A Reprint From the *Textbook of Functional Medicine*

WEB-LIKE INTERCONNECTIONS OF PHYSIOLOGICAL FACTORS

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Introduction

Understanding the scientific basis and clinical applications of functional medicine and a "whole patient" approach to health care requires that clinicians fully appreciate the interconnectedness of organ system function with biochemical and physiological processes. Simplistic models of health and disease developed decades ago may no longer be accurate or clinically useful insofar as they fail to reflect the more recently discovered complex and multifaceted interrelationships. (Figure 10.2 uses the functional medicine matrix to depict some of this complexity.) Numerous mechanisms mediate these interrelationships, including, but not limited to, those that can be described as biochemical, hormonal, neurological, immunological, piezoelectric, and physical or mechanical. Ultimately, we are forced to dissolve the artificial intellectual boundaries we have created between organ systems and expand our appreciation of individual molecules, cellular messengers, and the physiologic mechanisms that mediate intercellular communication and coordinate interorgan function.

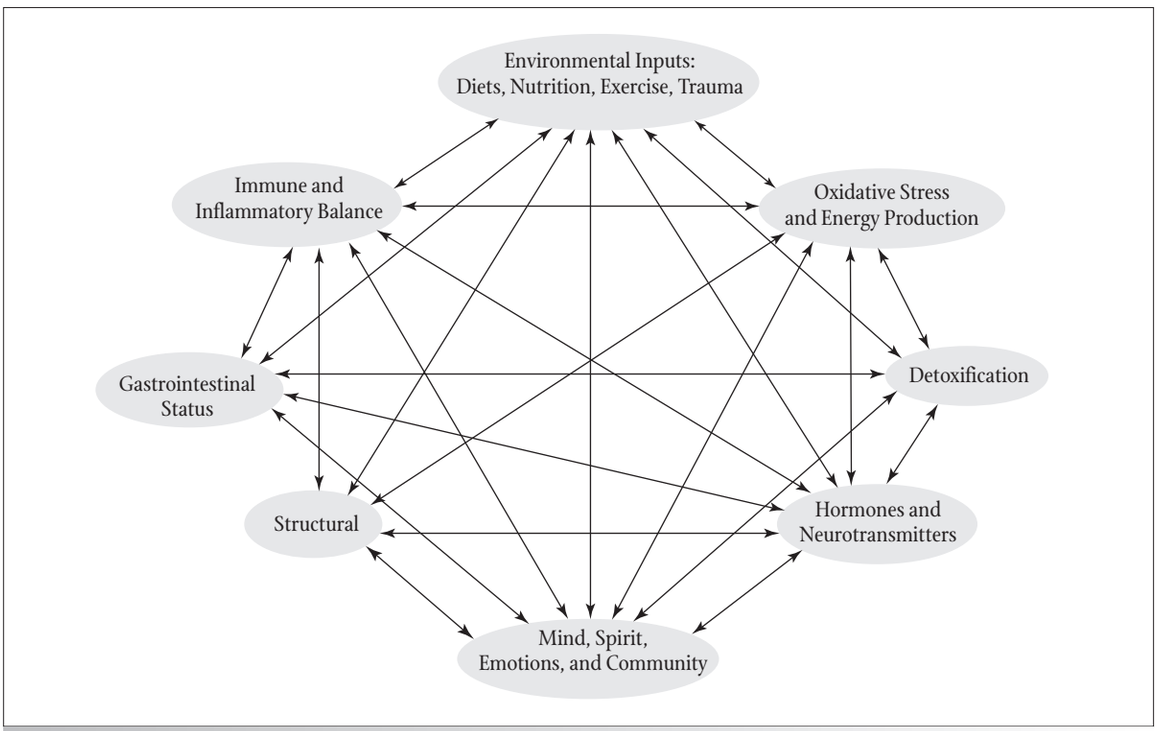

FIGURE 10.2
FUNCTIONAL MEDICINE MATRIX

Web-like Interconnections of the Functional Medicine Matrix

The following discussion provides some specific examples of this profound interconnectedness that is a foundational principle of functional medicine. We will survey current research literature documenting the interconnected nature of some key organ systems and disease processes. With these examples, clinicians will better appreciate how the gastrointestinal, immune, cardiac, neurologic, and other systems interact with and depend upon each other for optimal physiologic function. Likewise, clinicians will understand more completely how essentially any dysfunction or lesion in the body can have clinically significant implications and distant adverse effects. From this perspective, individualized clinical interventions can be designed and employed to deliver better health outcomes.

Gastrointestinal Tract and Liver

While the liver and the gastrointestinal tract share an obvious anatomic connection via the portal circulation, the functional clinical implications of this connection are often not fully appreciated. Not only is the gastrointestinal tract the recipient of massive amounts of "external information" in the form of nutrients, toxicants, and allergens that weigh in at more than 1,538 pounds (700 kilograms) per year, but the gastrointestinal tract is also a reservoir for the several hundred species and subspecies of yeast, bacteria, and other microbes with the potential to modify hepatic function (e.g., detoxification) and overall health (e.g., immune response) by numerous mechanisms and with positive effects or negative consequences.

The various organs and tissues of the gastrointestinal tract perform the complex functions of digestion, absorption, exclusion, excretion, immunologic defense, antigen sampling, and temporary storage of food residues and other substances that have been ingested. The mucosa is selectively permeable and allows the absorption of nutrients and other molecules via transcellular and paracellular routes. Compromise of mucosal integrity due to injury from antigens, infection, systemic inflammation, or toxicants such as ethanol or nonsteroidal anti-inflammatory drugs, increases absorption of potentially harmful substances that are normally excluded when mucosal integrity has not been breached. Materials that are harmless when rejected by the selectivity of the intestinal mucosa can, when inappropriately absorbed, serve as a source of inflammatory and immunogenic stimuli for the embedded macrophages in the liver (Kupffer cells) and also for the systemic immune system and the brain's embedded astrocytes and microglia. This phenomenon is clearly demonstrated by the neurological complications and focal white-matter lesions seen in the brains of patients sensitized to the dietary antigen gluten; in this scenario, it appears that dietary antigens cross a damaged mucosal lining and escape filtration by the liver to produce a systemic inflammatory response that manifests clinically as neurologic disease.[23,24] It seems likely that other antigens are also capable of inducing a systemic inflammatory response in susceptible individuals.

The two most voluminous substances in the gastrointestinal tract are food antigens and microbial metabolites and debris, notably lipopolysaccharides (LPS, endotoxin) from gram-negative bacteria. These foreign substances normally excluded by an intact mucosa can serve as mediators of physiologic disruption (hence the importance of their exclusion), and indeed this is what has been observed in experimental and clinical data. For example, in patients with autism, increases in inflammatory mediator production are seen following exposure of monocytes to dietary allergens and LPS.[25] We also note that LPS is a potent inhibitor of numerous cytochrome P450 biotransformation pathways, thus leading to impaired drug metabolism as demonstrated in recent clinical trials.[26,27] The implications of these data are profound and correlate closely with phenomena observed in clinical practice, namely that patients with irritable bowel syndrome—a condition causatively associated with both food intolerance and bacterial overgrowth of the small bowel—commonly report environmental sensitivity and medication intolerance. One plausible answer to the conundrum of the chronically unwell patient—typified by the patient with chronic fatigue or environmental illness—now becomes clear: overgrowth of the small bowel with LPS-producing bacteria leads directly to the gastrointestinal symptoms of gas and bloating, with immune system activation,[28] and also reduces hepatic clearance of metabolites, toxicants, and xenobiotics to which the patient eventually becomes sensitized (immunologically and/or non-immunologically). This explains, at least in part, the rationale for and impressive clinical efficacy associated with the implementation of clinical therapeutics that simultaneously improve intestinal microecology, improve mucosal integrity, and provide biochemical/nutritional support for the processes of detoxification.[29,30]

Gastrointestinal Tract and Immune System

Any discussion of the role of the gastrointestinal tract in relation to the immune system must include a view of the gut that is inclusive of its contents of food antigens, intraluminal microbes, and their debris and metabolic products. When the gut is simply pictured as a passive semi-sterile tube with food entering one end and feces exiting the other, then it would appear an unlikely locus of immunogenic stimulation and neurogenic inflammation that can have systemic health consequences.[30-35] Conversely, appreciation of the manifold quantitative and qualitative variables that can exist hidden from both the clinician's external view and the endoscopist's internal

camera enables practitioners to have a more realistic perspective on the influence that gastrointestinal function, dietary antigens, and microflora can have on extra-gastrointestinal processes and overall health.[36,37]

The combination of a hypersensitive/dysregulated immune system and exposure to dietary antigens sets the stage for the clinical phenomenon commonly described as "food allergy." Diverse in frequency, duration, severity, and quality, these immune-mediated adverse reactions to foods can precipitate or exacerbate a wide range of clinical manifestations including rhinoconjunctivitis, chronic sinusitis, dermatitis, epilepsy, migraine, hypertension, joint inflammation, and mental depression.[38,39] The immunopathogenesis generally includes multiple mechanisms and is not limited to mediation via IgE antibodies and histamine. Indeed, the pathophysiology of "food allergy" is commonly seen with numerous (not singular) aberrations in physiologic function, including responses mediated by or resultant from antibodies (including IgE, IgG, and/or possibly IgA classes of antibodies), cytokine-mediated responses (e.g., TNF-α), increased intestinal permeability, occult gastrointestinal inflammation, and alterations in gastrointestinal microflora.[40] To be more complete, our conceptualization of "food allergy" must also include awareness of enterometabolic disorders (i.e., the inter-connections between food, intestinal flora, and systemic health[41]) as well as contributions from neurogenic inflammation (i.e., the translation of immunogenic inflammation to a neurologic signal with systemic proinflammatory effects[42]).

Aberrations in gastrointestinal microflora can provoke a cascade of physiologic responses that may lead to widespread physiologic imbalances and result in a variety of clinical manifestations that may or may not conform to a recognized pattern or named disease even though the patient is highly symptomatic.[43] Furthermore, we can conclude from recent literature that the concept of molecular mimicry is now well established and that it provides us a model with which to apprehend the induction of immune dysfunction (especially autoimmunity) by microorganisms with immunogenic epitopes that are structurally similar to those in human tissues.[44] Thus, the link between "dysbiotic" gastrointestinal flora such as *Klebsiella pneumoniae* and systemic immune-mediated inflammatory disorders such as ankylosing spondylitis and chronic uveitis has a biological and scientific basis. Individualized assessment and treatment of such dysbiotic loci, whether in the gut, genitourinary tract, or nasopharynx, are likewise supported by current research and offer the hope of cure rather than an endless and additive cycle of anti-inflammatory and anti-rheumatic drugs. For example, evidence now shows that the systemic autoimmune disease Wegener's granulomatosis may be triggered and perpetuated by molecular mimicry with occult respiratory infections caused by *Staphylococcus aureus*, and that eradication of the infection can result in clinical improvement and reduced need for ongoing anti-rheumatic medication.[45-47] In addition to molecular mimicry, microbes (i.e., occult infections and environmental exposures) can also alter immune regulation by serving as a source of superantigens, which cause widespread and multifaceted immune dysfunction with resultant proinflammatory effects contributing to the exacerbation of allergy and autoimmune disease.[48]

Immune System and Cardiovascular System

The role of subclinical inflammation in the etiopathogenesis of atherosclerosis is no longer an issue of conjecture, as it has become a well-established aspect of the disease process. Even slight elevations in high-sensitivity C-reactive protein are associated with a significantly increased risk for cardiovascular morbidity and mortality in otherwise "apparently healthy" individuals.[49] With the increasing irrefutability of these data, pharmaceutical companies have scrambled to develop and sell drugs that can reduce this low-level inflammation, while physicians with a broader perspective have directed their energies toward intensifying their patient-centered search for the source(s) of inflammation in each individual patient. For example, subclinical inflammation can result from dietary indiscretion,[50] disturbed sleep,[51] and vitamin D deficiency;[52] in any of these situations, addressing the underlying causes of the inflammation with multicomponent nutritional/lifestyle interventions may deliver more effective health improvement than can the long-term use of inflammation-suppressing medications.[53-55]

Gastrointestinal Tract, Liver, and Neurologic Systems

The last several years have witnessed an increased appreciation for the influence that the gut and liver have on the brain, and advancements in functional assessments are now documenting analytically what was at one point known only clinically—that the status of the gut and liver have profound effects on the functioning of the brain. Evidence supporting the existence of a clinically important gut-brain interconnection has been published consistently over many decades and in major journals. Today, among the most poignant examples are Parkinson's disease and the autistic spectrum disorders. Indeed, the strength of evidence supporting the hepatogastrointestinal link with these "neurologic" conditions is so strong that it could be logically argued that any treatment of these conditions that does not address the hepatic and enteric aspects of these diseases is therapeutically incomplete.

Although Parkinson's disease was once considered idiopathic, we now recognize it as being a multifaceted

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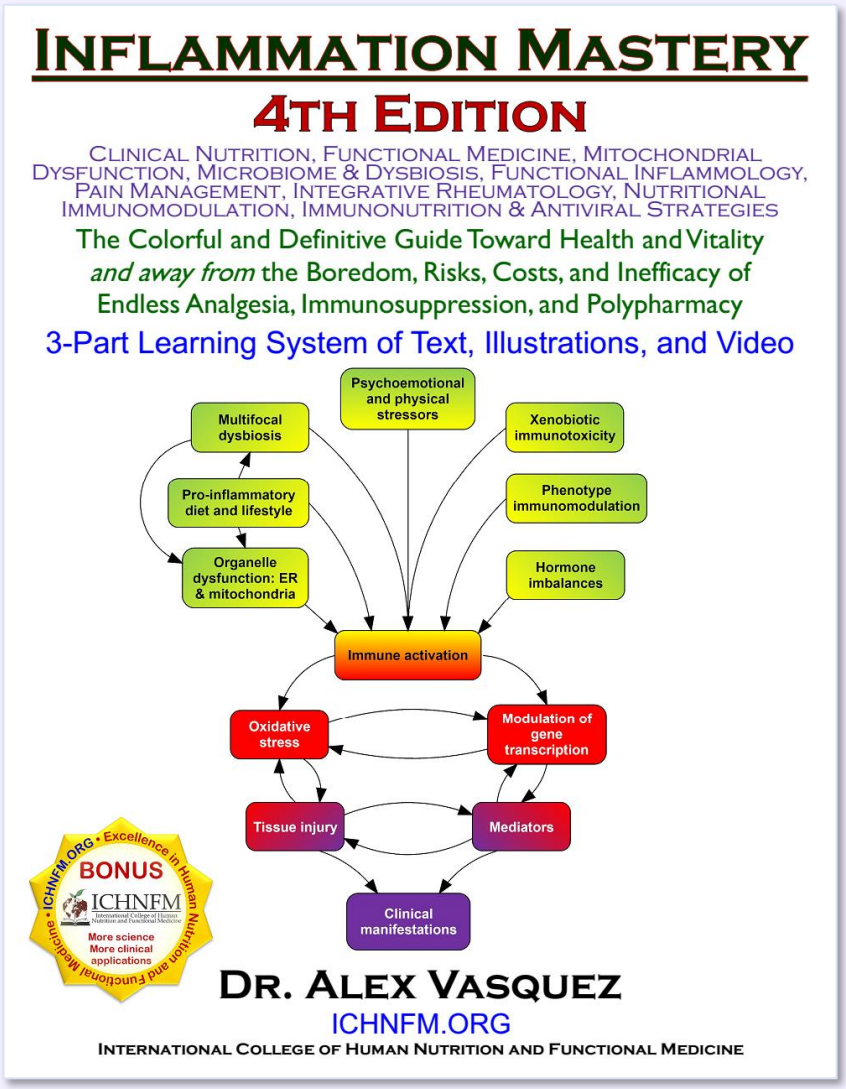

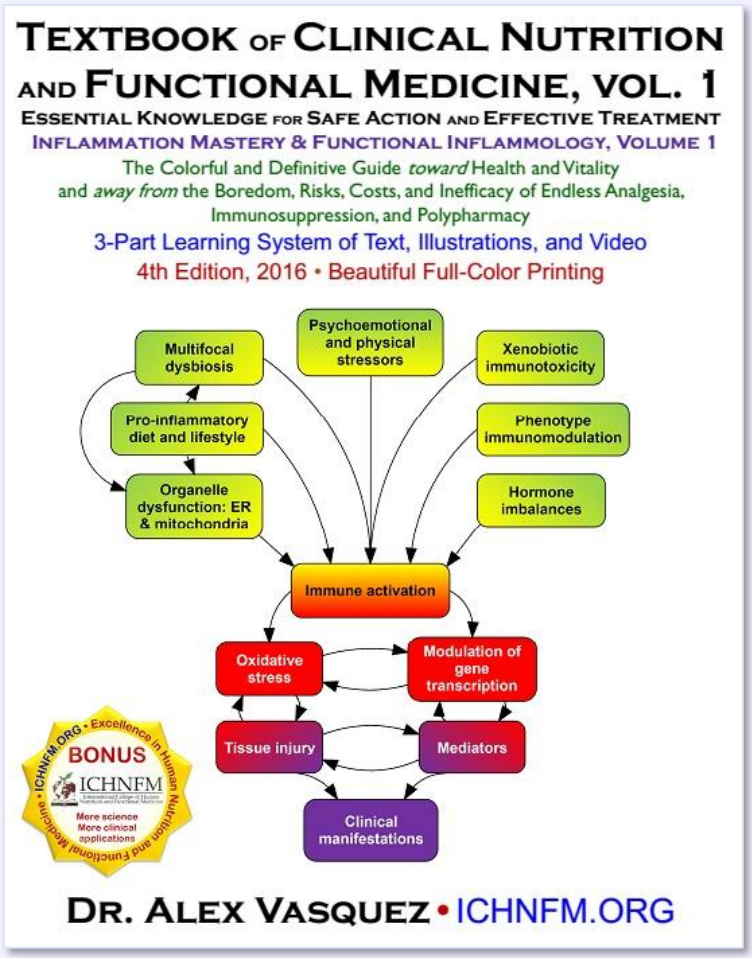

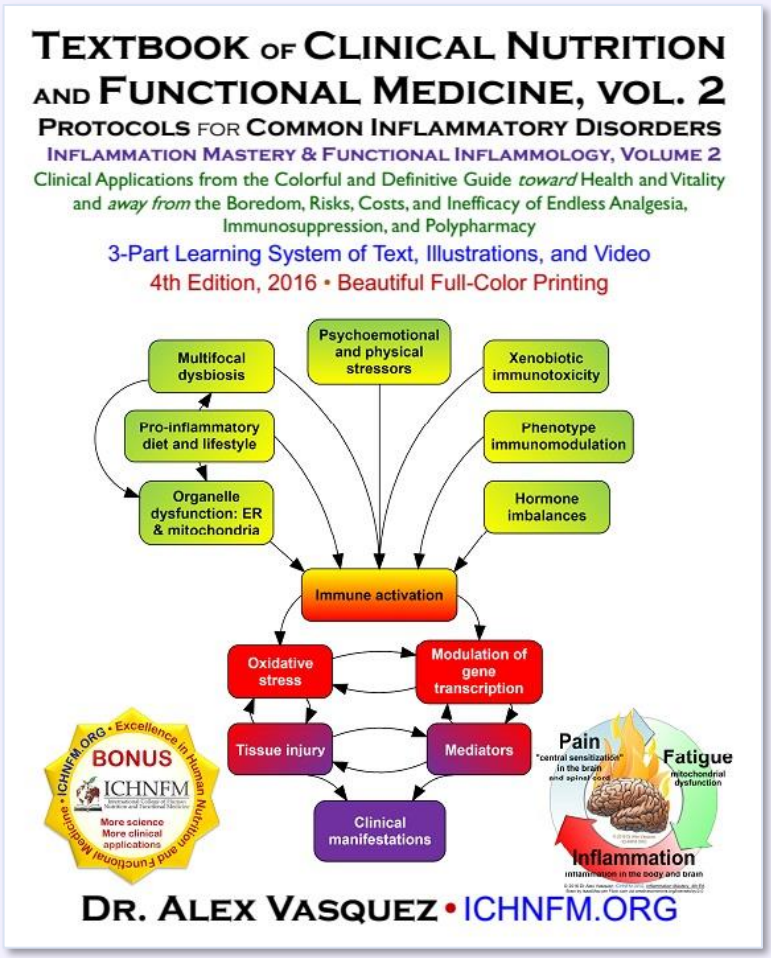

disorder associated with defective mitochondrial function, impaired xenobiotic detoxification, and occupational and/or recreational exposure to toxicants, particularly pesticides. These associations align to create a new model for the illness based on exposure to neuro-toxicants such as pesticides,[56] which are ineffectively detoxified[57] and then accumulate in the brain,[58] inducing mitochondrial dysfunction[59] and oxidative stress,[60] and leading to the death of dopaminergic neurons. Therefore, from the perspective of both prevention and treatment, the clinical approach to Parkinson's disease must include pesticide avoidance and optimization of detoxification to prevent the neuronal accumulation of neurotoxic mitochondrial poisons. The plan must also include optimization of nutritional status, antioxidant capacity, and mitochondrial function.[61]

The view that autism is a behavioral problem unfortunately continues to permeate present-day medical treatment of this condition, and many pediatricians and psychiatrists still advise only behavioral therapy and medicalization with psychoactive pharmaceuticals, particularly selective serotonin reuptake inhibitors (SSRIs).[62,63] While these interventions produce modest improvements over those seen in control groups, neither intervention remotely addresses the complex underlying physiology nor offers the possibility of cure, and SSRI use in children is highly controversial due to the association with increased incidence of suicide.[64] We now know that autism is a multifaceted disorder associated with gastrointestinal inflammation, nutritional deficiencies,[65] multiple food allergies and intolerances,[66] impairments in liver detoxification and resultant accumulation of xenobiotics, the majority of which have neurotoxic and/or immunotoxic effects.[67] Thus, autism is not a behavioral disorder *per se*; rather, it is a gastrointestinal-allergic-immunological-toxicant-nutritional-environmental disorder, and the behavioral/cognitive abnormalities are symptoms of the underlying complex and interconnected pathophysiology.

Musculoskeletal System, Neurologic System, Immune System

The adverse effects of a dysregulated immune system upon the musculoskeletal system are well known for their contributions to autoimmune diseases such as rheumatoid arthritis. In this classic scenario, the immune system is the effector, and periarticular structures, synovium, and joint surfaces are the targets of inflammatory and destructive processes that result in joint destruction and pain that affect the musculoskeletal and neurologic systems, respectively. This model holds that the direction of events flows from the immune system (autoimmunity) to the musculoskeletal system (target site) to the nervous system (perception of pain). This popular model must be updated in light of current research.

The phenomena of neurogenic inflammation and neuronal plasticity demonstrate the active, effector functions of the sensory nervous system and exemplify the extent to which the Cartesian model of the sensory nervous system (i.e., as exclusively afferent and passively receptive) is no longer valid.[68,69] Much of the musculoskeletal inflammation seen in clinical practice appears due, in large part, to inflammation that originates from and is mediated by the sensory nervous system through the release of proinflammatory mediators from sensory nerves in periarticular tissues.[70,71] Furthermore, evidence is accumulating that neurogenic inflammation can result from a heterogenous group of diverse stimuli, including allergens, environmental chemicals, and pain distant from the site of arthritis.[72,73] Likewise, evidence that intentional relaxation[74] as well as acupuncture[75] can modulate inflammatory pathophysiology indicates that psychoemotional variables and nonbiochemical therapeutics are important clinical considerations for patients with inflammatory diseases.

Evidence also suggests that musculoskeletal therapeutics such as spinal manipulation may influence immune responsiveness. Brennan et al.[76,77] showed that chiropractic spinal manipulation resulted in an acute increase in phagocytic capacity of polymorphonuclear neutrophils, and that this result was seen only following authentic (versus sham) manipulation, and that the effect was proportional to the increase in serum levels of substance P, a multifunctional molecule that acts as a neurotransmitter as well as a proinflammatory messenger. While the clinical implications of these data are yet to be clarified, they clearly demonstrate that the immune system is sensitive to mechanical stimuli.

Beyond Biochemistry and Neurophysiology: Piezoelectricity as a Mechanism for Intersystem Connectedness

Piezoelectricity, the continuum between mechanical stress and bioelectric conduction, is a well-established aspect of organic matter, affecting all vertebrates and, therefore, humans. Notably, the nervous system in general and the spinal cord in particular demonstrate an intrinsic dipole moment that is demonstrable across species of vertebrates.[78,79] In 1977, Lipiski from Tufts University School of Medicine[80] summarized the current research of the day and speculated on the effects of spinal manipulation, yoga, and acupuncture as mediated via the body's inherent pyroelectric and piezoelectric properties. Lipinski's literature review (particularly including the work of Bassett[81]) suggests that "piezo-electricity present in many biological systems may theoretically control cell nutrition, local pH, enzyme activation and inhibition, orientation of intra- and extra-cellular macromolecules, migratory and proliferative activity of cells, contractility of permeability of cell mem-

branes, and energy transfer." With these concepts and possibilities considered, we can construct a conceptual bridge linking mechanical stimuli such as massage, manipulation, exercise, and yoga, and (neuro)electrical stimuli such as acupuncture, meditation, prayer and intentionality, to plausible biochemical/physiological effects that translate into observed clinical benefits. This integrated model helps to explain the effects of "energetic" therapeutics such as moxibustion, acupuncture, and yoga that may be mediated by nonbiochemical physiologic mechanisms. Furthermore, this model also helps us to understand hitherto unexplainable phenomena such as the well-reported sensitivity that some people display to changes in the weather and the positioning of their bodies in relation to electromagnetic fields of the planet, electrical equipment, and power lines. Piezoelectricity may also be the physiologic conduit that transmits the effects of "distance healing," prayer, and intentionality.[82-84]

Summary

Human physiology is complex and treatment plans must be multifaceted to reflect this complexity. Cells, tissues, and organ systems work in concert—not in isolation—and therefore effective intervention generally requires improvement in numerous organ systems. As the artificial boundaries between organ systems dissolve, a unifying theme emerges, namely that the attainment, preservation, and re-establishment of health must be all-encompassing. Programs and paradigms related to the treatment of disease and the attainment of optimal health must reflect appreciation of environmental, physical, mental/emotional, nutritional, biochemical, hormonal, immunologic, neurologic, and gastrointestinal components of our existence that coalesce without boundaries to make the human body and our experience of life itself. Thus, new frontiers in health care will be reached not solely when new discoveries occur, but also when the integration of these discoveries into a cohesive, multifaceted, unified healthcare model prepares the way for more accurate understanding and more effective interventions. Healthcare providers of diverse backgrounds (e.g., ND, DC, MD, DO, RD, RN, LAc, and others) can and must work together to offer scientifically-based, multifactorial interventions that are adapted to the specific needs of individual patients.

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Additional articles and book excerpts have been amended to the previous publication in order to provide context and orientation to the author's main works.

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  - Migraine: https://www.inflammationmastery.com/**migraine**
  - Complete protocol: https://www.inflammationmastery.com/**book-nutrition-functional-medicine**
- **Main: https://www.ichnfm.org/ This is actually a very rich website with many blogs and videos**
  - https://www.ichnfm.org/antiviral2019 and the long series starting with https://www.ichnfm.org/**antiviral**, https://www.ichnfm.org/antiviral2, https://www.ichnfm.org/antiviral3, https://www.ichnfm.org/antiviral4, and continuing…
  - https://www.ichnfm.org/**braininflammation**

SOCIAL MEDIA UPDATES: Note that updates are made on a regular basis to the following social medial pages, with some overlap but also some topic-specific specialization, which is self-explanatory by the titles of these pages:

- **Dr Alex Vasquez 's Inflammation Mastery https://www.facebook.com/InflammationMastery**
- Migraine Headaches, Hypothyroidism, and Fibromyalgia https://www.facebook.com/MigraineHypothyroidismFibromyalgia
- International Journal of Human Nutrition and Functional Medicine https://www.facebook.com/IJHNFM
- International College of Human Nutrition and Functional Medicine (higher quality and academic news) https://www.facebook.com/IntCollHumNutrFunctMed
- Revista Latinoamericana de Nutrición Humana y Medicina Funcional https://www.facebook.com/RevLatinoNutrHumMedFunc
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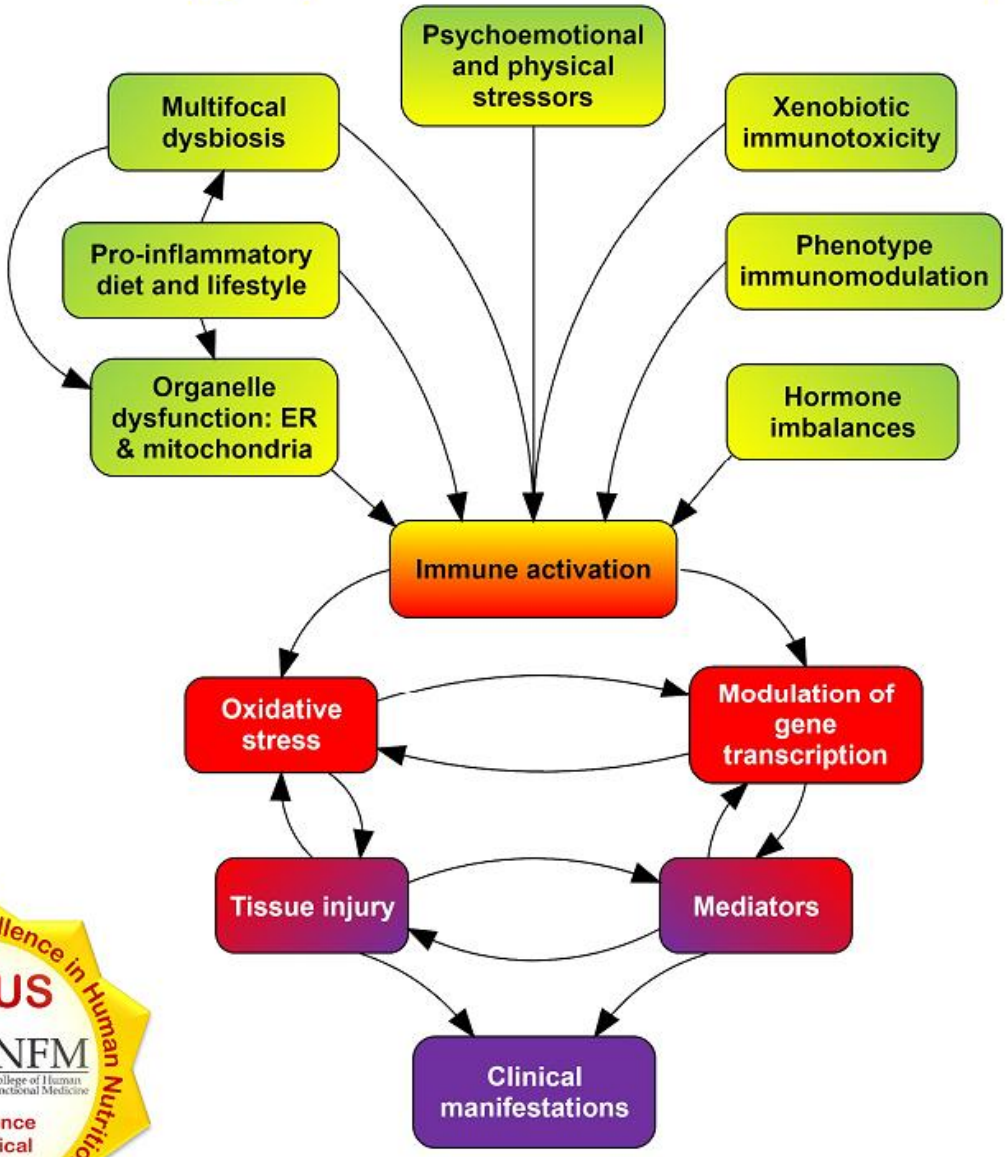

Dr. Alex Vasquez

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As of 2019 and for the foreseeable future, the most current versions of all major patient management and clinical treatment protocols is published in ***Inflammation Mastery, 4th Edition*** as a single volume of 1,182 pages available in full-color print at discounted pricing directly from ICHNFM from https://www.ichnfm.org/im4, while the digital formats are available via several different platforms, including Amazon's Kindle (free) software, Barnes and Noble's Nook, Apple iBook, etc as hyperlinked below. Per popular request by students who were studying (as a required textbook) only one section at a time, "IM4" was also published in two easier-to-carry separate volumes under the name ***Textbook of Clinical Nutrition and Functional Medicine***, which contain chapters 1-4 (pages 1-712+index) and 5 (713-1154+index), respectively. Video access is included with ***IM4*** and ***TCNFM,1+2***. Availability in print and digital formats (examples): https://www.**ichnfm**.org/im4 , https://books.**apple**.com/us/author/alex-vasquez/id1139497284
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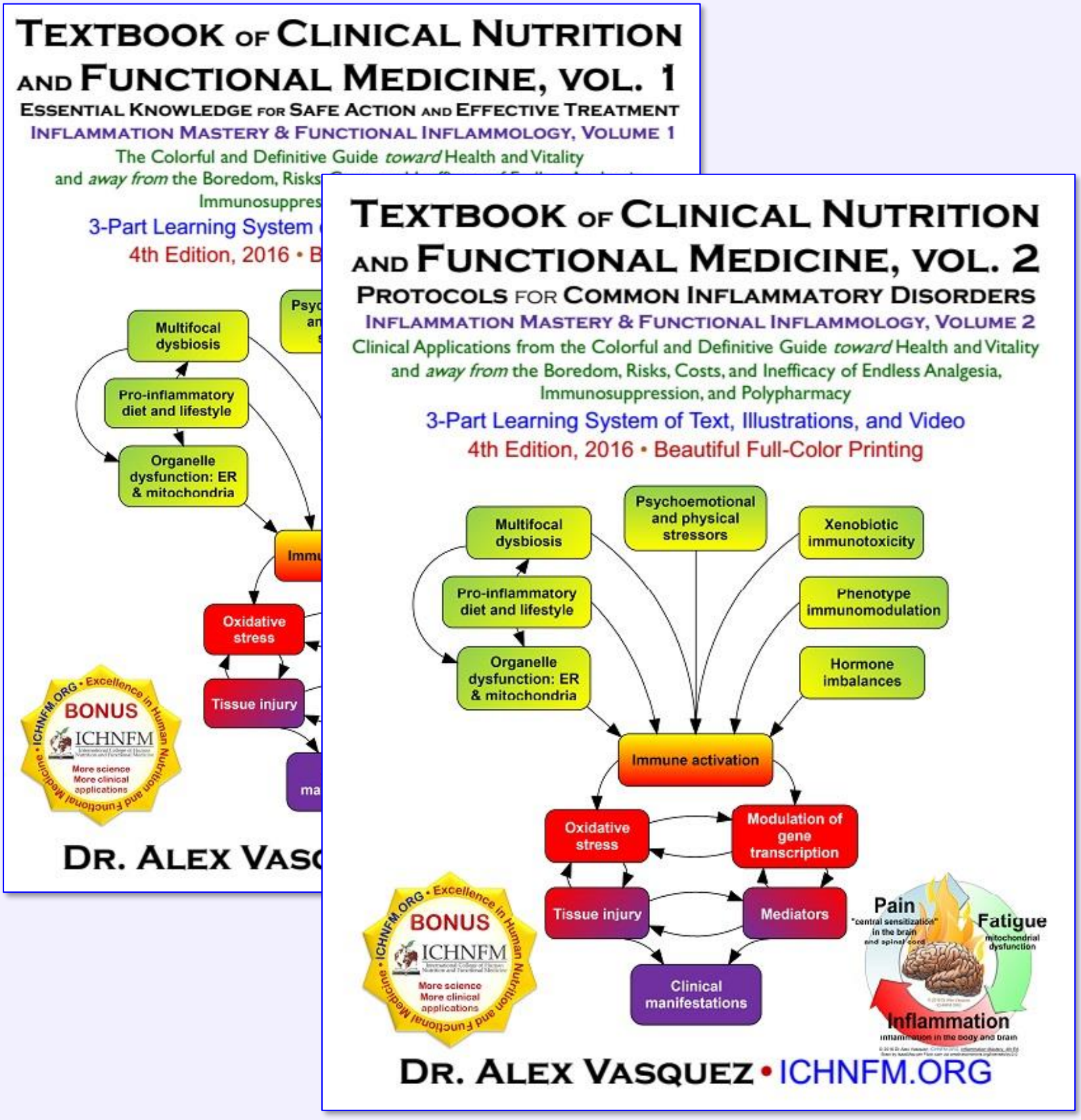

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Alex Vasquez D.C. N.D. D.O. F.A.C.N.

- Doctor of Osteopathic Medicine, graduate of University of North Texas Health Science Center, Texas College of Osteopathic Medicine (2010)
- Doctor of Naturopathic Medicine, graduate of Bastyr University (1999)
- Doctor of Chiropractic, graduate of University of Western States (1996)
- Fellow of the American College of Nutrition (2013-present)
- Former Overseas Fellow of the Royal Society of Medicine
- Editor, *International Journal of Human Nutrition and Functional Medicine* IntJHumNutrFunctMed.org. Former Editor, *Naturopathy Digest*; Former/Recent Reviewer for *Journal of Naturopathic Medicine*, *Alternative Therapies in Health and Medicine*, *Autoimmune Diseases*, *International Journal of Clinical Medicine*, and *PLOS One*
- Private practice of integrative and functional medicine in Seattle, Washington (2000-2001), Houston, Texas (2001-2006), Portland, Oregon (2011-2013), consulting practice (present)
- Consultant Researcher and Lecturer (2004-present), Biotics Research Corporation
- Teaching and Academics:
    - Director of Programs, International College/Conference on Human Nutrition and Functional Medicine ICHNFM.org
    - Founder and Former Program Director of the world's first accredited university-affiliated graduate-level program in Functional Medicine
    - Adjunct Professor, Integrative and Functional Nutrition in Immune Health, Doctor of Clinical Nutrition program at Maryland University of Integrative Health
    - Former Adjunct Professor (2009-2013) of Laboratory Medicine, Master of Science in Advanced Clinical Practice
    - Former Faculty (2004-2005, 2010-2013) and Forum Consultant (2003-2007), The Institute for Functional Medicine
    - Former Adjunct Professor (2011-2013) of Pharmacology, Evidence-Based Nutrition, Immune and Inflammatory Imbalances, Principles of Functional Medicine, Psychology of Wellness
    - Former Adjunct Professor of Orthopedics (2000), Radiographic Interpretation (2000), and Rheumatology (2001), Naturopathic Medicine Program, Bastyr University
- Author of more than 100 articles and letters published in *JAMA—Journal of the American Medical Association*, *BMJ—British Medical Journal*, *TheLancet.com*, *JAOA—Journal of the American Osteopathic Association*, *Annals of Pharmacotherapy*, *Journal of Clinical Endocrinology and Metabolism*, *Alternative Therapies in Health and Medicine*, *Nutritional Perspectives*, *Journal of Manipulative and Physiological Therapeutics*, *Integrative Medicine*, *Current Allergy and Asthma Reports*, *Nutritional Wellness*, *Evidence-based Complementary and Alternative Medicine*, and *Arthritis & Rheumatism*: Official Journal of the American College of Rheumatology

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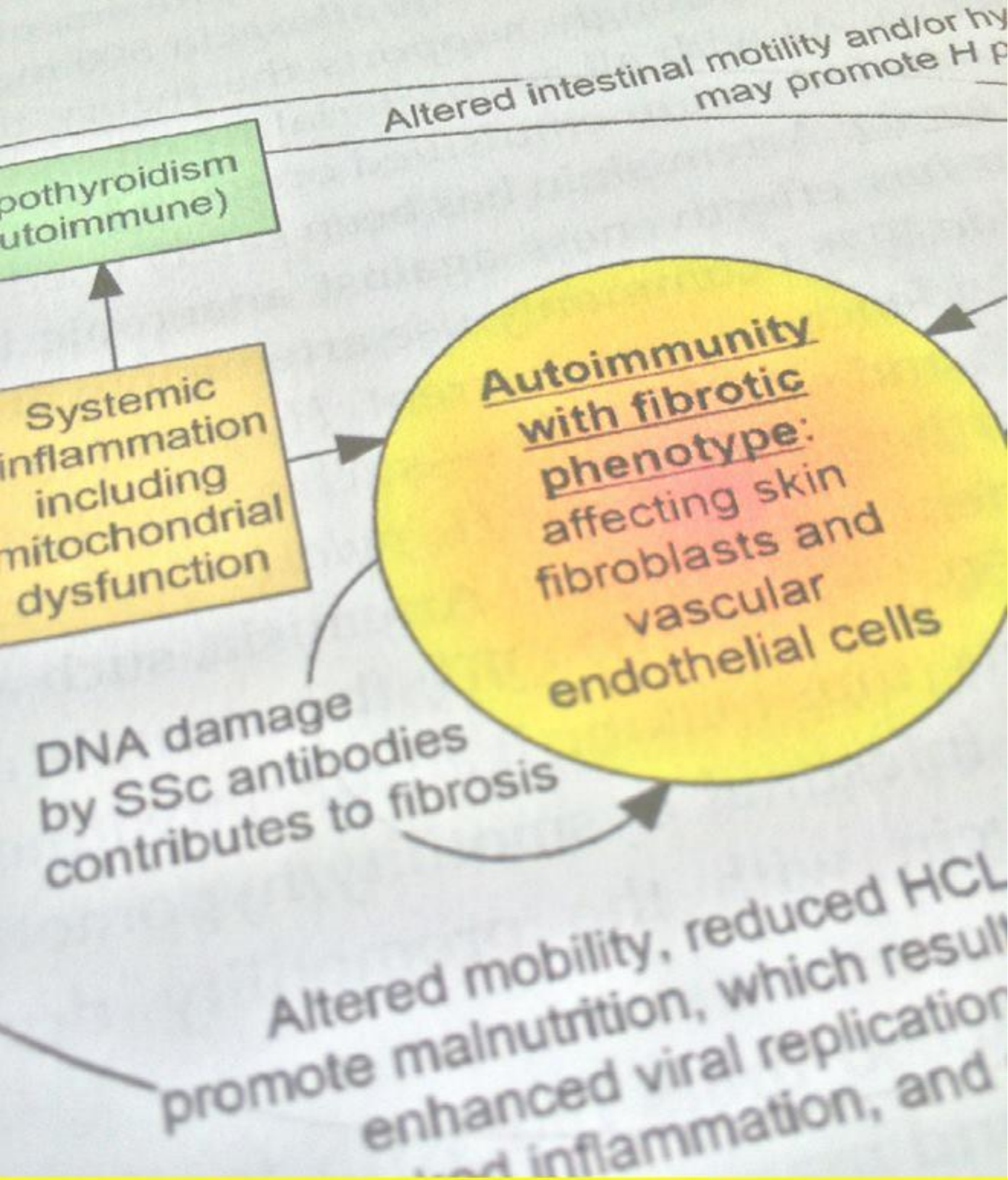

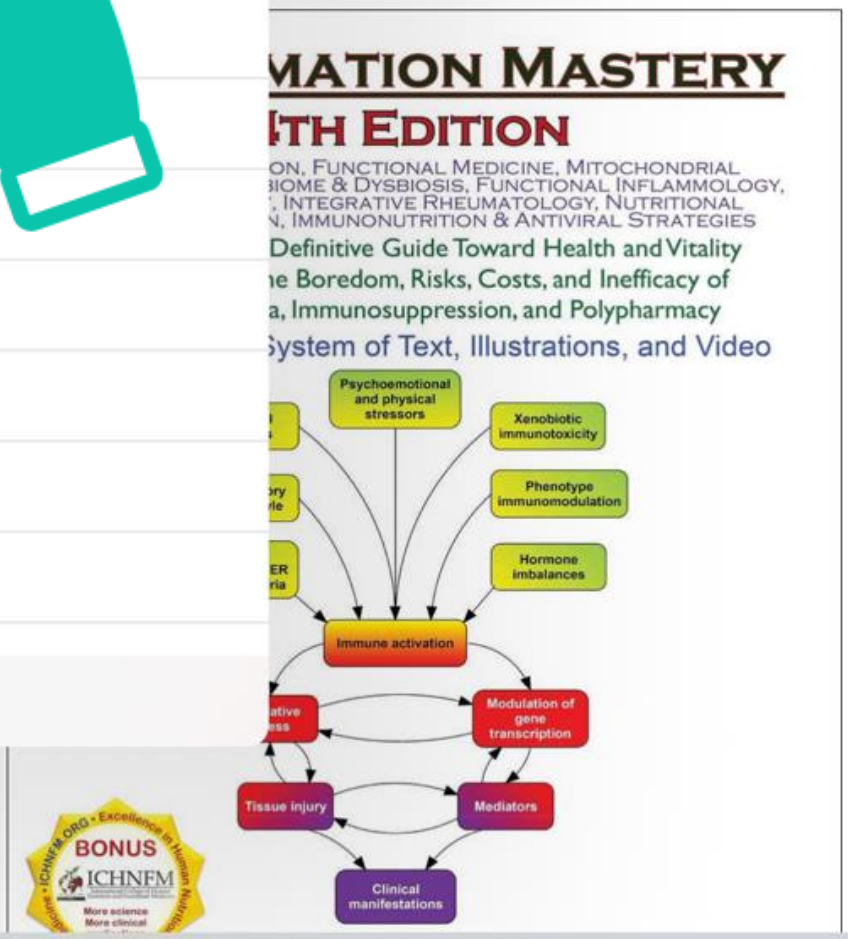

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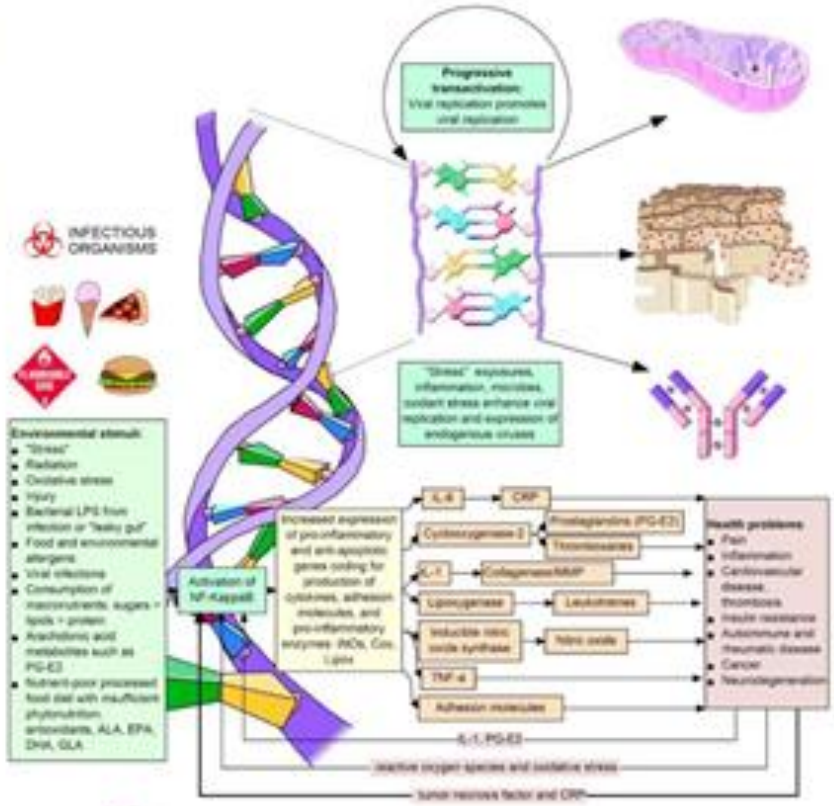

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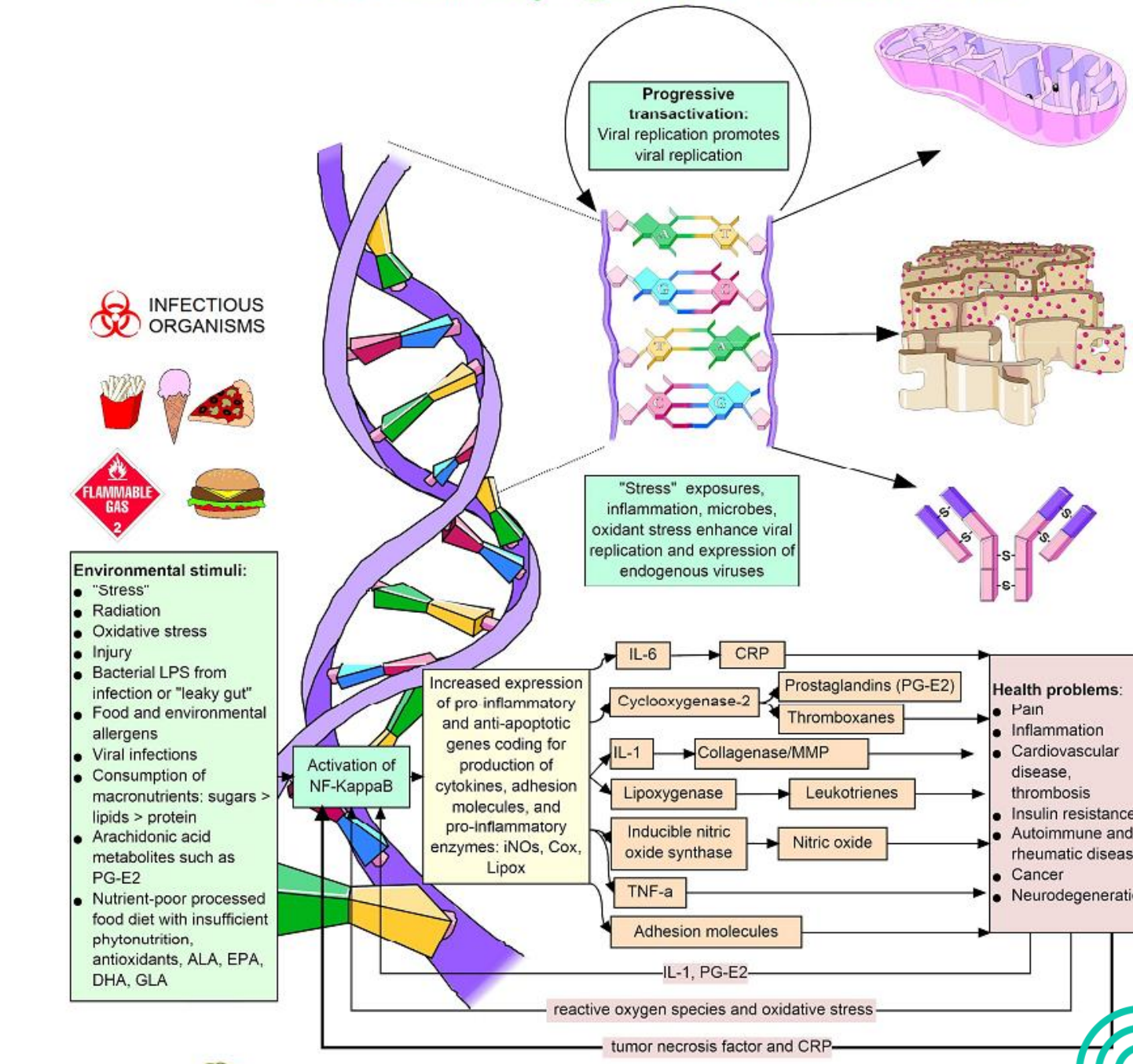

Dr. Alex Vasquez

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Concerns About The Integrity of The Scientific Research Process—Focus On Recent Negative Publications Regarding Nutrition, Multivitamins, Fish Oil And Cardiovascular Disease

Alex Vasquez, DC, ND, DO; Joseph Pizzorno, ND, Editor in Chief

Abstract

The next step in reestablishing credibility seems to us honesty and recognizing we all share a common goal of the health and wellness of the human community and the planet. Everyone agrees that the current healthcare system, despite its many incredible successes, is also showing its limitations and is no longer sustainable. We believe the solution starts with us the researchers and editors. A good first step might be formally recognizing the errors and showing how we can and *intend* to get better.

Evidence-based medicine—by definition—requires objective, reliable and accurate research and reviews from which to make the best decisions in patient care and public policy. The causes of inaccurate information, ranging from presumably innocent mistakes all the way to apparently intentional fraud, affect all scientific and biomedical disciplines.[1] While these accidental and intentional errors can derail our understanding of diseases and impact tens of thousands of affected patients such inaccuracies in the field of nutrition c ent policy and worldwide.[2] While ons of people. a specific disease examples of human populatio lications, lists nutrition researcl sed solutions. particularly conte pendent upon nutrition researcl stigative and healthcare profess s of clinical nutrition. Clinical rovements are vast majority of ignorance in medical training p are obviously i gastroenterology[7] tion training in clini proclaims itself a eview recent including the enti publications and serious problem arises when unskilled and invalid research is published by authors (including nonphysician journalists[11]) in major journals which mischaracterizes the validity of nutrition interventions (e.g., essentially always concluding that nutritional interventions are inefficacious or potentially hazardous) and then such research is used politically and in the media to disparage, restrict and regulate practitoners and nutrition supplement industry[12] to the detriment of human health.

Several factors disrupting the integrity of nutrition research are commonly found in studies published by "elite" universities in "top-tier" journals, which are then republished and distributed as "headlining news" in newspapers, magazines, and television via which they related to nutrition. Perceived shortcomings are documented with both citations here and links to more detailed and authoritative reviews and video presentations. In some instances, speculations regarding the cause and consequences of identified errors are provided.

PDF articles: Full-text archives of the author's articles are available per the following:

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- **VIDEO**: BRIEF Critique of "Effects of n−3 Fatty Acid Supplements in Diabetes Mellitus: ASCEND Study" https://vimeo.com/287650812
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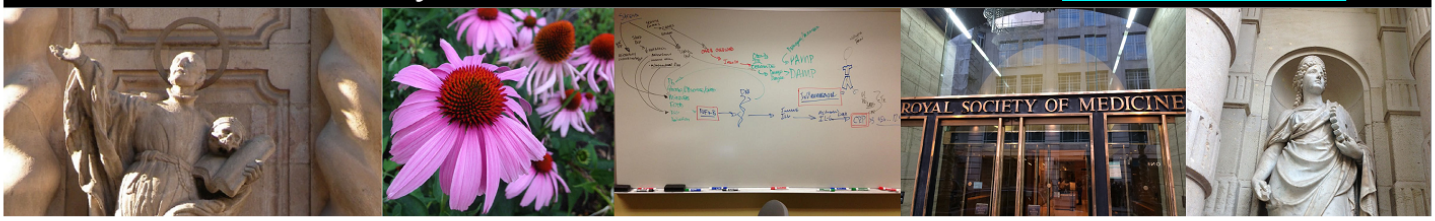

Perspective, Opinion, Editorial • Education • Academia • Wage Theft • Corruption

Ending the Exploitation of Experts Begins with Educating Them about Employment, Curbing Enthusiasm to Preserve Enthusiasm

Alex Vasquez DC ND DO FACN

My own paths toward and perspectives on Education

My passion for teaching and education began "formally" when I was about 9 years of age, sitting on the floor of Ms Hall's 4th grade classroom; from that vantage as I sat somewhat near my best friend Robert, I saw the destructive power of bad teaching and discrimination, and from that day I started analyzing teachers, teaching methods, educational and social structures, and ways to convey knowledge and inspire students. Additionally inspired by my teacher of English and Literature in my final years at Riverside Military Academy, I began college with the plan of eventually teaching "something—most likely English and Literature" because I appreciated and valued teaching, proper grammatical structure, and nuanced use of language; I later developed and interconnected my interests in teaching, writing, language, physiology, medicine, and nutrition to complete three doctorate degrees in the health sciences and publish more than 120 articles, letters, rebuttals, monographs, and books on a wide range of topics, with those publications ranging from dense 1-page Letters and Responses to published research up to single-author textbooks of more than 1,180 pages. I have taught at various colleges and universities at the undergraduate, graduate/Masters, and Doctorate levels and have lectured internationally for post-graduate medical education. I see teaching not simply as effective transferal of information, but also as a means to interconnect and inspire generations of people, notably in a reciprocal manner. At its best, teaching and learning are activities that reflect and support love for life itself.

Oh, the stories I could tell you Academia, "nonprofits", and "

I would be happiest to tel
Administrators are vanguard
support for fellow Professors, a
commitment is to truth and rea
setting ablaze the passions of t
they teach, lead, and supervise
in flower fields like a professo

singing a rhythmical rendition of "*The Hills are Alive…with the…Passions of Education and Intellectual Integrity*." But a pollyannic representation of my observations would be a misrepresentation of the realities I have seen and experienced. I have seen university presidents lie to their students, expel experts for the sake of maintaining their own petty powers and preferences, and I have seen entire academic administrations lie (misrepresent) in unison to their boards of trustees and their accreditation commissions. I have seen stand-alone academic programs make millions of dollars in profit, while its administrators refuse to pay a living wage to doctorate-level infrastructure and while allowing themselves 6-week European vacations during major institutional initiatives. I have seen administrators lie to accreditors and allow students to cheat their way through graduate programs (by bypassing faulty examination software in online programs), and I have seen accreditors turn a blind eye to obvious university corruption, made worse when the accreditation commission is infiltrated by university administrators—thus did "accreditation" come to lose its value. I have seen "nonprofit educational institutions" underpay their faculty, plagiarize from their faculty, resell the work of other professionals without notice or compensation, and then pay their upper administrators in excess of US$160,000 for less than part-time work—thus did "nonprofit organization" come to lose its value. I have seen schools blackmail excellent professors and leaders in education with gag orders, legal threats, and financial bribery (range US$25,000 up to $250,000) to buy their silence about institutional corruption. I have corresponded

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International Journal of Human Nutrition and Functional Medicine (ISSN 2378-4881) ICHNFM.ORG/journal

Barceloneta sunset © 2019 by Dr Vasquez

Tutorial & Editorial • Scientific Writing • Journal Editing • Professional Experience • Video

How to Improve Scientific Writing and Journal Editing: A Short Narrative-Video Guide, Part 1

Alex Vasquez DO ND DC FACN

Introduction

"Hello everyone, Dr. Alex Vasquez here, and today I'm going to start a different series of videos, and this time the conversation is going to focus around journal editing and writing. I'm calling this "*Editing and Writing Tips #1*", and I'm going to start with a few of my own perspectives and experiences, then I'll talk about a few basics, and a few influential ideas. In later videos, I will talk about some more specific examples, and then perhaps at some point we will have a review and conclusion.

Early Experiences and Influences

Very briefly I'll talk about some of my own experiences, and the reason for my doing this is to share with you and segue into some examples that I think are very important. Basic though they might be, a lot of our success in various fields of life actually comes from respecting and appreciating and utilizing those basic concepts.

Let us start here with some of my initial experiences. I started becoming aware of language and the fact that I had some facility for it, first, when I was about 12 years old. I remember writing a poem in class, and again this is somewhat peripheral to the main topic of today, but I do remember that e
kind of my entryway, I think, i
that our assignment was to wr
remember writing this poem in cl
on and on, and—compared with s
I just realized that writing for me

Then again, when I wa
military school, I remember in ou

being asked questions, and I remember just how the answers to understanding grammar and language just came very easy to me, and I do remember feeling like I had some facility for the structure of language.

Another influential experience I had when I was about 11 years old, totally unrelated to language, is that we took, in the late 1970s or early '80s, a Computer Science class in our elementary school, and I remember that class also specifically having some influence on me, in terms of structuring logic. We basically had to write our own computer programs and this was back when computers were very new. Obviously today everybody has computers; back in the late '70s, computers were a novelty. I consider myself lucky to have taken this Computer Science class; it was obviously extremely basic, but we did have to write some code and what I remember from that is just the sequential manner in which communication has to take place in order to be successful. In this case, we were writing programs for computers and doing basic

> "Writing comes from the entirety of one's experience."
> Dr Alex Vasquez

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Med 2019;7:1 https://www.ichnfm.org/jo Externally archived at https://www.academia.edu/38426978

JOURNAL OF ORTHOMOLECULAR MEDICINE

OPEN ACCESS
VOLUME 34, NUMBER 1
PUBLISHED: MARCH 2019

Editorial

Misrepresentations of Clinical Nutrition in Mainstream Medical Media: Growing Importance of Legitimate Expertise in Independent Peer-Reviewed Publications - Part 1

2018 As a Milestone in the Post-Truth Era

Among the various topics that have either interested or fascinated me throughout my youth and well into my adult years, Nutrition has certainly reigned supreme. My personal routine has been to read as much as reasonably and practically possible on the topic, while not doing so to the exclusion of other topics in biomedicine, psychosociology and philosophy. Thus, with roughly 30 years of experience in reading books and primary research in the field of Nutrition, I could not help but notice the radical departures that occurred in 2018 from the previous norms to which I had grown accustomed.

Of course, 2018 was not the first year during which "bad research" was published in mainstream medical journals and then replicated throughout the echo chamber of mass media; one could observe this periodically occurring throughout the past 50 years, starting not at least with the demonization of dietary cholesterol and the glorification of processed foods, especially refined grains and so-called vegetable oils. But in 2018 what many of us observed was not simply poorly performed research but, in some instances, radical departures from any attempt to pre descriptions that could be considered "reason previous standard.[1] Especially related to the trition, mainstream medical journals and the which parrots their conclusions have begun overt misrepresentations of Nutrition with re gard for science, logic, biomedical history and

One has to be aware of a few key ironies terize mainstream medical discussions of nutri that 1) medical physicians receive essentially in clinical nutrition in their graduate school e in their post-graduate residency training[2], 2) sicians and organizations publish "research commentaries (both of which commonly conc tritional interventions are inefficacious or uns their lack of formal education on the topic, and stream medical voices consistently call for "regulating the nutrition supplement industry" despite their lack of training on the topic and because of negative conclusions based on their own poorly conducted research and self-serving conclusions. As such, not only are the map-makers blind, but they mislead their blind followers, and then both groups promote themselves as expert cartographers and guides when advising the public on an area that none of them have studied or understood. We should have no surprise whatsoever when the "medical community" publishes poorly conducted and self-serving "research" on the topic of nutrition, to reach their desired conclusion that nutrition is unsafe and inefficacious, and that the profitable market needs to be managed of course by the selfsame "medical community" that is never received a decent 15 minutes on the topic of therapeutic nutrition. Pervasive and persistent ignorance on the topic of nutrition among medical physicians must be understood as intentional and strategic, because otherwise this problem would have been solved 30 years ago when it was first discussed during what was called at the time the "golden age of nutrition."[3] The easiest way to manipulate people and to keep them in a perpetual state of confusion, ineffectiveness, and dependency is to keep them ignorant on important topics; our educational sys-

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 ISSN 0317-0209

Mitochondrial Medicine Arrives to Prime Time in Clinical Care: Nutritional Biochemistry and Mitochondrial Hyperpermeability ("Leaky Mitochondria") Meet Disease Pathogenesis and Clinical Interventions

Alex Vasquez, DC, ND, DO, FACN

Alex Vasquez, DC, ND, DO, FACN, is director of programs at the International College of Human Nutrition and Functional Medicine in Barcelona, Spain and online at ICHNFM.org. (*Altern Ther Health Med.* 2014;20(suppl 1):26-30.)

Corresponding author: Alex Vasquez, DC, ND, DO, FACN
E-mail address: avasquez@ichnfm.org

MITOCHONDRIAL MEDICINE ARRIVES TO GENERAL PRACTICE AND ROUTINE PATIENT CARE

Mitochondrial disorders were once relegated to "orphan" status as topics for small paragraphs in pathology textbooks and the hospital-based practices of subspecialists. With the increasing appreciation of the high frequency and ease of treatment of mitochondrial dysfunction, this common cause and consequence of many conditions seen in both primary and specialty care deserves the attention of all practicing clinicians.

We all know that mitochondria are the intracellular organelles responsible for the production of the currency of cellular energy in the form of the molecule adenosine

Nutrition and Functional Medicine[1] in Portland, Oregon, in September 2013, we have collectively arrived at a time when mitochondrial therapeutics and the contribution of mitochondrial dysfunction to clinical diseases must be considered on a routine basis in clinical practice. *Mitochondrial medicine* is no longer an orphan topic, nor is it a superfluous consideration relegated to boutique practices. Mitochondrial medicine is ready for prime time—now—both in the general practice of primary care as well as in specialty and subspecialty medicine. What I describe here as the "new" mitochondrial medicine is the application of assessments and treatments to routine clinical practice primarily for the treatment of secondary/acquired forms of mitochondrial impairment that contribute to common conditions such as fatigue, depression, fibromyalgia, diabetes mellitus, hypertension, neuropsychiatric and neurodegenerative conditions, and other inflammatory and dysmetabolic conditions such as allergy and autoimmunity.

BEYOND BIOCHEMISTRY

Structure and function are of course intimately related and must be appreciated before clinical implications can be understood and interventions thereafter applied with practical precision. The 4 main structures and spaces of the mitochondria are (1) intramitochondrial matrix—the innermost/interior aspect of the mitochondria containing various proteins, enzymes of the Krebs cycle, and mitochondrial DNA; (2) inner membrane—the largely

passive transport systems for select molecules that need to enter and exit the mitochondria. Clinicians need to appreciate that mitochondrial membrane integrity is of the highest importance; just as we have come to appreciate the

JOURNAL OF ORTHOMOLECULAR MEDICINE

OPEN ACCESS
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PUBLISHED: DECEMBER 2018

Editorial

Orthomolecular Medicine, Catalytic Creativity, and the Psychosocial Ecosystem

Transitioning From One Year to the Next

Various cultures since time immemorial have marked and celebrated the winter solstice with celebrations, meals with friends and family, and time away from work; transitioning from one calendar year to the next has given people pause and a moment to reflect on the events that happened in the past year and what might be anticipated in the next. Reflection with anticipation along with the realization that the future is somewhat malleable inclines people to imagine how the future might be shaped by the exertion of some modicum of creativity and effort. Any realistic conception of how we might improve the near future must segue from our recent past; we must have an awareness of what is going on around us as we look toward the future to visualize ourselves living within it and also acting upon it. What is going on in the world and how might I act upon that trend and flow in order to improve both its transition and its destination? What should each of us do on a personal level to (in the words of Mahatma Gandhi) be, embody, and materialize the change(s) that we want to see in the world?

Salutation and Introduction From the Journal's New Editor

Over the past few years I have reflected on several occasions how much I enjoy editing, and so I was correspondingly surprised and pleased when I was offered the opportunity to be the next Editor for the *Journal of Orthomolecular Medicine.* I began studying nutrition and orthomolecular concepts in my teen years and mo school in the early 1990s. trition" book that I read as *Your Nerves* (1975) by me this was followed immedi tures of Jonathan V Wrigh of whom would later be m University. By the mid-199 Jeffrey Bland PhD had int tional medicine, which I and personal[3] reasons. By contained several hundred tion and health with another large section on philosophy and psychology. In 1994, I joined the Review Staff of the *Journal of Naturopathic Medicine,* and I started publishing nutrition articles, perhaps most of which might be seen as practice in preparation of an important letter published in 1996 by the American College of Rheumatology in their journal *Arthritis and Rheumatism.* Since those early years and during the course of three doctorate degrees and teaching thousands of students/attendees internationally, I have reviewed for[4] and published in[5] a wide range of refereed journals in addition to publishing commissioned books, chapters, and independent publications and videos. Being an author and reviewer for many different publications—along with my experiences teaching internationally, treating patients in various settings, designing and directing academic programs, and producing educational videos—has given me a wide range of experiences and insights that I hope to bring to the benefit of the *Journal of Orthomolecular Medicine.*

We Must Work Together if We Are Going to Succeed

I have to start this conversation with a few hopes, assumptions, and beliefs, namely that you (the reader) and I (the author and new Editor) have a few things in common. On a professional level, by virtue of the fact that you are reading this essay, I will assume that you are interested or actively engaged in healthcare, medicine, nutrition, research and/or public health. I might also imagine that some smaller percentage of our new and established readers are perhaps less inclined toward the mechanisms and more drawn to the *Journal of Orthomolecular Medicine* for its potential human- utions; we can reasonably and competent healthcare dequate nutrition) are basic submit a counterargument r all of my assertions, they and more to the point, my regardless of personal po- —we share some common uding the following:

nd deliver the best health- roblem, then we each want the best possible solution. Efficiency of time or money is not the top priority when we are seeking solutions

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Mini-Review • Continuing Education • Microbiome • Dysbiosis • Infectious Disease

Translating Microbiome (Microbiota) and Dysbiosis Research into Clinical Practice: The 20-Year Development of a Structured Approach that Gives Actionable Form to Intellectual Concepts

Alex Vasquez DC ND DO FACN

Experience and Perspectives

Many years ago when I published my first books[1,2] and articles[3] detailing "dysbiosis", the word could hardly be found in the Medline index, the topic was controversial at best and ethereal at worst, the term "microbiome" (first published in French in 1949 and in English in 1988) was virtually unknown, and I spent most of the time and space in my lectures and articles substantiating and defending the condition's existence. These days, everyone is talking about microbiome, dysbiosis, "leaky gut" (thanks largely to Leo Galland MD), and my 1996 article on "Silent Infections and Gastrointestinal Dysbiosis" has been downloaded at least 4,000 times and is one of the top 1% most popular art… dysbiosis le… 2010, I fou… "dysbiosis" … than 1,200 … concept has … popular, bu… to do with it … *Medicine* … microbiota … *the comple… Project, the number of scientific papers linking the microbes that live in our gut to diseases ranging from diabetes and colitis to anxiety and depression has grown exponentially. Yet, these tantalizing connections have yielded few benefits from a therapeutics standpoint*."[5] To the extent that this information is being integrated into clinical practice at all, the current level of practical application is a bit indelicate and cumbersome beyond the most commonly repeated advice of advocating probiotics, avoiding antibiotics, perhaps delving into using botanical antimicrobials and laboratory testing. Breath testing (an insensitive test for only one subtype of gastrointestinal …opular to the …nical clues. …ratory testing …rticular used …ods to extract …ney only to …uffering and

"Dysbiosis" is an important concept, but doctors cannot treat concepts.

We have to define, describe, and deconstruct the microbes, molecules, and mechanisms into their components, then rebuild a conceptual scaffold and intellectual structure that becomes a useful tool that, with study and experience, can be used in a clinical setting to effective benefit.

PDF articles: Full-text archives of the author's articles are available:

- https://ichnfm.academia.edu/AlexVasquez (main archive)
- https://www.inflammationmastery.com/reprints (PDF folder)
- https://www.ichnfm.org/public
- **See various videos and course excerpts here: https://www.ichnfm.org/image-gallery-dysbiosis-course**

…M
International College of Human Nutrition and Functional Medicine

ICHNFM has many videos on the topics of dysbiosis, persistent infections, and dysbiotic clinical conditions such as fibromyalgia at www.Vimeo.com/ICHNFM

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CME
CONTINUING MEDICAL EDUCATION

THE CLINICAL IMPORTANCE OF VITAMIN D (CHOLECALCIFEROL): A PARADIGM SHIFT WITH IMPLICATIONS FOR ALL HEALTHCARE PROVIDERS

Alex Vasquez, DC, ND, Gilbert Manso, MD, John Cannell, MD

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OBJECTIVES

Upon completion of this article, participants should be able to do the following:

1. Appreciate and identify the manifold clinical presentations and consequen
2. Identify patient grou
hypersensitivity
3. Know how to imple
proper doses and wi

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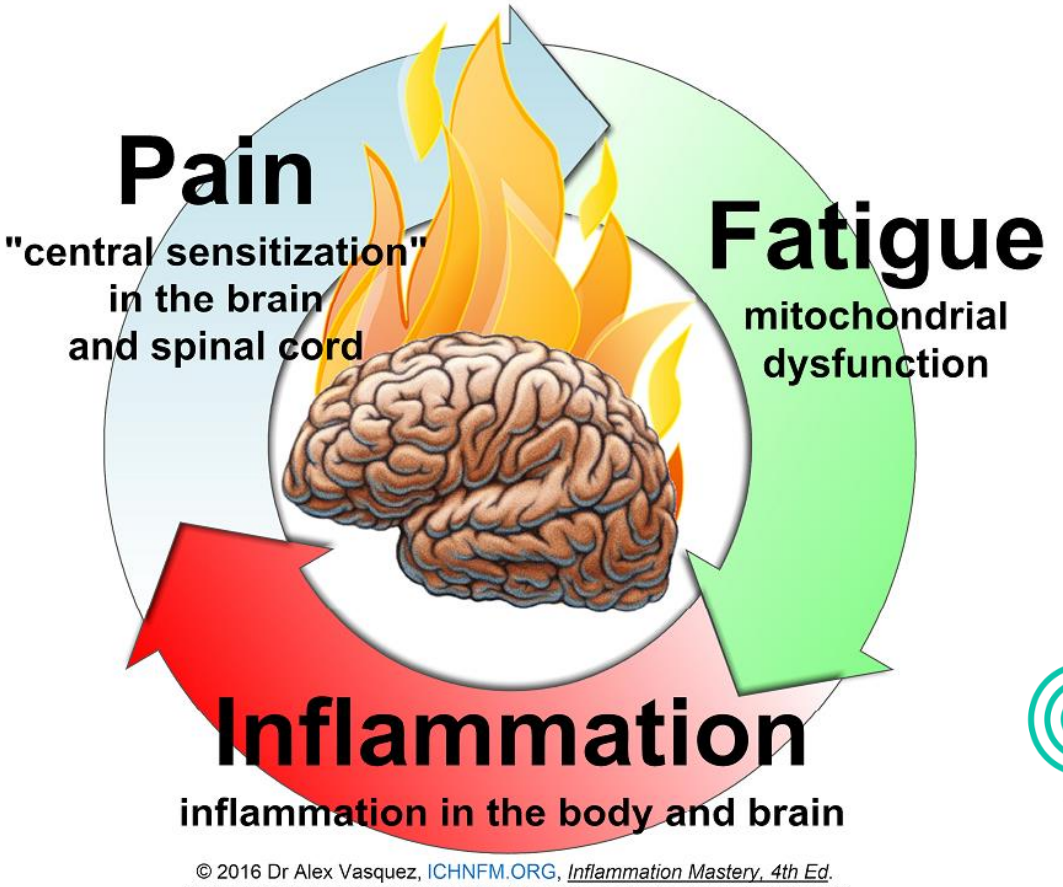
While we are all familiar with the important role of vitamin D in calcium absorption and bone metabolism, many doctors and patients are not aware of the recent research on vitamin D and the widening range of therapeutic applications available for cholecalciferol, which can be classified as both a vitamin and a pro-hormone. Additionally, we also now realize that the Food and Nutrition Board's previously defined Upper Limit (UL) for safe intake at 2,000 IU/day was set far too low and that the physiologic requirement for vitamin D in adults may be as high as 5,000 IU/day, which is less than half of the >10,000 IU that can be produced endogenously with full-body sun exposure.[1,2] With the discovery of vitamin D receptors in tis-

Brain Inflammation
in Chronic Pain, Migraine and Fibromyalgia
The Paradigm-Shifting Guide for Doctors and Patients Dealing with Chronic Pain



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- **VARIOUS VIDEOS AND BLOGS**: https://www.ichnfm.org/braininflammation
- **INFO**: https://www.inflammationmastery.com/fibromyalgia
- **INFO**: https://www.inflammationmastery.com/migraine
- From ***Inflammation Mastery, chapter 5***, the two sections specific to migraine and fibromyalgia were also published separately as ***Pain Revolution*** (full-color printing; https://www.amazon.com/dp/B01AR3NX0S) and ***Brain Inflammation in Chronic Pain, Migraine and Fibromyalgia: The Paradigm-Shifting Guide for Doctors and Patients Dealing with Chronic Pain*** (black-and-white printing; https://www.amazon.com/dp/B01EQ9KMH6/); both versions are also available in digital ebook format for phone, computer, iPad via the free Kindle software

The New York Academy of Sciences 200 Years

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES
Issue: Annals *Reports*
COMMENTARY

Biological plausibility of the gut–brain axis in autism

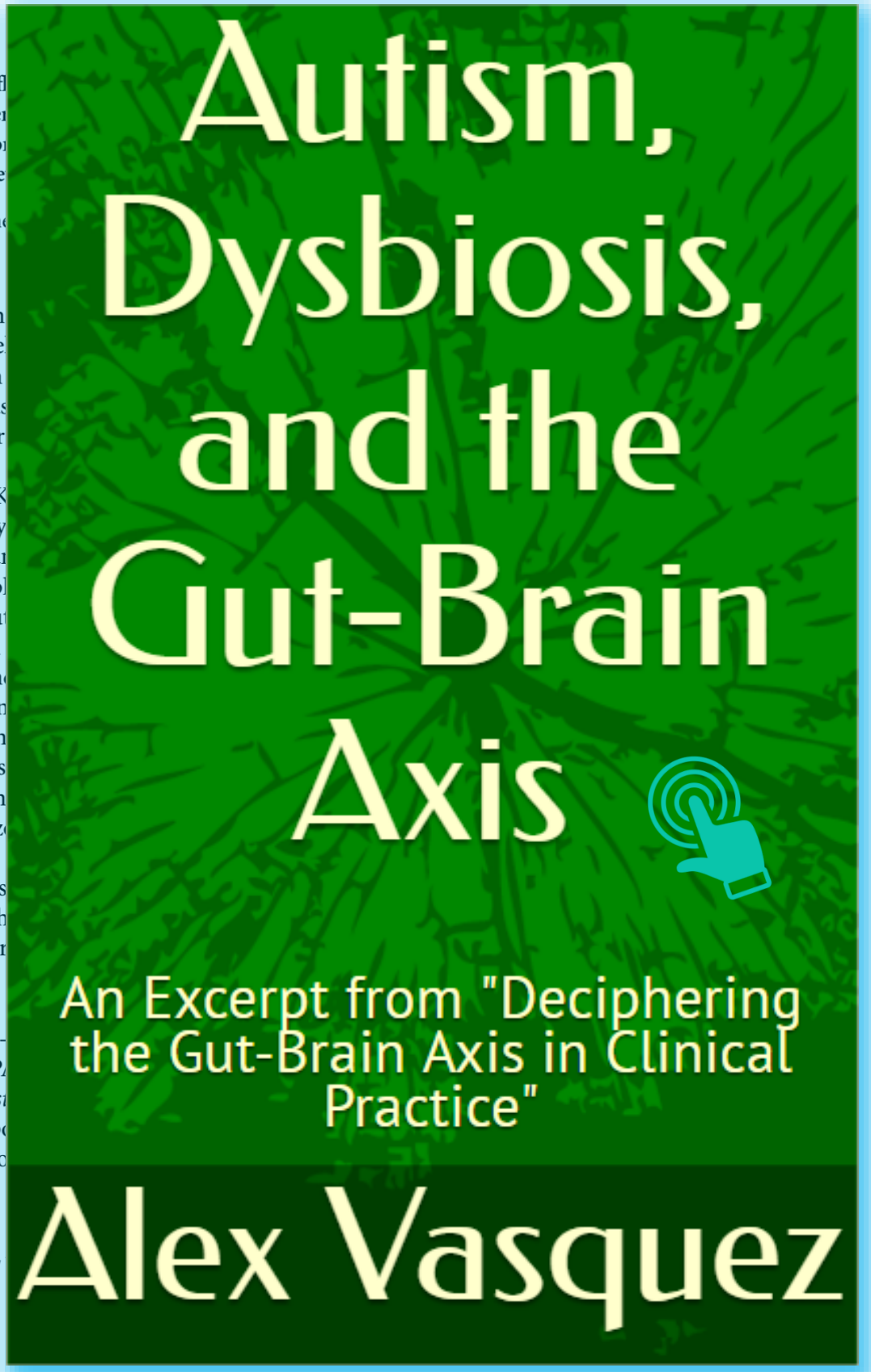
Alex Vasquez

**Organic abnormalities with neuroinfl
purine metabolism, neurotransmitte
noted in autism, and many of these ab
metabolites, and heightened serum le**

Keywords: gut–brain axis; autism; m

In their recent review, Sherwin
among many other issues, the re
gut microbiome–brain axis with
section subtitled "Microbiota-bas
the treatment of autism: hype or
et al.[1] largely discuss preclinical
the 2017 open-label study by K
used a sequence of oral vancomy
polyethylene glycol laxative, a
human fecal microbiota transpl
clinical benefit in subjects with au

Readers will likely benefit from
tional relevant clinical studies, in
lication by Sandler *et al.*[3] showin
of autistic manifestations followin
oral vancomycin, as well as cas
ing positive impact of various an
apies (metronidazole, ketoconaz
cillin) in patients with autism.[4,5]
have been shown to have gut dys
as well as *Clostridia* species,[6] th
group of bacteria noted for their pr
rotoxic substances. International
consistently demonstrated that
have heighted production of 3-(3-
3-hydroxypropionic acid (HPHP
phenylalanine metabolite of *Clos*
trointestinal tract.[7,8] HPHPA rep
with the conversion of dopamine to



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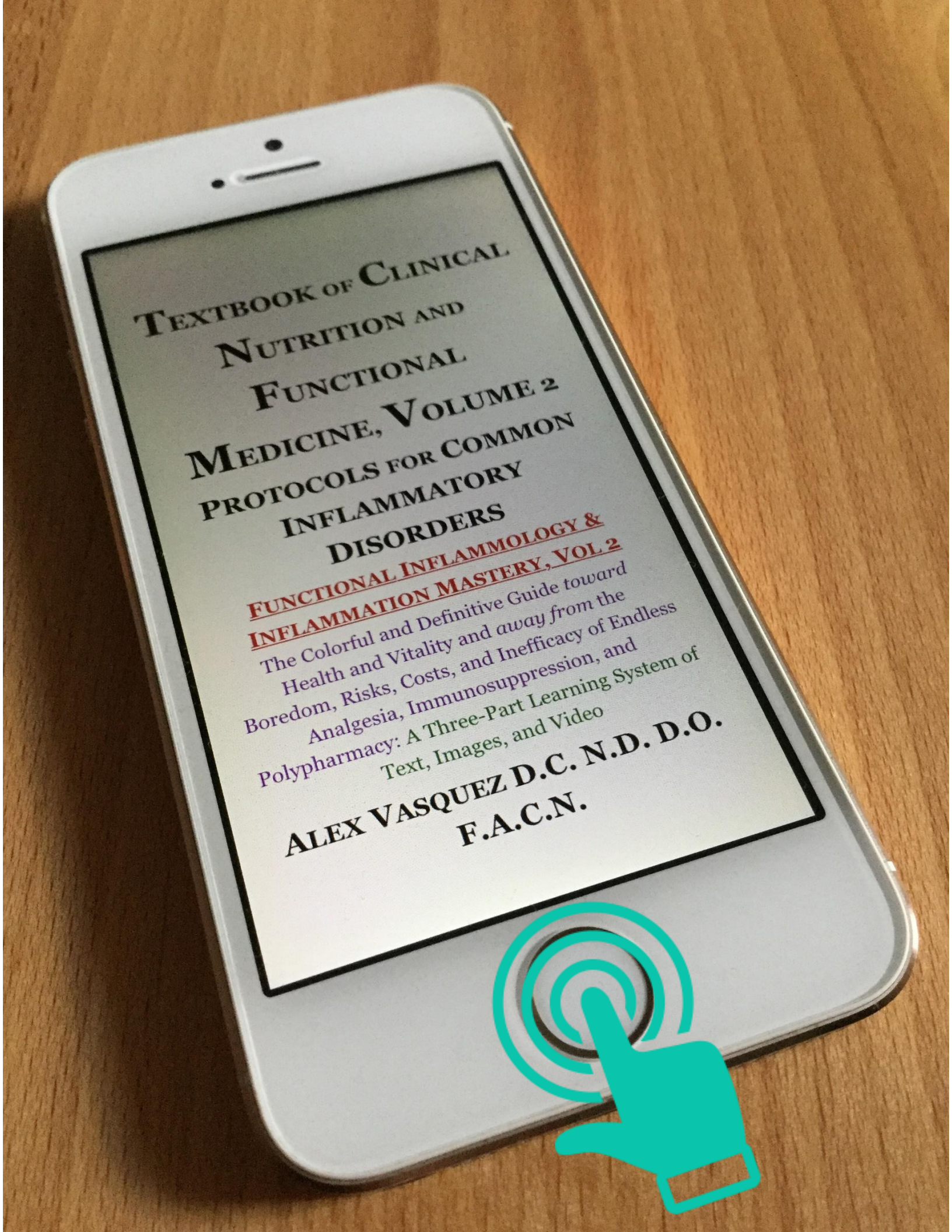
Textbook of Clinical Nutrition and Functional Medicine, Volume 2
Protocols for Common Inflammatory Disorders
Functional Inflammology & Inflammation Mastery, Vol 2
The Colorful and Definitive Guide toward Health and Vitality and away from the Boredom, Risks, Costs, and Inefficacy of Endless Analgesia, Immunosuppression, and Polypharmacy: A Three-Part Learning System of Text, Images, and Video
Alex Vasquez D.C. N.D. D.O. F.A.C.N.