

Politics, Philosophy and "TMD"

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The issues facing graduating dentists in the late '60's seemed clear. Few new graduates doubted their ability to make the diagnoses, "decay or not decay," "periodontitis or not periodontitis," "abscessed or not abscessed" "pathological lesion or normal tissue." Yes, there was subjectivity. Dentists could disagree whether or not to fill a small lesion, but the disease "dental caries" had definable criteria, and decisions such as whether to treat or not were based on clinical judgment.

As dentistry entered the '80's and the '90's, the enigmatic problem of "TMD" erupted into controversy. Clinical dentists were gaining more and more knowledge and success at treating temporomandibular disorders when a well-known academic clique declared that this clinical experience was unscientific. "It works" they said was not scientific evidence but anecdotal theory. They did however declare pain as "The Gold Standard."

As we approach the millennium "TMD" remains a hot issue. Most of the disagreements however have reduced to political and philosophical rather than scientific issues. Is TMD a structural or psychological problem? Is it a disease or an illness? Can pain possibly be a valid gold standard? Does one most properly diagnose and treat to the specific etiologic conditions or the generalized non-specific symptoms? Is epidemiology a more appropriate methodology than ethology for the scientific study of TMD? Is subjective clinical judgement a better guide in diagnosis and treatment than objective measurement? Is there a causal relationship between "TMD" and malocclusion?

At the very core of the political arguments is the issue of money. Insurance companies seem to be under the assumption that "TMD" is a condition unrelated to human beings. They have isolated it from the rest of the body in singularly trying to deny coverage for anything related to pain and dysfunction associated with the temporomandibular joints. These insurance companies have approached as their allies and consultants, the academic clique of research dentists who, for political and monetary considerations, attempt to hold the clinician/patient faction at bay by rejecting claims.

The academic faction has its agenda (1) perpetuating their research grants; (2) gaining specialty status for orofacial pain; and (3) defending a very weak scientific position, by politically positioning themselves to dictate what is the "appropriate standard of care."

This political warfare also puts the clinician in a very bad light. The politics of TMD is such that clinicians too often feel obligated to list as diagnosis "whatever it takes" to get insurance reimbursement for their patients. They will call this

disease/disorder virtually anything, such that their patients get insurance coverage for the proper treatment. Too often this "game" has no relationship to scientific diagnosis. Thus the academics report that clinicians want to do treatment that is experimental or unrelated to the diagnosis. They deny payment, and accuse clinicians of employing unscientific and unwarranted treatment, and an inconsistent standard of care. This chapter is an attempt to elucidate the opposing positions and facilitate clearer understanding of the issues.

From the time of Hippocrates to the present, the concept of both disease and diagnosis has undergone evolutionary change. In the era of Hippocrates, identification of disease was an act of observation, i.e., fever, consumption or rash. Etiology was based on conjecture such as deranged humors or angry gods. Sydenham in the seventeenth century originated the discipline of nosology which proposed that each disease had a specific pathogenic cause. With the advent of the microscope, nineteenth century medical science searched for the histopathology of the diseased part.

Syndromes have been created to describe a concordance of multiple entities. In the 1930's Costen reported successfully treating a group of patients with a mandibular overlay appliance which separated the teeth 2-4 mm. The syndrome designated with his name manifested the following symptoms: hearing loss, aural fullness, tinnitus, preauricular pain, dizziness, eustachian tube fullness, headaches and burning in the throat. Later renamed "TMD," the clustering station has been identified as the temporomandibular joint, but the etiology can be trauma, derangement, histopathology or dysfunction, with the origin in either the masticatory system or a remote location.

"TMD's" pose many intellectual challenges for diagnosing and treating doctors. Identification of the pathology may be an effect rather than the diagnosis or etiology. Shared neurology of the head and neck often makes etiological identification difficult to ascertain. The location of the pain may not be the site of the pathological lesion. The quality and intensity of the pain may not relate to the extent or severity of the disease process.

Dentistry's predicament is that reproducible identification is necessary for scientific diagnosis of any disease. Definitive measurable, reproducible, objective disease criteria must be elaborated for identification of "TMD" or each disease or disorder categorized as a "TMD". No such disease criteria for the entity called "TMD" have ever been suggested. Indeed the emerging consensus in dentistry seems to be that "TMD" is a collective term embracing a number of clinical problems involving masticatory dysfunction, the temporomandibular joints and associated structures.

When doctors discuss a disease, there is usually an unspoken mutual assumption that they share a common understanding of the medical model, conception of the disease process, definition of the disease itself, and that they

are discussing the same level of disease. Often this is not the case and confusion and disagreement ensue.

There are many levels at which doctors discuss disease. As noted, the evolution of a disease usually starts with a description of the symptoms and this becomes the syndrome. level. As the syndrome is studied often the disorder or disease is localized to the specific system affected such as skeletal, muscular, vascular, neurologic, connective tissue, organic, etc. Further study of the problem by clinicians and researchers often reveals histopathological changes next and the problem then reduces to the cellular level. When these cellular changes are further studied, often the genes responsible for the change can be isolated on the chromosomes. When the chemical changes resulting from and causing the problem are eventually isolated, the problem is reduced to the molecular level.

Satisfactory treatment for the disorder or disease can often be found at different levels. Analgesics are effective for controlling pain, which is a symptom, but they do not treat the cause (or etiology). Conventional medical wisdom is to treat diseases at the most basic etiologic level possible and reasonable. But what if doctors cannot even agree on whether or not the problem is a disease? What if they do not even agree on the definition of disease?

The term "TMD" has been used to characterize the generalized *nonspecific* symptom complex of headache, neck ache, ear pain, face pain, tenderness of muscles to palpation, sensation of bite change, difficulty chewing and/or swallowing, gross joint sounds and limited range of jaw motion.

Hans Selye, in his classic book The Stress of Life , relates how early on in his medical training he noticed a certain *nonspecific* symptom complex common to all infectious diseases. Each patient felt and looked ill, had a coated tongue, complained of more or less diffuse aches and pains in the joints, intestinal problems, loss of appetite, fever, enlarged tonsils and skin rash. Each infectious disease had a few *specific* signs by which a differential diagnosis could be made and to which a specific remedy could then be directed.

The *nonspecific* reaction of the body common to all infectious diseases, the "syndrome of just being sick," Selye initially identified as the *General Adaption Syndrome* (GAS). He spent most of his career studying the *nonspecific* symptom complex, which relates to what we know as *stress*.

Selye defined *stress* as the state manifested by a specific syndrome which consists of all the *nonspecifically* induced changes within a biologic system. Briefly he summarized: "Stress is the *nonspecific* response of the body to any demand." He admits that the concept of stress is an abstraction. The study of stress is exploration and measurement of its tangible effects. Reduction and dissection of such an abstract concept has caused problems relative to temporomandibular disorders and orofacial pain.

NON-SPECIFICITY

In 1993, at an NIDR conference, Dworkin defined disease as an "objective biologic event involving disruption of specific body structures or organ systems caused by pathologic, anatomic or physiologic changes." He defined illness as "a subjective experience or self-attribution that a disease is present, yielding physical discomfort, emotional stress, behavioral limitations and psychosocial disruption." He claims progressive pathologic changes cannot be reliably diagnosed in TMD's and concluded that "TMD is more usefully considered to be an illness." Dworkin thus created his psychosocial model of "TMD."

This approach is fraught with problems and has pernicious implications for many clinical dentists. Relative to the generally accepted Selye Stress Model, Dworkin's **psychosocial model fractionates "TMD" to the *nonspecific symptom complex only***, and, of necessity, limits all treatment to the nonspecific components, because his **definitive position** states that progressive pathophysiological changes **cannot** be reliably diagnosed in TMD's. Certainly stress reduction therapies can be appropriately directed at TMD's, but isn't this just symptomatic treatment, aimed at reestablishing homeostasis, and not addressing the specific etiologic factor?

SPECIFICITY

The problem simply stated is this: Can the clinician get beyond the *nonspecific* GAS components common to all temporomandibular disorders to diagnose *specifically*, and direct more effective treatment at the specific etiological component of each disorder? Each of the 25 or so individual temporomandibular disorders discussed in the literature has specific definitive diagnostic criteria that differentiate or define them. These unique identifiers also suggest treatment that is disease-specific, which is different than the nonspecific treatment suggested for "TMD" in the Dworkin Model?

If dental clinicians perceive of themselves as diagnosticians and treaters of orofacial pain, on any given patient they must make a differential diagnosis from approximately 145 possibilities. Weldon Bell has taught that, "An accurate diagnosis is the first step in the treatment of any TMD and the process cannot be abridged." He believed that a diagnosis should do the following: properly identify and classify the disorder, establish the mechanism of dysfunction and the source of pain, determine the etiology, if possible, and provide a basis for prognosis in the light of effective therapy. He, of course, advocated that the treatment should specifically and appropriately relate to the diagnosis. It seems self-evident then, that no knowledgeable, self-respecting clinician would treat muscle trismus secondary to infectious disease the same as MPD, or treat disc displacement without reduction the same as rheumatoid arthritis. Thus it would seem that in temporomandibular disorders dentists must concern themselves with the "specific diagnosis."

Gould's Medical Dictionary defines disease as, "a response to injury, sickness or illness; a failure of the adaptive mechanism of an organism to counteract adequately the stimuli or stresses to which it is subjected, resulting in disturbance in function or structure of any part." Diagnosis involves analysis of the scientific evidence of what is wrong with a patient, and why, and applying a tentative name to the disease. This approach to masticatory problems is based on "disease," not "illness."

When a patient presents to a health professional and asks, "Doc, have I got TMJ?", it is imperative that the doctor consider all the possibilities in making a differential diagnosis. A patient obviously feels some pain and/or dysfunction in the head, face or joint area as the basis for their office visit. It would certainly be beneath a reasonable standard of care and might even result in a malpractice case, should the doctor treat a patient for "TMD" and miss a diagnosis of infectious disease or cancer whereby the patient dies or ultimately loses half their face to radical surgery. It could cost the doctor his or her livelihood, life savings and sanity, and the patient could lose their life or any semblance of a quality life and endure constant pain and suffering.

There are about 145 diseases and disorders manifesting orofacial pain. In studying textbooks on the differential diagnosis of these 145 possibilities it was found that the expert authors consider about 18 categories of factors or *rubrics* in arriving at a diagnosis. Each of these rubrics has between 5 and 27 possible responses, most of which are not mutually exclusive. This means that while a disease cannot be both painful and not painful at the same time, symptomatology can simultaneously be sharp, continuous, throbbing, unilateral, preauricular, infraorbital and severe. Actually, the number of permutations and combinations one might possibly consider in making such a differential diagnosis approximates 1.5×10^{55} . If a supercomputer could sequentially consider 1 billion possibilities per second and started on its first such diagnosis at the "big bang" (origin of the earth), it would not have completed its first diagnosis by the year 2000 A.D.

Psychological studies have shown that the human mind can consider only a few variables (in the range of 4-7) in making complex decisions. Thus a clinician is faced with a difficult task in diagnosing diseases and disorders manifesting complaint of pain in the area of the head, face and jaws.

Certainly, not all of the approximately 145 diseases and disorders with the symptom of orofacial pain are temporomandibular disorders. In fact only about 25 of these involve the masticatory apparatus and a significantly smaller amount involve the temporomandibular joint itself. Yet there seems to be little disagreement in the dental literature that myogenous problems with **no TMJ pathology** be included in the category temporomandibular disorders, soon to be retitled masticatory diseases and disorders.

"TMD" or temporomandibular disorders certainly have posed many philosophical and conceptual problems to dentists and other health professionals. The panel statement at a 1996 NIH/NIDR Technology Assessment Conference on Management of Temporomandibular Disorders determined the following:

- *The term "TMD" has been used to characterize conditions as diversely presented as pain in the face or jaw joint area, headaches, earaches, dizziness, masticatory musculature hypertrophy, limited opening, closed or open lock of the TMJ, abnormal occlusal wear, clicking or popping sounds in the jaw joint, and other complaints.*
- Temporomandibular disorders have no common etiology or biological explanation and comprise a heterogeneous group of health problems whose signs and symptoms are overlapping but not necessarily identical.
- The name "TMD" is not universally endorsed. Generally accepted, scientifically based guidelines for diagnosis and management of "TMD" are unavailable.
- There are significant problems with present diagnostic classifications of "TMD" in that these classifications appear to be based on signs and symptoms rather than on etiology.
- Validated diagnostic methods for identification and classification of "TMD" patients are needed.
- A classification system based on measurable criteria should be developed as the first step in a rational approach developing diagnostic protocols and appropriate methodologies. This should lead to a labeling of subtypes that could permit the elimination of the term "TMD" which has become emotionally laden and contentious.

Summarizing so far, there seems to be no agreement as to what constitutes "TMD." There are no universally accepted diagnostic criteria for "TMD." What constitutes normal has never been definitively established. We have no means of scientifically determining what constitutes diseased or disease-free relative to "TMD," thus making it impossible to conduct an epidemiological controlled study. And we need a new, less contentious name for "TMD."

Perhaps a new paradigm is in order. Logic dictates that the variables that must be dealt with in arriving at the differential diagnosis for orofacial pain patients must be crunched and organized into categories and subcategories in a manner that they can be reasonably contemplated by human minds. It is suggested that clinicians consider themselves diagnosticians of orofacial pain. A methodological algorithm is suggested (the Orofacial Pain Diagnostic Hierarchy, figure 2). It is a result of a search of the medical/dental literature for all diseases and disorders having orofacial pain as a symptom in which there is not an observable

pathological lesion. Thus diseases such as pemphigus, herpes, and aphthous ulcers are not on the list. The term "Temporomandibular Disorder" has been eliminated.

It should be generally agreed that the area of treatment expertise for most dentists is the "masticatory" category in which all diseases and disorders share the characteristic of dysfunctional movement of the masticatory apparatus, and the odontogenic category which may result in dysfunctional movement, but not as a primary identifying characteristic.

A diagnosis of "TMD" or "TMJ Syndrome" is no longer appropriate. The acquisition of the signs, symptoms and patient characteristics that constitute clinical data is sine qua non for arriving at a correct diagnosis. Doctors must readjust their thinking to be more specific. The recommended treatment must be appropriate for the *specific* condition or conditions diagnosed.

Most importantly doctors are largely dealing with physiologic problems. All conditions on the Orofacial Pain Diagnostic Hierarchy except those few under the category Psychogenic have a physiologic basis. They are characterized by pathophysiologic findings as diagnostic criteria. They are diseases not illnesses. They can be stress-related, but psychological stress is not the primary etiology.

PAIN AS GOLD STANDARD

Illness, defined as subjective self-attribution of pain experience or pain as "gold standard" must be examined further. Horal's study showed that the only difference between controls and subjects in a stress disorder is that the patient group is complainant. Thus it has been said the "TMD" patients are self-selected. But "TMD" has no definitive diagnostic criteria. Horal's study simply demonstrates the inappropriateness of epidemiology as a methodology for the study of "TMD" because one cannot distinguish normals or controls from the subject group and that pain as gold standard is unreliable.

Most clinicians have had the experience of dealing with the patient who presents complaining of toothache in the upper, only to have the correct diagnosis be abscessed tooth in the ipsilateral lower arch. This is an example of poorly localized pain. Many have had patients who present with complaint of pain over the TMJ, where local anesthetic injection does not relieve the pain, but on closer examination find trigger points in a remote location such as SCM or trapezius where local anesthetic injection of the trigger point relieves the pain over the TMJ. This is referred pain. Often, when asked if palpation hurts, a patient will reply, "not really." This does not say yes or no and affirms that pain is often vague and quantification difficult. If palpation of a muscle on the right side evokes pain on the left side, it is an example of psychosomatic pain. There is no known neurological circuitry to account for this response. It is well-known that patients can lie about pain for financial gain, such as insurance fraud. So how scientific

can pain be as gold standard if it is untestable, unreliable, referred, poorly localized, poorly quantified, imagined, vague and lied about?

Referring to the Diagnostic Hierarchy for Orofacial Pain each condition has distinct diagnostic criteria. Pain without the criteria necessary for any diagnosis may be psychogenic. Pain in the presence of the appropriate diagnostic criteria constitutes a pathophysiologic based condition. This pathophysiologic condition in the absence of pain may or may not necessitate treatment. That decision is based on the clinical judgement of the doctor and the willingness and understanding of the patient to undergo treatment. Often this is based on risk/reward considerations and frequently on financial considerations. Decisions are often based on political factors rather than need, but the diagnosis does not change and should be based on scientific criteria.

ETHOLOGY

The process of scientific discovery often begins with an unexpected observation that forces researchers and/or clinicians to reconsider [their thinking relative to] existing theory and formulate new hypotheses that better explain their findings. Koch's Postulates, Harvey's work on blood flow, Darwin's evolution, Fleming's penicillin are examples of ethological discoveries. Facts that can be well-established from observation, and hypotheses supported by evidence become specific explanations. Accurate observations of human behaviors have proven invaluable in sound scientific research and diagnosis of disease.

It is a major point of this chapter that reliable methods such as clinical ethological study, using non-invasive objective measurement may represent a far better investment of research funds than controlled epidemiological studies. Astute clinical observation aided and corroborated by objective measurement and new imaging methods offer significant promise for identifying the causes of masticatory diseases and disorders and susceptibility characteristics of patients.

For dentistry to advance in the management of masticatory disorders from an art to a science, a systematic approach to gathering and interpreting clinical evidence must be refined. Its elements must be consistent with those of basic sciences such as morphology, physiology and biochemistry. This body of knowledge must be fed by relevant clinical research and, as a result, generate better strategies for identifying and solving problems in diagnosis and management of masticatory diseases and disorders.

CLINICAL ETHOLOGY

By coming to a dentist a patient asks to participate in the reproduced experiment that is dental care. They are asking, "Doctor, can you repeat your most successful results of past therapy on me?" Treatment of human beings demands a methodology capable of identifying and reproducing the conditions of past

successes. Every act of treatment is an experimental attempt to reproduce successful results of the past.

The clinician must contemplate previous patients with the same disease and whose characteristics resemble the patient being considered. This process is called "clinical experience." Understanding of that experience is "clinical judgement." A good clinician must evaluate the conditions associated with success or failure to decide how to improve future performance. Such method of investigation is called "retrospective study." The data for such study is patient records. This is the clinical use of ethologic methodology. It is scientific.

Clinicians are capable of correlating the knowledge gained from such retrospective studies with proper non-invasive measurement tools to find solutions to problems previously thought to be unsolvable and thus provide better care for sick people. A good clinician can benefit from any inanimate objective measuring device which improves his or her sensory acuity. It should be self-evident that scientific precision in making accurate diagnoses can be increased by improving the detail, accuracy, objectivity and consistency of protocol in obtaining clinical data from patients.

EVIDENCE-BASED CARE

Information obtained from electromyography, electrosonography and electrokinetic tracings analyzed properly in retrospective studies aid in assessing what a specific masticatory disease does to a patient and the effect treatment has on that disorder. This is scientific. It is the essence of evidence based care.

A clinician whose sole measure of success is relief of pain does not know what was done to the patient to get that result. This is not scientific. It does not constitute evidence.

Human beings often have a strong desire to identify trends and infer causes which cannot be intellectually sustained. People often confuse correlation with causality. They often correctly identify certain parameters of a trend but wrongly assume something else happening simultaneously to be cause. It is important, therefore, to differentiate experiential learning from intellectual learning.

Intellectual learning is independent of emotion and is dominated by language, books, instruction, logic and analysis. Science is the human intellectual effort to make sense out of nature. Science represents a medium of logical analytical resolution of conflicts between experiential learning, which is subjective and coincidental, and intellectual learning which is meaningful and objective.

In our search for understanding of the diseases and disorders manifesting orofacial pain, this differentiation between intellectual learning and experiential learning is crucial. The U.S. Congress has established Federal Rules of

Evidence for use in the courts. Rule 702 states that the word "knowledge connotes more than just subjective belief or unsupported speculation." The ultimate test of scientific knowledge is whether it can be tested. Scientific methodology is based on generating hypotheses and testing them to see if they can be falsified. The criterion of refutability, testability or falsibility is what distinguishes science from pseudoscience.

EVIDENCE VS. INFERENCE

Evidence has been defined variously as the means by which a fact is established; a body of facts on which a proof is based; and facts that tend to clarify, support or prove a point in question. Inference is a probable conclusion, not based on deduction, but loose usage, experience, or statistical correlation. Inference does not absolutely establish a premise but constitutes a demonstration of probability.

"Circumstantial Evidence" is events and occurrences which establish reasonable grounds by which a fact is substantiated. Circumstantial *evidence* is an example of inference. It is considered soft rather than hard evidence.

Epidemiology is another example of inference. Epidemiology is concerned with the incidence of a disease in populations. It addresses whether an agent can cause a disease, not whether it did cause any one patient's disease. Specific causation is beyond the domain of the science of epidemiology. It is a soft science based on manipulation of statistics.

There is often confusion between correlation and casualty based on subjective experience. The vast majority of correlated sequences cannot be casually related. The study of "TMD" is overladen with experiential subjective beliefs.

There are those such as Greene, Mohl⁴, and LeResche³ who advocate pain as a gold standard for the diagnosis of "TMD." Pain is a presumption, however, which is untestable, unfalsifiable, unmeasurable and unreliable, and therefore must be considered unscientific as criterion for research. Inferential use of such statistics must be regarded as weak and very soft science. Epidemiologic studies of "TMD" based on statistical manipulation of pain complaint is really pushing the limits of scientific reasonableness.

We are often led to believe that natural systems conform to a Bell Curve. "Normal" has been defined by Gaussian distribution or the Bell Curve as we know it. Researchers leave out two standard deviations at each end of the Bell and define normal as the 95% in the middle of the curve. This usage begs the question "What value can there be in definition of normal relative to "TMD's" in which extremes of good health are as abnormal as extremes of bad health?" If the occurrence of any such disease were greater than 5%, normal controls in epidemiological studies could be both symptomatic and complainant. Such a

definition of normal is also contrary to a defined purpose of epidemiology which is to discover the distribution of diseases in populations, not define it. In reality, few biological problems conform to a Bell Curve, and "TMD" is one that does not. Basing evaluation of treatment efficacy for any patient on reliance of statistics and results of double-blind controlled studies from the dental literature defines "INFERENCE" not "EVIDENCE." The United States Federal Judicial Center recently published "The Reference Manual on Scientific Evidence." It establishes that epidemiologic double-blind studies *cannot* prove causation. Based not on individual case study, but on representative samplings, such studies cannot ascertain very small effects. They address whether an agent can cause a disease or a treatment might work, not whether it did cause a disease or will work for treatment. There is no logically rigorous definition of what a statement of probability means with reference to an individual instance. Interpretation and manipulation of epidemiologic statistics does not constitute scientific evidence or explanation; it is inference.

Epidemiology and double-blind controlled studies on "TMD" are being challenged. Normal has never been unequivocally defined and there are not two well-delineated states such as diseased and disease-free relative to masticatory diseases and disorders. "TMD" is not one disease entity but a grouping of many different conditions (now known as masticatory diseases and disorders). In virtually all epidemiological research, "TMD" has been studied as a group entity, so the results are meaningless. Pain as a gold standard is unscientific. It is irrefutable having no testable, observable or measurable phenomenology. Psychometric testing based on the patient's self-report of pain has never been proven to be more appropriate than objective physiologic measurement of the study of "TMD" phenomenology. No double-blind study based on pain can possibly be considered hard scientific evidence.

Fortunately, hard scientific evidence is available to aid in documenting the physiologic status of our patients, advancing our understanding of temporomandibular disorders and guiding doctors toward better patient care. Intellectual learning is alive and well in the diagnosis and treatment of orofacial pain.

Evidence-based care is being practiced by many clinicians. Using non-invasive, objective, electronic measurement such as electromyography, electrosonography and electrokinetic range of motion tracings, doctors are now able to confirm that status of the musculoskeletal facial pain patient before, during and after treatment. Thus one can accurately evaluate what was done to the patient to get the result. This is evidence. The validity construct and ethological methodology for clinical study are well-established in the scientific literature."

Relative to making a differential diagnosis in masticatory diseases and disorders, objective electronic measurement can aid in:

- judging the severity of the disorder
- strengthening the diagnostic hypothesis
- predicting the prognosis
- estimating the responsiveness to alternative therapies in the future
- determining the response to present therapy

These instruments are FDA approved for safety and have earned the ADA seal for accuracy of their measurement. When non-invasive instrumentation is used:

- There is no variation in the senses of the examiner
- There is no tendency to record inference
- There is never entrapment by prior expectations.

IS THERE A CAUSAL RELATIONSHIP BETWEEN MALOCCLUSION AND "TMD"?

The proper approach to this disagreement should now be obvious. With "TMD" no longer considered an appropriate diagnosis, then the question properly rephrased becomes "Could there be or is there a causal relationship between malocclusion and any of the 24 specific masticatory diseases and disorders?" Any respectable scientist would study the EVIDENCE presented on each of the 24 problems, listed on the Hierarchy, on an individual basis to answer the question appropriately. Broken down to this level of specificity a causal relationship can be demonstrated such that successful occlusal management of certain myogenous problems results in repeatable improvement of relevant measurable parameters and symptoms.