, offers an unexcelled laboratory for the study of the effects of this changed mode of living upon descendants of these different racial strains.

Civilization Has Weakened Strains

Most of our patients are Nordics. Dental decay and arthritis are rampant among them. What was formerly considered the strongest and most aggressive strain has become the most vulnerable to the degenerative changes.

The Alpines are not greatly affected. Their body chemistry is efficient. How our foot-ball teams would dwindle if all those of Alpine or Mediterranean descent were eliminated from them.

It is very noticeable that most of

our movie queens come from states bordering salt water, yet most of our population resides inland. It seems not unlikely that the body chemistry of Nordics is better in such regions, and that grace of figure depends upon body chemistry.

This difference in requirements as regards nutrition is very important to us as biochemists in diagnosis and in prescribing for the individual, for we must treat each case as an individual problem. We must learn if the individual has been meeting his individual requirements and in so far as we know how, remedy the food intake. The basic principle of preventive dental medicine is to supply first of all an adequate nutrition.

Refined Products

Yet other great changes in dietary habits have developed of recent times. These changes are also due to the mechanistic development of the times, and affect peoples of all races similarly. I refer to the use of refined products made from natural foods.

White flour is one of these, a product fostered upon the people as a matter of convenience to the manufacturer. A convenience because it is difficult to store and ship the whole grain flour because of spoilage, while no great difficulty is had with white flour. This being a case of what isn't good enough for bacteria being good enough for us.

White flour in itself is a good partial food. The danger in its use lies in the tendency of people to think that because their stomachs are full they have been fed.

It is possible for a person having a good understanding of nutrition, to eat of refined foods almost exclusively and by variety obtain the

essentials of an adequate nutrition, but for the unthinking such a course is disastrous. Nature made foods to contain a great variety of the essentials, so that a fair selection gave us all the essentials. The more we change our foods the less likely that our intake contains all of the food principles we need.

But the chief villain of them all is a drug. Drugs have their uses when their actions and contra-indications are thoroughly known and are applied by those versed in such knowledge for the ills of mankind. But when the use of a drug becomes almost universal, and but few even of the healing profession are aware of the disaster caused by its use, then indeed is the situation serious. The situation is more than serious if the people do not recognize this drug to be what it is and to the contrary accept it as a delightful, valuable and harmless food, to the extent that its use steadily increases in all parts of the world, but especially so in our prosperous section of the world.

All of our organic drugs are obtained in a similar manner. The herb or plant is crushed and the juices extracted. The juices are then separated by heat and chemical processes into their component chemicals. These are then separated so that the desired chemical can be obtained in pure form, in which form it enters the marts of trade.

Sugar

Such is the process through which the article of commerce known as sugar, passes. Part of our misconception of the true nature of this drug has come to us from the study of carbohydrates in nutrition.

Carbohydrates are an essential part of the diet of the human race. Nearly all of our foods contain some.

These carbohydrates comprise a large portion of our meals, and start to undergo digestion at the very beginning of the alimentary tract, and are among the last to finish.

Before these carbohydrates can be useful to us, they must be broken down to sugar so that they can go through the intestinal wall into the blood stream and to the cells where they furnish most of the energy required by them.

The carbohydrates from five or six meals are in various stages of this breaking-down process at the same time so that a thin trickle of sugar is going through the intestinal wall all the time.

The amount of sugar in the blood normally is about one teaspoonful. This amount is so essential that if it were reduced to one-half teaspoonful, coma would ensue, and if it were increased for any great length of time glycosuria would follow with many serious results.

Our sugar mechanism has yet another safeguard. In times of plenty a place has been made for the storage of sugar in a slightly different form, a form called glycogen which is readily changed to sugar again should the blood sugar be reduced.

Thus is safeguarded a continuous level of this important food substance by a very wonderful body mechanism.

But through the ages this mechanism had only carbohydrates and a few natural sugars limited in quantity, to deal with. It was illy prepared to undertake the task assigned to it by modern man, an organism whose mental mechanistic attainments outran the ability of his physical being to cope with the results of this drastic change.

Instead of being required to handle a continuous thin trickle of

this energy juice, it was asked to not only do this, but also to take care of frequent and voluminous floods of it also. The body mechanism often works admirably in spite of this unnatural load which the blood stream must take whether it likes it or not, for the intestinal wall was not built as a barrier to sugar, but must admit it at any time and in any volume, yet many are unable to withstand it's effects forever.

As a nation we have been in a similar predicament. We deforested the land, and as a result our soil surfaces were unable to store water to the degree they had in the past, and as a result the nation also had disastrous floods of a substance which used correctly, was essential and life giving, but when out of control was disastrous and death dealing.

Like the nation, we must build dams to restore the continuous thin trickle that our bodily mechanism may once again function normally and safely.

Our consumption of sugar in the United States exceeds 115 lbs. per inhabitant per annum. In dealing with this excessive and unnatural drug our body mechanism does it's very remarkable best. The blood disposes of some of it through the kidneys. The cells increase their consumption of it and the cells of the pancreas which manufacture a

hormone used in the metabolism of sugar, work overtime. At times this mechanism breaks down and a disease known as diabetes ensues.

According to certain insurance statistics, more than half of those who die between the ages of 55 and 64 die of diabetes. Multiples of this number must have incipient but unrecognized diabetes.

We doing preventive dentistry, however, are chiefly concerned with the effect that sugar has upon the tissues of the oral cavity. Bunting and others have conclusively shown what the effects of sugar are upon the teeth as regards localized action. Later in this article the effects of sugar upon the nutrition of teeth and alveolar process as well as other bone will be shown. An effect in the author's opinion, much more serious and far reaching than it's localized effect.

Does it seem reasonable that the requirements as regards food intake for the peoples of today be dissimilar from that upon which our predecessors lived and managed to survive and thrive? And does it seem reasonable that our well being is in jeopardy unless we take viosterol, calcium phosphate, water soluble chlorophyl and what-not as a regular part of the dietary of everyone? Not that there may not be indications for the use of certain drugs for temporary treatment.

Index of Susceptibility To Dental Caries

In a recent article on Rheumatoid Arthritis in the Journal of the American Medical Association, the writer in effect has this to say. "The lack of a measuring stick in a disease of unknown etiology such as arthritis offers a serious obstacle to progress in its treatment."

These words may well be used in reference to dental caries and pyorrhea, and one of our first considerations is to find such a "measuring stick."

The author is convinced that such a measuring stick exists in calcium-phosphorus determinations of the blood plasma.

Many investigators have stated that calcium-phosphorus determinations show nothing as regards caries, susceptibility or immunity, whereas they should have stated that such tests do not show them that the patient is caries susceptible or caries immune.

We are surrounded by phenomena of nature which mean nothing to most of us or all of us but which, could we interpret correctly, would disclose many new facts of nature.

The author several years ago realized that if dental caries were systemic in origin, then the blood stream, which builds and maintains every part of the body, must have in it those factors essential to the completeness or incompleteness of the process. And since calcium and phosphorus were known to be the

major constituents of teeth and bone, an analysis of the blood for these minerals must throw some light on the problem of dental caries and alveolar absorption.

Many analyses were studied of hospitalized patients. These people were selected because of the availability of other physical findings. Results were barren for a long time, but finally it was noticed that certain patients who were under insulin treatment for diabetes, had calcium-phosphorus determinations of about ten to four.

A peculiarity of these findings was that these patients were almost the only ones whose plasma analyses did show these proportions. Another fact was noticed that these patients invariably had had very poor teeth, but at the time of the tests showed arrested decay, as evidenced by blackened carious substance.

The thought came in mind that possibly this ten to four ratio was the correct ratio, and that calcium and phosphorus united to form a compound having this proportion of the ingredients. Since a compound, if there was but one used in the formation of tooth and bone substance, must always be composed of proportional parts of its ingredients, a table was made having different values for calcium and the corresponding values of phosphorus with which these amounts of calcium would unite.

Since the amount of this compound in the blood plasma was de-

terminated by the amount of the lowest ingredient available the ingredients of the compound were usable and the portion of either the calcium or the phosphorus left over was called unusable.

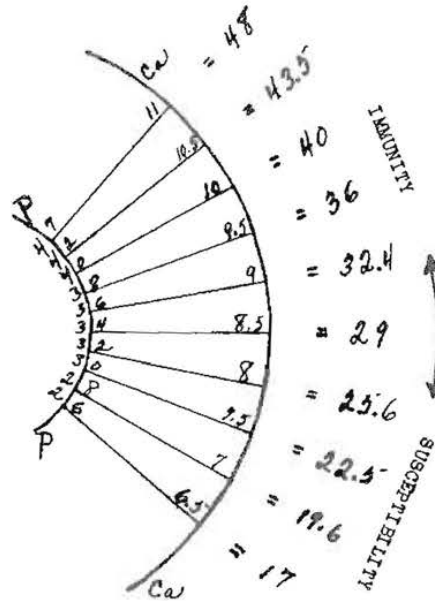
For instance if the blood analyses showed there to be twelve mg of calcium and four mg of phosphorus, then the compound could use only ten of the calcium to combine with the four of phosphorus, leaving two mg of calcium in excess or unusable. By multiplying the usable amount of calcium with the usable amount of phosphorus, a figure known as the usable product was obtained. In

the above example this usable product would be 10×4 or 40.

Tables were made in an attempt to fix the level which this usable product must have, to make donor of the blood immune to caries.

These tables did not show at once just where this level was, because of the difficulty of determining if decay were going on at the time or not and because the author at the time didn't know that age made a difference.

Eventually it was found that a usable product of 30 or more created immunity



CALCIUM-CARBONO-PHOSPHATE LEVEL
AND CARIES INCIDENCE, AGES 18-45

The author was much pleased to be substantiated in his conception that calcium and phosphorus unite to form a compound in approximately the proportions of ten to four.

Broderick states that Barille has shown that calcium carbonate and calcium phosphate unite to form a double salt calcium-carbono-phosphate which serves as the nutrient matter for bone and dentine. The formula of this compound would indicate that 10.4 calcium unites with 4 of phosphorus.

Influence of Foods upon Calcium-Phosphorus Levels

In order to effect improvement upon the usable calcium-phosphorus levels, first of all the diet must be corrected so that it contains the essentials for an adequate nutrition for the individual treated, in so far as we know how, and harmful substances must be eliminated.

To this end inquiry is made as to the quantities and kinds of foods habitually eaten. Occasionally are found those who eat no fresh fruits or some who will not eat milk or eggs. Some very little meat or none at all. It is surprising how many have adopted this or that fadism in the way of eating or who have eliminated certain classes of foods altogether in the attempt to make themselves feel better or to reduce.

Almost invariably the author finds it necessary to have the patient eliminate white flour and sugar from their diet, telling the patient that only in this way can a correct estimate of the efficiency of his body

chemistry be determined, as white flour and sugar so interfere with the calcium-phosphorus levels as to make the tests valueless.

In explaining that it will not be necessary to be so rigid forever, but for only a month, cooperation is invariably secured.

Effects of White Flour and Sugar

The result of eliminating white flour and sugar is to lower the calcium and raise the phosphorus. Ordinarily this is to be desired in the patient susceptible to caries or alveolar absorption.

The effects of alcohol upon the calcium-phosphorus levels are the same as sugar. The author has been unable to determine any bad effects upon these levels from the use of tea or coffee, but has observed deleterious effects from the excessive use of tobacco in the form of smoke in some individuals. These individuals feel better generally when they use moderation in this respect.

Tests are usually taken at weekly intervals. The results of these tests are plotted and graphed. The patient invariably wishes to see his graph each week and takes a keen interest in the outcome. Occasionally a patient with an experimental turn of mind will eat or drink something tabooed without informing his guide, to check up on the dentist. These unknowing tests of the accuracy of the blood analyses are welcome and in fact sometimes it is advisable to inform the patient that he may try out certain tabooed things, as in that way he will find out what the tolerance limits of his body mechanism are.

We learn best by experience, and the chief value we give the biochemistry patient is in teaching him how

to live that he may get the most out of life both mentally and physically; that his body chemistry be as efficient as nature intended it should be.

Endocrine Influence upon Calcium-Phosphorus Levels

If our food intake contains all of the essentials and has contained them for a long period, then our endocrines function normally. Practically the only way that the endocrines become unbalanced is by faulty nutrition.

By the same reasoning the only way in which the endocrines can be restored to normal function is by their own powers of recuperation after the diet has been made to conform to the needs of the individual whose endocrines are involved.

By substitution therapy, which is the feeding or injection of an endocrine substance to augment the function of an endocrine known to be producing less than its quota of hormonal substance, we can at times produce a rapid and great improvement in the patient's well being, but unless we correct the nutrition we have done little to aid that patient's own gland regeneration.

The endocrines or ductless glands are situated in various parts of the body. They control the chemical processes of the body which includes the assimilation of various food principles. They are the governors of our body processes. Their lessened function, abnormal or normal function, makes idiots, geniuses, or normal people of people otherwise similar.

From our ancestors we inherit tendencies, which if given the opportunity develop subnormal function of some and abnormal or super-

normal function of other endocrines.

Our personalities are dependent greatly upon which endocrines are dominant and which sub-dominant. Countless combinations are possible. Much is known about the endocrines yet the subject has hardly been touched. The student is overawed by the information gathered on the subject, yet feels that the labyrinth has hardly been entered.

Fortunately, enough has been learned about the endocrines governing the assimilation of calcium and phosphorus, that we may practice endocrinology in the dental field with beneficial results.

Our first efforts are to balance the calcium-phosphorus levels of our patients by means of dietary correction alone.

The history of the patient and of his parents and of their predecessors gives us at times an inkling of the probabilities of so doing.

Hereditary Influences

We are apt to think of ourselves as independent from our ancestors, whereas we are in fact, but the last link (for a time) in a chain which goes back to the beginning. Nearly everything we are our ancestors were. We as individuals will soon be but a link somewhere back in the chain. May the rest of the chain not be weaker because of the present links. May we look with pride at our ancestors and may they not be ashamed of us.

They had the advantage over us of living under a fairly fixed set of conditions, whereas we are the same kind of organism as theirselves but are living under drastically changed conditions. Have we the brains to cope with the situation or will our chain soon come to an end?

Our endocrines too have descended from other endocrines and partake of the nature of those which preceded them. Those which preceded were strong while in their natural environment, but possibly didn't do so well when these environmental conditions changed.

Yet even after a whole lifetime of an individual they will respond rapidly when given the environmental necessities they require. They will respond rapidly even after two lifetimes and sometimes three, but eventually if the conditions are consistently unfavorable, the disability of the endocrines becomes more or less fixed. Even if they respond to dietary correction, they may not go the whole way, or if they do, so slowly that artificial help is indicated if we are not to lose the patient's confidence.

Newcomers React to Diet Changes

In the middle west the names Olsen, Hansen, and the Dutch names indicate usually a rapid response to dietary treatment alone, for they are apt to be newcomers to our environment. In all probability not more than two generations back. The names of English origin are apt to belong to Americans of several generations standing and show less rapid response to dietary treatment. If their ancestors came over in the Mayflower, watch out.

If our living conditions were suitable, the calcium-phosphorus levels of young adults should be as ten is to four, or in balance, but we very seldom find this desirable ratio in people of Nordic descent.

In younger people, below the age of eighteen the phosphorus level should be from $5\frac{1}{2}$ to $4\frac{1}{2}$ while the calcium should be about ten.

When we have a persistent imbalance which does not correct itself perceptibly by dietary means, the use of certain endocrine products is indicated.

Glands and the Minerals

But first we must understand a little more about the endocrine system, and especially about those concerned with calcium-phosphorus metabolism.

The autonomic nervous system is composed of two opposing sub-systems, the sympathetic and the parasympathetic. In perfect health the force exerted by each sub-system serves to balance the other, except when due to emergency the effects of one are required in greater degree than the other.

The endocrine system is related or controlled by the autonomic nervous system. When the sympathetic system is dominant, certain ductless glands respond by increased hormone production, and where the parasympathetic system is dominant certain other endocrines respond by increased hormone production. There is a corresponding decrease of hormone production of the opposing endocrines.

Thus it will be seen that there is a perpetual tug-of-war between the opposing systems. The governor of this tug-of-war is the pituitary gland. When it is necessary to increase hormone production on either one side or the other, the pituitary sends out certain substances or pro-hormones which call upon certain of the endocrines for increased action. Thus the pituitary by throwing its

influence to one system or the other, makes one side or the other temporarily dominant.

Another endocrine, the thyroid, serves to increase force or speed of action of the endocrines.

This normal state of the autonomic nervous system is dependent upon the health of the whole organism, and the food supply is the principle factor in maintaining and regaining this health.

Gland Extracts in Treatment

If endocrine response to dietary treatment is slow sometimes we can help by supplying endocrine substance to tide over a deficiency until they do respond, if we are able to determine which endocrine function or functions need bolstering up.

In case certain endocrines are functioning in excess of normal, stimulation of the endocrines of the opposing system will often serve to bring them to time, because of the increased pull of the weaker endocrine system.

The function of the endocrines and autonomic nervous system can be likened to a crew in which the pituitary is the coxswain, who by manipulation of the rudder and by directions to individual members of his crew, attempts to balance his craft and to keep it on a straight course.

The stroke oar is on the sympathetic side. It being the duty of the stroke or thyroid to set the pace.

Number two oarsman is on the parasympathetic side and may well be likened to the Isles of Langerhans of the pancreas.

The other endocrine members of the crew are equally divided; half pulling on one side; half on the other.

Thus stimulating the weaker side help to take strain from the coxswain or pituitary and helps to maintain autonomic balance.

It is necessary in the practice of preventive dental medicine to know which part of the autonomic nervous system is dominant, for an imbalance of calcium and phosphorus means that either the sympathetic system or the parasympathetic is dominant, or one may be dominant at one time and the other at other times.

This latter puzzling condition is not general where we are looking for the causes of dental pathology, so we will confine our description of symptoms and effects to those characteristic of either the sympathetically dominant or the parasympathetically dominant.

It is not so much the temporary status of the endocrines with which we are concerned in the practice of preventive dental medicine, for dental pathology depends mostly upon a more or less permanently dominant sympathetic or parasympathetic autonomic nervous system.

Fluctuations causing first one system to be dominant and then the other unless they are of long duration do not affect dental caries for there is a considerable lag between cause and effect in bony structure.

Sympathetic Stimulation

Of the endocrine substances used to stimulate or inhibit the autonomic nervous system, the author finds the greatest use in thyroid substance to stimulate the sympathetic and inhibit the parasympathetic and in insulin to inhibit the sympathetic and to stimulate the parasympathetic.

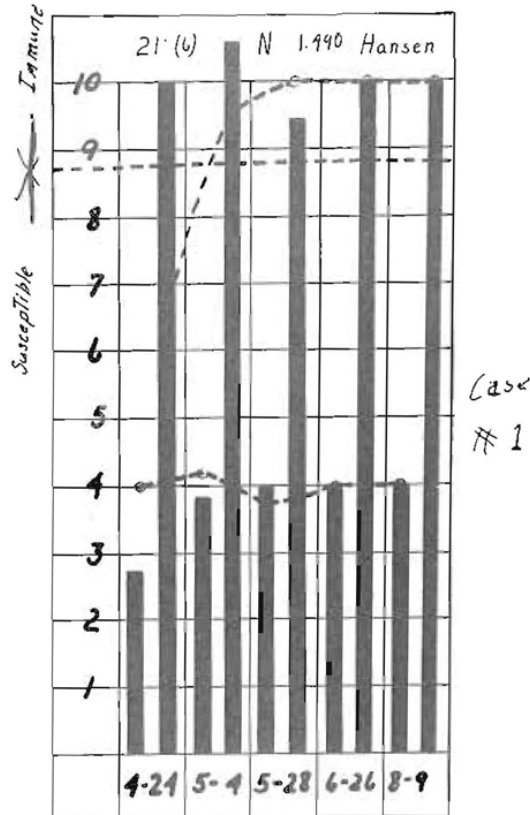
These substances are given when indicated, in minute doses. Thyroid in from one-tenth to one-half grain daily or less, and insulin in three unit doses one, two, or three times weekly.

Seldom are other endocrine substances necessary, for the action of these substances in small doses is not similar to their action in larger doses for known deficiencies of the endocrines.

Other substances may well be used at times; a persistently low calcium calls for tenth grain para-

thyroid substance administered once or more daily. Care must be used to insure an adequate calcium intake, for if there be insufficient calcium in the food intake for the needs of the blood, the parathyroid substance will draw it from other sources such as the bones.

A low phosphorus and high calcium is the characteristic blood picture of the parasympathetically dominant, while a low calcium and high phosphorus characterized the sympathetically dominant.



Index of Endocrine History

Physical characteristics help us to determine which side of the autonomic nervous system is dominant.

The sympathetically dominant are apt to be high strung and are more numerous among females. They dislike hot weather and thrive when it is cold. They are apt to have a more rapid pulse than normal. Many have high blood pressure. They require less sleep than normal, and may in severe cases be classified as emotional and sometimes mentally unstable. Women between the ages of 15 and 50 of this type are apt to have large breasts and be heavy through the shoulders, whereas their legs are sometimes so thin that one wonders at their ability to support the heavy upper portion of the body. Severe cases have the pouter pigeon build and can be symbolized by a triangle standing on its apex.

The parasympathetically dominant usually have a high calcium and low phosphorus, but this phosphorus level will fluctuate in those having arthritis or pyorrhea.

The hair of both sexes is inclined to grey at an early age. The nails may be ridged and the lumen slight or invisible—they are tired most of the time, and exert much will power to keep going. This continual effort is sometimes evinced in the wrinkled brow as a sort of worried look. Some get fat, but the majority are thin.

Women between the ages of 15 and 50 show disproportion of body build; the breasts being most always small, the shoulders thin, ribs prominent, while their hips and legs seem to have most of their weight. Many such women cannot buy clothes of one size to fit them, but may take a 16 upper portion and an 18 or 20 lower portion of their dresses.

These disproportions of body build are so characteristic of endocrine dysfunction, that the author uses a system of arm and leg measurements to aid him in classifying his female patients.

It consists of measuring the circumference of the forearm and lower leg in five equidistant places and dividing the leg measurements by the corresponding arm measurements.

The results obtained are added and divided by five to obtain the average. This figure then represents the proportional size of the leg to the arm.

From the results obtained from a series of cases, a chart was prepared showing the caries average together with the proportion obtained.

The fact that caries increased in direct proportion to the disproportion is significant. The figure showing a proportion of the lower leg to the arm of 1.420 to be about correct, as caries were noticeable by their absence when they measured this proportion.

The calcium-phosphorus tests pretty well coincided with the

measured proportions and with the incidence of dental decay. A great percentage of those showing disproportion and who had no caries, showed a strong arthritic or pyorrhetic diathesis and a fluctuating phosphorus level, whose average level was high enough to prevent caries.

Women sometimes change from being parasympathetically dominant to the sympathetically dominant and vice versa. In such a case the conflict between symptoms and body proportions is apparent if one keeps this possibility in mind.

A Metabolism Test for Women Based on Comparative Measurements

Normal 1.400 to 1.430
 Hyper-Function 1.300 to 1.400
 Hypo-Function 1.430 to 1.650

DIRECTIONS

Measure forearm from wrist to elbow, divide this measurement by 4, take 5 circumferential measurements, starting with wrist, around prominences of wrist bones and ending with elbow at intervals of this distance.

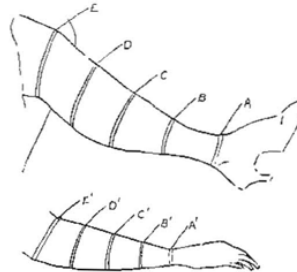
Repeat for leg, measuring over both ankle bones and over center of patella. Divide each leg measurement by corresponding arm measurement, add results and divide by 5 to obtain average.

The result will be comparative size of leg to arm and can be translated in terms of Metabolism.

EXAMPLE

From ankle bone to patella—16" Length of forearm—9"
 Interval= $\frac{16}{4}=4$ " Interval= $\frac{9}{4}=2\frac{1}{4}$ "
 A= $9\frac{1}{8}=\frac{73}{8}$ A'= $5\frac{7}{8}=\frac{47}{8}$
 B= $9\frac{2}{8}=\frac{74}{8}$ B'= $6\frac{7}{8}=\frac{55}{8}$
 C= $13\frac{2}{8}=\frac{106}{8}$ C'= $8\frac{3}{8}=\frac{67}{8}$
 D= $12\frac{6}{8}=\frac{102}{8}$ D'= $9\frac{1}{8}=\frac{73}{8}$
 E= $14\frac{2}{8}=\frac{114}{8}$ E'= $9=\frac{72}{8}$
 A-A'= $\frac{73}{8}-\frac{47}{8}=1.558$
 B-B'= $\frac{74}{8}-\frac{55}{8}=1.345$
 C-C'= $\frac{106}{8}-\frac{67}{8}=1.592$

META FACTOR	0	1	2	3	4	5	6	7	8	9	10
1.310											*
1.320											*
1.330											*
1.340	*										*
1.350											*
1.360											*
1.370	*	*									*
1.380	*	*									*
1.390	*	*	*								*
1.400	*	*	*	*							*
1.410	*	*	*	*	*						*
1.420	*	*	*	*	*	*					*
1.430	*	*	*	*	*	*	*				*
1.440	*	*	*	*	*	*	*	*			*
1.450	*	*	*	*	*	*	*	*	*		*
1.460	*	*	*	*	*	*	*	*	*	*	*
1.470	*	*	*	*	*	*	*	*	*	*	*
1.480	*	*	*	*	*	*	*	*	*	*	*
1.490	*	*	*	*	*	*	*	*	*	*	*
1.500	*	*	*	*	*	*	*	*	*	*	*
1.510	*	*	*	*	*	*	*	*	*	*	*
1.520	*	*	*	*	*	*	*	*	*	*	*
1.530	*	*	*	*	*	*	*	*	*	*	*
1.540	*	*	*	*	*	*	*	*	*	*	*
1.550	*	*	*	*	*	*	*	*	*	*	*
1.560	*	*	*	*	*	*	*	*	*	*	*
1.570	*	*	*	*	*	*	*	*	*	*	*
1.580	*	*	*	*	*	*	*	*	*	*	*
1.590	*	*	*	*	*	*	*	*	*	*	*
1.600	*	*	*	*	*	*	*	*	*	*	*
1.610	*	*	*	*	*	*	*	*	*	*	*
1.620	*	*	*	*	*	*	*	*	*	*	*
1.630	*	*	*	*	*	*	*	*	*	*	*





D ÷ D' = $\frac{102}{73} = 1.393$
 E ÷ E' = $\frac{114}{72} = 1.583$

Sum 7.466

$7.466 \div 5 = 1.493 = \text{Metabolism factor.}$

Preventive Dental Medicine Illustrated

Red Mucous Membrane	Excess Body Fluids	Excess Sodium	Deficient Potassium	Dominant Sympathetic	Excess Thyroid 	High Phosphorus Low Calcium
Infection Zone Acidosis Paradentosis, Arthritis or Caries				Treatment Insulin Sea food Calcium		
Caries Free Zone						
Glandular Equilibrium		Autonomic Level		Calcium Phosphorus balance		
Caries Free Zone						
Allergic Zone Alkalosis Calcular deposits— Arthritis or Caries				Treatment Thyroid Sea food Dil. HCl Pituitary		
Pale Mucous Membrane	Low Body Fluids	Parasympathetic	Dominance		Excess Insulin 	Low Phosphorus High Calcium

General Treatment

Parasympathetic dominance.

These people are put on some form of sea food to furnish the trace minerals and are denied sugar and white flour. The rest of the diet is scrutinized to see that it contains the other essentials. Meat, eggs, cooked and raw vegetables and fresh fruits. Those people who work indoors a great deal are given cod liver oil plain.

Blood analyses are made at weekly intervals and if progress is too slow, endocrine treatment is begun.

There may be difficulty in determining, from physical characteristics, just what the autonomic imbalance is. In such a case after two or three blood analyses have been made on a sugar free diet and that patient's average calcium-phosphorus level determined, thyroid in quarter grain doses may be given once or twice daily for 3 or 4 days and another test taken. Improvement in the phosphorus level would then indicate that the patient is parasympathetically dominant and the sympathetic needed the stimulation which it obtained from the thyroid medication.

The treatment with thyroid substance then could be continued possibly with a smaller dose and its effect noticed on the subsequent analyses. Care should be taken to so regulate the dosage that the phosphorus level does not become too high, or a case of arthritis may be produced.

If a satisfactory dose becomes established, occasional tests should be taken to determine if the dose used is still satisfactory, for the effects of thyroid medication are

somewhat accumulative, and too, any glandular regeneration which occurs necessitates smaller doses.

Eventually if the diet allows of the regeneration of the endocrines of the individual under treatment, it will become unnecessary to use any medication at all.

Sympathetic Dominance

The treatment of the sympathetically dominant is also by establishing an adequate nutrition for that individual. These individuals seem to have a stronger endocrine system than the parasympathetics and show resistance at times to some of the ill effects of dietary insufficiency. They are apt to grow fat, which the author interprets as an effort on the part of the organism to overcome the disability of insufficient mineral intake by an increased consumption of food. These people though sometimes fat are energetic, perspire freely, and like cold weather. They are unlike the fat parasympathetics who are sluggish and do not like cold weather.

Since the thyroid is in the sympathetic system, many of these people showing sympathetic dominance may show symptoms of hyperactive thyroids.

Women at the menopause having sympathetic dominance usually have a serious time both physically and mentally while the endocrines are undergoing the re-adjustment necessarily taking place at this time.

Insulin in three unit doses acts as a specific in both cases. As near as it is our privilege to see miracles happen, we have the opportunity to its greatest extent by the well considered use of three unit insulin in the sympathetically dominant.

EXAMINATION CHART
 PREVENTIVE DENTAL MEDICINE
 MELVIN E. PAGE D.D.S

						Date
Name	address					ref. by
Age	Wt.	Ht.	Color hair	eyes	sex	single married
Lived where and when						children
Father born where			Ancestry			
Mother born where			Ancestry			
Head	round	medium	long.	Teeth good	fair bad	eden. caries average ()
Dental work	little	none	much.	Gums red	normal	pale inflamed
Foods used habitually:- meat eggs milk fresh water fish salt water fish kelp						
white bread, no. of slices daily () whole wheat () corn bread rye bread ()						
cereals candy cake pie cookies canned fruit sugar teaspoons()						
coffee tea cocoa Cooked vegetables:- peas beans potatoes cabbage carrots						
spinach greens Raw vegetables:- cabbage lettuce carrots celery						
Raw fruits:- apples oranges grapefruit Cooked fruits:- apricots peaches						
apples prunes Nuts Pickles vinegar cheese yeast cod liver oil						
viosterol concentrate other vitamin preparations wine beer						
liquor soft drinks						
Configuration:- breasts large medium small Legs straight bowed						
elbows large thin Ankles large small						
Allergic to:-						
Medical history:-						
Examination.						
pale	inferior turbinates				red	
much	secretions				little	
slow	pulse				fast	
slow	respiration				fast	
low	temperature				high	
low	blood pressure				high	
contracted pupil					dilated pupil	
low gag reflex	sensitive to cold				protrusive eyeball	
constipation	nails ridged no lunula				high gag reflex	
gas	frequent colds				talkative	
back pains					irritable	
pruritis					indefinite body symptoms	
tired					skin dry	
sleep much					nails show lunula	
cold hands feet					likes cold weather	

Case number one is of a girl aged 21 of Swedish extraction. Her caries average per year was 5; her measurements showed her to have had a slightly subnormal body chemistry. Her diet was very good with the exception of sugar and trace mineral intake. She was given *Macrocystis pyrifera*, 6 tablets daily, to be certain that these minerals were in her food, and was asked to forego sugar for awhile.

The results were that her phosphorus level began to increase immediately and after a slight period of fluctuation steadied at the ratio of ten of calcium to four of phosphorus.

The response of this patient was very rapid, accounted for probably by her recent European ancestry. General conditions also improved remarkably. Her chief symptom of being tired most of the time left her. If she continues her dietary regime she is bound to be caries free, since her usable calcium-phosphorus level is considerably above the danger line.

Case number two is of a woman aged 55 in need of partial restorations. Her caries average had been 4 annually. It was explained to her that the cause of dental caries was an underlying systemic condition which if not corrected would cause her to lose her remaining teeth and the supporting process for her partials also.

This woman was born in Sweden and came to the United States when she was 20. At that time she had no carious teeth, but developed them soon after arrival here. Her diet was not good. She averaged 14 teaspoons of sugar daily in her coffee, and ate mostly bread, meat and fruit. Vegetables bothered her as she expressed it.

Upon dietary correction by insisting upon vegetables both raw and cooked and upon the daily use of *Macrocystis pyrifera* to furnish the trace minerals found only in sea food, her response was very rapid. The improvement in general health was remarkable. She found to her surprise that she could go without sugar and that vegetables no longer bothered her.

To date she has developed no new cavities and there is no evidence of alveolar change.

Case number three is of a woman eighty years of age who had alveolar absorption under full dentures and who was developing cataract in both eyes.

Her general diet being very good, only the addition of *Macrocystis pyrifera* was made to it. She was asked to go without desserts containing sugar which was no hardship in her case as she used very little anyway.

The improvement in her calcium-phosphorus balance is evident, and to her great delight her eyes improved so that upon re-examination by her oculist she could read two more lines on his chart.

Treatment in this case consisted entirely of adding the trace minerals to her diet.

Case number four is of a woman aged 44 of Nordic descent who by her measurements showed sympathetic dominance. She was from out-of-town and could stay only one month. Her dentist in her home city referred her to the author for attention if her gums should bother her while here. He had been treating her for pyorrhea for some time.

Treatment after the second visit was three units of insulin twice a week plus *Macrocystis pyrifera* and the discontinuance of sugar.

Inflammation and soreness left her gums at the third visit and she continued to improve. It was believed that continued dietary control would prevent further trouble. Calcium Gluconate was given her to take if she had any recurrent inflammation.

Case number five is of a man aged 32, whose caries average was 5. His diet was not good. His selection was good enough, but his work necessitated his eating two meals a day in restaurants.

Discontinuance of sugar and the addition of daily amounts of *Macrocystis pyrifera* had the desired effect. It was nearly a year after his first blood test that he became sold on the idea of prevention, having had five new cavities in that time. No new cavities have developed since that time about, one and one-half years.

Case number six is of a girl 15 years of age who averaged three cavities annually. Thyroid was indicated because of her measurements and because time of treatment was to be limited. The dose of thyroid selected was $\frac{1}{4}$ gr. daily for five days of the week. After two weeks the dose was cut to one-tenth gr. thyroid five days per week. This was discontinued in two more weeks.

The author was of the opinion that abstinence from sweets and the daily use of *Macrocystis pyrifera* with her otherwise good diet, would clear up the underlying cause of her caries.

Case number seven is of a man 22 years of age of Mediterranean ancestry, who gave a history of three cavities per year and also neuralgic pains in the shoulders.

Dietary correction and the extraction of a devitalized tooth proved beneficial to the shoulder pains. This case is yet unfinished as his

calcium-phosphorus level is still too low and they are not in balance.

Case No. eight is of a woman 52 years of age who had been treated for pyorrhea for twenty years. Her teeth were all sound and very good looking.

Dietary correction solely by the addition of *Macrocystis pyrifera* was started at the time of taking the first blood test.

Extraction was found necessary one and one-half years later, with a marked change in the graphed blood analyses for the two years following.

No other treatment was indicated in this case because of her measurements. The result was interesting because it showed so well the effects of infection upon body chemistry.

Case No. nine is of a normal. Normals of Nordic descent are very rare in Michigan. This one had been taking *Macrocystis pyrifera* on her own initiative for two years before the author saw her. As the author had no normals he persuaded her to serve as a guinea pig. Tests were taken frequently over a period of two years. Occasionally experiments were tried on her to find the effects upon the calcium-phosphorus levels of different substances. She had not always been a normal as evidenced by her teeth, but has not had a cavity in the four years she has been taking this mineral food supplement.

In all of the cases charted, the ingestion of sugar caused the phosphorus to drop and the calcium to rise. Any inflammatory process such as acute pyorrhea, arthritis or a sore throat was accompanied by a high phosphorus, in excess of the amount of calcium available for compound formation.

In short, calcium-phosphorus balance is an index of efficient body chemistry.