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CLINT PUBLICATIONS

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The Original Internist is published quarterly. Publication months are March, June, September and December, barring any unusual or unforeseen circumstances.

News items and/or letters pertaining to natural health care are welcome. The editorial staff reserves the right to edit and/or reject all material received. Letters to the editor may be condensed in order to fit the allotted space. An address and telephone number where the author may be reached during normal business hours should also be included for verification purposes. Deadline for article submission is the 5th of the month preceding publication.

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Please notify Clint Publications if you change your address or office name, or we cannot be responsible for proper delivery of your journal.

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The opinions expressed in The Original Internist are presented for the purpose of providing an open forum for unbiased case studies, contemporary ideas and discussion of matters relevant to natural health care. Its primary mission is to educate and inform those especially interested in promoting natural health care as a primary treatment. The opinions expressed in The Original Internist do not necessarily reflect the opinions and policies of Clint Publications or The Original Internist.
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<td>Review of Systems, History and Physical Exam</td>
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## Save the Dates

**ACA CDID Symposium**  
March 13-15, 2020  
Denver, CO

**ACA Nutrition Council**  
April 30-May 3, 2020  
Port St. Lucie, FL

## Coming Soon 2020

**Online DABCi Program**

In cooperation with ACA CDID and National University of Health Sciences, ProHealth Seminars is happy to announce a new venue for becoming a Chiropractic Internist.

Most sessions will be available online. Three, out of 26 of the 12-hour sessions will be required to be attended in person, since they are workshops.

*For further information, call Virginia or Carrie 573.341.8292*
Live Stream
Seminar locations
573-341-8448

DABCI
ST. LOUIS, MO

300 HOUR DABCI DIPLOMATE PROGRAM

(WEEKENDS 1-26)

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Registration Information:

- **$395 per Weekend** if received 10 days prior to seminar
- **$425 per Weekend** if less than 10 days out, or at the door
- **Chiropractic Students**: $199
- **DABCI Doctors**: $250

*Every attempt is made to offer these seminars as publicized; however, we reserve the right to adjust seminar locations, dates, times, etc. due to circumstances beyond our control. Program continuation is contingent upon adequate attendance. No audio or video tape recorders are allowed, and no portion of the seminar may be reproduced in any manner without expressed written consent. Pre-registration is required. Pro Health Seminars shall not be held responsible for any expenses incurred by registrant if a program must be altered and/or cancelled. Seminar fee is non-refundable. Credit cards will not be billed until we have the minimum number of attendees (20). If the Doctor is unable to attend after pre-registering and payment has been received, the seminar fee will be transferred to another Seminar (attended within 12 months of the original seminar) for an administration fee of $25. Any seminar fee not transferred and used within 12 months will be forfeited.
One of the definite perks of being the Editor of The Original Internist is handling controversy. I say that tongue in cheek!

Since I inherited this position from Dr. Jack Kessinger, I have methodically wrote an opinion page in this column. Not having a lot of credentials behind my name, I have always felt free to voice my opinion, and move on.

Jack and I were a team for over 50 years. I was the “big idea” partner and he was the realist. I would see a project that needed to be done or a new idea that could make the world better. He was the voice of reason. He would either enthusiastically join my project or explain why it would not work. Basically, he was my filter!

Since the passing of my soul mate in 2011, I have tried to be more aware of my knee jerk reactions, my big overwhelming projects and my rambunctious approach to life in general. I have to say, I have not always been successful putting on my brakes, but I have been aware.

I printed an article in the June issue of this journal that drew a “Letter to the Editor” response. Hmmmm?

WWJD…I have two references for this acronym. The one I refer to now is, “What Would Jack Do?” Should I print the letter? Should I have run this past more of our Editorial Board? Should I contact the author of the printed article?

I sure miss Dr. Jack Kessinger. Just Sayin! ♦

Letter to the Editor:
Concerning Nail Mineral Analysis article
Volume 26, No.3, September 2019

While the basics of the article were sound, the therapeutic and functional value of NMA are not.

With hair analysis we can use the 10mm strands closest to the scalp that reflect more current health conditions. You cannot do that with NMA and therefore the ends of the nails being tested reflect the status at least 6 months previous.

That would be akin to prescribing supplements or medications based on last year’s blood test or blood pressure measurement.

But Chinese nail analysis and visual inspection are a valuable diagnostic tool that should be utilized in our offices.

Bill Rice, DC, LAc, DCBCN

Response from E. Blaurock-Busch, PhD

Dear Dr. Rice,

Thank you for your letter. Your thoughts are much appreciated. I’ve been working with hair and nail analysis in metal toxicology for over forty years, and I truly wish all our clients would be sending appropriate samples as you propose.

It is true, for metal testing i.e. the detection of a chronic exposure, hair samples are preferred. Unfortunately, many people have chemically treated hair and testing such samples causes falsely elevated results. To wait for a 1cm growth of new hair is feasible, but in reality I have yet to meet the doctor or assistant who takes the time to cut sufficient hair close to the scalp, which would cause some bald spots. No one I know wants that.

Nail samples provide an alternative but yes, growth of hair and nails varies. Since we rarely if ever know the precise time of exposure and since chronic metal exposure generally happens over a longer time (generally much more than a month or two), the time of exposure is not as critical as you may think.

You suggest that nail analysis results would be akin to using last year’s blood test results. I beg to differ. After an acute or chronic exposure, metals are either excreted or deposited in tissue and unless detoxification treatment is initiated, the toxic metal status in the respective tissue does not change much over time. This is precisely why hair or nail analysis are useful tools for the diagnosis and treatment of metal overexposure or under-supplementation.

At my laboratory, we do have data to prove that a patient’s metal status more or less remains unchanged, unless the appropriate treatment is applied. This is especially true when it comes to toxins, such as lead or mercury. In other words, a comparison of hair or nail analysis data can prove that.

Coming to think, that might be an interesting topic for another article. Thank you for a stimulating thought.
pINC
The Holy Grail of modern times is ultimately our search for absolutes. Doctors, their employers (patients), and denizens alike of all persuasions concur that there are absolutely a lot of answers from a seemingly endless source of purveyors. With the advent of information at our fingertips and 24/7 news coverage, not to mention Amazon, et.al and home delivery services, it is a daunting task to ascertain and procure the solution best suited to correct or supply whatever problem is at hand, but it is obviously within our reach. We are at heart a DIY lot, and the instant gratification of multiple answers for any dilemma really fuels our inquisitive self reliant nature.

As solutions are concerned for health related disorders, the first step in the direction of correction has been deemed identification. Diagnostic accuracy is a great opener to the atlas of road maps for various remedies/therapies complete with a compendium listing previous results and side effects of said procedures. Another step concerning health related disorders is the identification of the effects of any syndrome on each given patient’s affected organ systems. This opens another avenue for treatment goals matched to the specific patient, as opposed to the treatment of the specific condition. The detective work becomes more involved and painstaking within the world of functional medicine. This new branch was born to fulfill a new need, as have all the intentional and serendipitous discoveries that are in use today. Even though the results of the functional medicine model are being found and continually shown to be far superior than the old band-aid approach, ultimately the only absolute is found within the first step of any successful treatment. That is the assurance of survival. Hope is a necessary ingredient of any successful endeavor, therefore, within the world of professional healthcare the assurance of the ability to fight another day is an understood positive.

Diagnostic competency, or accurate evaluation of the present functionality of the major systems and their subsets, is the most accurate key to the measurement of any chosen treatment protocol efficacy; however, the wait and see approach is the most common method of analysis. Within these modern times in stride with our endless search for absolutes, the guess work of the wait and see approach too often is not satisfactory. In the most critically acute conditions where accurate observation of moment by moment changes in health status is necessary, there is little room for waiting patiently; however, in the greater whelm of most health related issues, after a treatment protocol has been enlisted, active patient positivity very well may bring about the best overall outcome.

With the explosion of all the new ideas, concepts and inventions we are experiencing, the truth is where the Holy Grail of the absolute truth resides. No matter how far our environment of geologic, psychologic, intellectual, and computer generated abilities take us, the basics of compassion toward one another to achieve a lifetime of fulfillment remains the absolute toward which we strive. In this age of technological and scientific astronomical growth, the solid ground, it’s the tried and true of what works, always add to and never take away from what works, that counts the most.

As a board certified chiropractic internist I have at my fingertips the essence of diagnostic expertise through physical and laboratory examination as-well-as the dexterous ability to specifically adjust the intersegmental articulations of the spine and extremities. Dr. Michael Cessna, the father of ACA’s modern DABCI program, said he’ll let any physician “take half of any group of patients and they can treat them with any technique they choose while the only thing I’ll do for my half is feed them. After 6 weeks observe how much healthier my patients are.” It is obvious that nutrition is a foundational truth. The success of any one searching for the Holy Grail of absolutes must reside in their lifelong accumulations of foundational truths.
IODORAL
Who is Behind That Handshake?

Many years ago, attending a chamber of commerce meeting I saw a young man about my age in a wheelchair. No one would speak to him so I walked over and introduced myself and we sat together. We talked and found out I was just getting started in practice and he was running for his first political office of county judge. So, we started going places together and I would hand out cards and he would politic. When he won the race, I was the only non-lawyer invited to his swearing in. I was honored and we stayed in touch over the years.

To make a long story short this man is now the Governor of Texas. Who would have thought of that day I walked over and shook hands with who would become one of the most powerful and influential men in Texas? This has happened to me dozens of time over the years and taught me a valuable lesson. Never pass up the opportunity to find out who is behind that handshake. That handshake that day changed my life and because of that I was able to participate in society at a level most folks never get to do. Never pass up an opportunity to meet someone new.

It is particularly important as a physician.

Editors note: I have had the privilege of knowing Dr. McCullough over several decades. He has continually impressed me with his wisdom and deep perceptions of life in general. What an asset he has always been to the chiropractic profession... and to the world, in general. We should all reflect on his example and try to go that extra step. A wise man once said, “you should always strive to do 100 things one percent better, rather than one thing 100 percent better.”
An Easily Absorbed Magnesium Formula for Effortless Relaxation

by: Rachel Olivier, MS, ND, PhD

As an essential mineral, Magnesium plays a vital role in human biochemistry and general health. It is involved in over 300 biochemical reactions in the body. Subsequently, a high potency magnesium formulation is beneficial in supporting the body’s natural relaxation response, and also functions to optimize energy levels. According to one source, foods that are high in fiber are generally high in magnesium. As detailed by Natural Standard, “dietary sources of magnesium include legumes, whole grains, vegetables (especially broccoli, squash, and green leafy vegetables), seeds, and nuts (especially almonds). Other sources include dairy products, meats, chocolate, and coffee. Water with a high mineral content, or "hard" water, is also a source of magnesium. Magnesium deficiency is not uncommon in the US, and is particularly prevalent among African Americans and the elderly. It has also been reported that dietary intake of magnesium may be diminished, particularly among women. Thus, the combination of low intake and impaired absorption of magnesium has been associated with the development of various disease states such as osteoporosis, hypertension, atherosclerotic vascular disease, cardiomyopathy, diabetes, and stroke. "Intracellular magnesium is maintained within narrow concentration limits except in extreme situations such as hypoxia or prolonged magnesium depletion." A new formula supplying an easily absorbed magnesium (Acti-Mag Plus™) delivers 400 mg of magnesium, as magnesium glycerophosphate, combined with key nutrients such as taurine, beetroot juice, B-vitamins and bamboo extract, a rich source of organic silica. Because of the high amount of Mg, along with other synergists, it is specially formulated to support multiple body systems, including bone health, digestion, cardiovascular function, the maintenance of healthy blood sugar levels, a healthy relaxation response, bowel and kidney function, and optimal energy levels. In addition to Mg, the formula also provides taurine, organic beet-root juice, B-vitamins, and bamboo extract, and is supplied as a powder formula with a great tasting berry flavor.

Taurine, a ubiquitous sulfur containing amino acid, is recognized as one of the most abundant amino acids in mammals. Although in some species it is essential, it is considered a semi-essential nutrient in humans. Taurine functions in many roles in humans, including a role in the central nervous system (CNS) as a neurotransmitter, as a neuro-protective agent, and as a potent regulator for intracellular calcium homeostasis. Taurine also has numerous benefits in the body. These include, benefits against cardiac arrhythmias, atherosclerosis, cataracts, congestive heart failure, hypertension, immunodepression, and macular degeneration. It has been stated that “arrhythmias characteristic of acute myocardial ischemia may be partly due to loss of intracellular taurine.”

Taurine has also demonstrated a neuro-protective effect by the prevention of glutamate-induced neuronal injury in cultured neurons. Likewise, Taurine has beneficial effects as a cytoprotective agent, and plays a role in osmoregulation, membrane stabilization and calcium signaling. In a meta-analysis of seven small clinical trials, it was demonstrated that taking taurine 1-6 grams daily for up to 2 weeks slightly improves endurance compared to control. In a separate study, Taurine (3 g/day) and Mg (340 mg/day) supplementation was demonstrated to significantly increase endothelial progenitor cells (EPC) colony numbers, as well as to significantly decrease free radical levels and thiobarbituric acid reactive substance (TBARS) scores in healthy men, “indicating that the dietary intake of taurine and Mg may prolong lifespan by preventing the progression of cardiovascular diseases.”

It is also noted that “Taurine may directly and indirectly help to regulate the Calcium [Ca], level by modulating the activity of the voltage-dependent Ca channels (also dependent on [Ca]/[Ca]), by regulation of Na channels, and secondly via Na-Ca exchange and Na-taurine cotransport.” Taurine is also cytoprotective. “The amino group of taurine can neutralize hypochlorous acid, one of the reactive species generated by neutrophils. In that reaction, taurine is converted to taurine chloramine, which is less toxic than hypochlorous acid, and serves as a modulator of the immune system.” Also, it has been observed that depletion of Mg and taurine can result in an acceleration of the development of hypertension.

According to Web MD, “Taurine is found in large amounts in the brain, retina, heart, and in platelets.”

(Continued on next page)
“It has been demonstrated that in animal or clinical studies, taurine lowers elevated blood pressure, retards cholesterol-induced atherogenesis, prevents arrhythmias and stabilizes platelets — effects parallel to those of magnesium.”23 A high dietary intake of taurine has been correlated to increased life span, as in the Japanese population, who have a high intake of taurine, and the world’s highest percentage of people over 100 years old.24 Functionally, “Taurine promotes cardiovascular health, insulin sensitivity, electrolyte balance, hearing function, and immune modulation.”25

Disease states—including liver, kidney, or heart failure, diabetes, and cancer—can all cause a deficiency in taurine.26; 27; 28 And, aging bodies often cannot internally produce an optimal amount of taurine, making supplementation vital.29 Thus, increasing taurine levels may result in better “cardiovascular, metabolic, and neurologic health.”25

**B-Vitamins**

B-vitamins are important in supporting both muscles and nerves. According to Dr. Kennedy, “The B-vitamins comprise a group of eight water soluble vitamins that perform essential, closely inter-related roles in cellular functioning, acting as co-enzymes in a vast array of catabolic and anabolic enzymatic reactions. Their collective effects are particularly prevalent to numerous aspects of brain function, including energy production, DNA/RNA synthesis/repair, genomic and non-genomic methylation, and in the synthesis of numerous neurochemicals and signaling molecules.”30 He also noted that, “adequate levels of all members of this group of micronutrients are essential for optimal physiological and neurological functioning.”30

**Vitamin B₁** (Thiamin) helps to release energy from foods and is important in maintaining the function of the nervous system. Thiamin is also active component in the citric acid cycle, in the decarboxylation of α-ketoglutaric acid to succinyl CoA.31 **Vitamin B₂** (riboflavin) is an important component in the intermediary pathways that utilizes either FAD (flavin adenine dinucleotide) or FMN (flavin mononucleotide), as part of the respiratory chain of the mitochondria. These coenzymes (FAD and FMN) are precursors for reactions that involve oxidation-reduction.35 **Vitamin B₃** is essential in the regulation of metabolism, and in its absence profound impairments can be expected, and death should follow in a short time once all of the FAD and FMN are used up. A deficiency in riboflavin results in poor growth, poor appetite, and certain skin lesions (crack at the corner of the mouth, dermatitis on the scrotum).35

**Niacin** functions as part of the coenzymes NAD⁺ and NADP⁺, which both function in the maintenance of the redox state of the cell. Pellagra is the term applied to the nutritional deficiency in niacin. NAD⁺ is the substrate for poly (ADP-ribose) polymerase, and the enzyme associated with DNA repair. It also helps to “promotes good vision and healthy skin and is important in converting the amino acid tryptophan into niacin.” Vitamin B₃ (niacin) also aids in digestion, metabolism, and normal enzyme function as well as pros-

(Continued on next page)
moting healthy skin and nerves. Vitamin B₆ (pyridoxine) aids in protein metabolism and the production of red blood cell, insulin, and hemoglobin. B₆ is involved in the making of several neurotransmitters, such as serotonin and gamma-aminobutyric acid (GABA). Deficiencies in B₆ may result in depression, anxiety, irritability and increased feelings of pain. Additionally, deficiencies in B₆ can result in immune system disruptions. A deficiency in B₆ can also result in the decreased production of antibodies needed to fight infections.

The generic term for both naturally occurring food folate and folic acid, the fully oxidized monoglutamate form of the vitamin that is used in dietary supplements and fortified foods is called folate. Folate (as 5-MTHF glucosamine salt) also aids in protein metabolism and red blood cell formation and may reduce the risk of neural tube birth defects. Folate is an inactive form of the vitamin, which needs to be metabolized to 5-methylte-trahydrofolate to become metabolically active. Supplied as 5-MTHF glucosamine salt it is in the fully active form. B-vitamins are beneficial in supporting both muscles and nerves, and are an important part of the body’s energy supply. Being water soluble, they are not stored in the body, thus they need to be replenished regularly by the diet. Any excess of water-soluble vitamins is quickly excreted in urine and will rarely accumulate to toxic levels.

Pantothenic acid supports fatty acid metabolism, as a component of Coenzyme A (CoA), and also supports the formation of hormones. CoA is “an essential co-enzyme in a variety of biochemical reactions that sustain life.” It plays a vital role in the conversion of food to energy, and is necessary in the production of red blood cells. Deficiency symptoms include: headache, fatigue, irritability, impaired muscle coordination and gastrointestinal problems. CoA functions as a “carrier of acyl groups in enzymatic reactions involving fatty acid oxidation, fatty acid synthesis, pyruvate oxidations, and biologic acylations.” Pantothenic acid also plays a role in fatty acid synthesis in the cytoplasm. CoA must be synthesized inside the cell, as it cannot cross the cell membrane. Thus, CoA is a central integrator of intermediary metabolism. Plants are able to synthesize pantothenic acid, however, humans cannot, thus must get it from the diet.

Whole organic Beetroot juice. Beetroot (Beta vulgaris), as the name indicates, is a root vegetable also known as red beet, table beet, garden beet, or just plainly beet. Beets mainly consist of water (87%), carbs (8%), and fiber (2–3%), however, they are also packed with essential nutrients, and are a noted source of fiber, folate (vitamin B₉), manganese, potassium, iron, and vitamin C. One cup (136 grams) of boiled beetroot contains fewer than 60 calories. Beetroots and beetroot juice have been associated with numerous health benefits, including improved blood flow, lower blood pressure, and increased exercise performance. Many of these benefits are due to their high content of inorganic nitrates. Beetroots are delicious raw but more frequently are cooked or pickled. Their leaves — known as beet greens — can also be eaten. Beet juice contains a high concentration of nitrates, and are high in fiber, providing about 2–3 grams in each 3/4-cup (100-gram) raw serving. They are also good sources of vitamins and minerals, such as folate, manganese, potassium, iron, and vitamin C.

Bamboo shoot is a rich source of silica. The properties of bamboo include sweet, slightly cold, clears heat and resolves phlegm; used in acute fevers, convulsions, bleeding due to heat, and for vomiting. Bamboo Shoot extract is another component that is beneficial in controlling intracellular calcium-magnesium balance. In general, bamboo is considered cooling, calming, and phlegm resolving. The tender shoots contain various valuable enzymes such as nuclease, deamidase, proteolytic enzyme, amylase, as well as amigdalin splitting and silicon splitting enzymes. The young shoots are particularly useful in stomach disorders. Additionally, the juice of pressed bamboo shoots possesses protease activity which helps in digestion of proteins. Shoots are commonly used throughout many parts of Asia in treating respiratory diseases. For respiratory diseases, a decoction is taken once or twice daily with a tablespoon of honey.

Silicon

Human exposure to Silicon imparts health benefits and essentially occurs through plant-derived food products. Silica is prevalent in the typical human diet with concentrations much higher in plant based foods, and has a multitude of uses, including, strengthen bones and connective tissues, reduces risks of alopecia, Alzheimer’s and cardiovascular diseases. Silicon imparts bioavailability in human diet, for example, strengthens bones and improves immune response, as well as supports neuronal and connective tissue health.

Silicon is the second most abundant element in the earth’s crust, with a mean share of 28.8% (dry weight basis), mostly ranging between 50 and 400 g Si/kg of soil. In plants, “soil Si immobilizes toxic metal ions such as aluminum (Al), arsenic (As), cadmium (Cd), iron (Fe), manganese (Mn), and zinc(Zn) via complexa-
tion, ultimately removing them from the rhizosphere as insoluble precipitates. In plants, exogenous application of Si increases soil pH and decreases solubility, and thus availability of toxic metals, aluminum (Al), arsenic (As), cadmium (Cd), iron (Fe), manganese (Mn), and zinc (Zn). Also in plants, Si application promoted Fe storage in the root apoplast during sufficiency/excess toxicity periods.

Thus overall, as noted previously, these mineral and vitamin components, along with the other factors provide an easily absorbed source of magnesium, which supports the body’s natural relaxation response as well as optimize energy levels. It is recommended to support deficiencies in the diet.

About the Author
Dr. Rachel Olivier serves as a Physician Advisor for Biotics Research Corporation, a position she has held for over seventeen years. As a Physician Advisor she serves to educate and provide professional leadership for physicians and practitioners, in an effort to improve product understanding. She serves as Biotics’ chief consultant, advisor and technical expert, and also writes technically oriented papers, training curriculum, and product support material for practitioners and members of the sales team. In addition to this role, she also maintains a part-time nutritional practice, Healthstone Wellness, where she guides patients on lifestyle interventions and provides nutritional consultations. She holds a master’s degree in Molecular Biology from University of Southwestern Louisiana (currently the University of LA), along with a traditional Naturopathic Degree from Honolulu University, and a PhD in nutrition from California University.

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THE ORIGINAL INTERNIST DECEMBER 2019
LAURICIDIN
PHP
Non-Genomic Risk Factors & Associations of Neuronal Damage & Loss

by:
Wayne L Sodano, DC, DABCI, DACBN, CFMP, CICP, BCTN

The World Health Organization’s 2019 Guidelines for Risk Reduction of Cognitive Decline and Dementia, certain medical conditions are associated with an increased risk of developing dementia, including hypertension, diabetes, hypercholesterolemia, obesity and depression, as well as lifestyle.

Understanding the proposed pathophysiology of these, and many other health conditions, as it relates to neuron damage and neuron loss, is relevant to understanding the appropriated preventive intervention measures.

The information that follows is a list of conditions and circumstances that are associated with brain cell damage and loss. Just as Alzheimer’s Disease is considered a polygenetic disorder, it’s most likely that there is a combination of conditions/circumstances at play regarding non-genomic risk factors related to neurodegenerative disease:

Altered Gastrointestinal Microbiome and Gastrointestinal Barrier: “Gut bacteria regulate body metabolism, eating behavior, adiposity and systemic inflammation and have been recently associated with cognitive disorders in adult humans and rodents.” Besides facilitating digestion and providing vitamin B and K, the gut microbiota plays many essential roles in inflammation and brain protection by secreting brain derived neurotrophic factor. In particular, the gut-brain axis has been implicated in neurodegenerative diseases such as Parkinson’s disease and AD.

Microbial Pathogens: Identifying and Treatment: Emerging evidence supports the hypothesis that chronic viral, bacterial and fungal infections might be causative factors for the inflammatory pathway in Alzheimer’s Disease. Herpes family viruses (HHV-1 and HHV-2) and cytomegalovirus, considered neurotropic viruses have been implicated as a risk factor for Alzheimer’s Disease. “Support for the concept that Herpes Simplex virus type 1, when present in the brains of apolipoprotein E-allele4 carriers, is a major risk for Alzheimer’s disease in increasing steadily, with over 120 publications providing direct or indirect evidence relevant to the hypothesis.” (and possibly the hepatitis C virus); Borrelia burgdorferi (Lyme neuroborreliosis: “It has been argued that dementia-like syndromes associated with Lyme borreliosis or Lyme disease occur more frequently when less stringent diagnostic criteria are used and that infections with Borrelia burgdorferi may even cause or trigger primary dementia, such as Alzheimer’s disease.” Lyme disease co-infections such as Babesia may be involved in this mechanism as well.); bacteria associated with chronic periodontitis (a chronic immunoinflammatory infectious disease) such as Porphyromonas gingivalis and Treponema denticola. “P. gingivalis, the keystone pathogen in chronic periodontitis, was identified in the brain of Alzheimer’s disease patients.

Physiological Role of Amyloid-β: “Recent finding on inflammation-mediated neurodegeneration and the role of Aβ in immunity have led to emergence of the “Antimicrobial Protection Hypothesis” of Alzheimer’s Disease. In this model, β-amyloid deposition is an early innate immune response to genuine, or mistakenly perceived, immune-challenge. Aβ first entraps and neutralizes invading pathogens in β-amyloid. Aβ fibrillation drives neuroinflammatory pathways that help fight the infection and clear β-amyloid/pathogen deposits. In Alzheimer’s Disease, chronic activation of this pathway leads to sustained inflammation and neurodegeneration.” Although this runs counterintuitive to the research that has focused on Aβ’s neurotoxic potential in Alzheimer’s Disease, enough evidence has accumulated to suggest that Aβ serves a beneficial role in human physiology, where it may contribute not only as an antimicrobial peptide but also in tumor suppression; sealing leaks in the blood-brain barrier; promoting recovery from brain injury; and regulating synaptic function.

Stress and Sleep Disturbance: “Evidence shows that sleep dysfunction and β-amyloid deposition work synergistically to impair brain function in individuals with normal cognition, increasing the risk of developing dementia later in life.” Stress, sleep disturbance, and circadian disruption interact at many levels to affect neurogenesis, neuroinflammation, and metabolic disruption. “For example, the hypothalamus-pituitary-adrenal axis (HPA) – the main mediator of stress – is regulated by the circadian rhythm. In particular, cortisol levels exhibit circadian fluctuations and is elevated and deregulated in people with Alzheimer’s Disease.” (Continued on next page)
It is recognized that both chronic psychological and physical stress can lead to cellular stress, which can lead to cellular damage such as DNA damage, and cell death if not addressed. Disturbances in sleep (e.g. obstructive sleep apnea) and circadian rhythm, and stress are known to independently or co-operatively influence the neuron pathogenesis. Sleep disturbance, circadian rhythm disruption and stress can lead to a decreased clearance of Aβ, HPA dysregulation, activation of microglia cell, disturbances in gut microbiota, a decrease in melatonin production, which leads to neuroinflammation, synaptic loss and neurodegeneration.

Age-Related and Disease-Related Melatonin Deficiency: “Decreased levels of melatonin, which exceed those observed during normal aging, have been repeatedly described in neurodegenerative disorders, specially Alzheimer’s disease and other types of senile dementia. In many affected individuals, the melatonin rhythm is practically abolished.”11 Decreased amount of melatonin have been associated with tissue destruction of the pineal gland and the suprachiasmatic nucleus of the hypothalamus (the hypothalamic pacemaker).

Chronic Stress and Glucocorticoids: “Glucocorticoids are secreted under conditions of stress; neuronal damage and brain pathologies are a common consequence of persistently elevated glucocorticoid secretion. Glucocorticoids can trigger mitochondrial dysfunction and apoptotic machinery, as well as cycle arrest and cell death. In addition, stress/glucocorticoids may induce neuronal atrophy and synaptic dysfunction/loss by stimulating hyperphosphorylation of the cytoskeleton protein Tau, thus disturbing the integrity of the cytoskeleton and mis sorting Tau at synapses.

Mitochondrial Dysfunction and Oxidative Stress: “Mitochondrial dysfunction and oxidative stress play a critical role in Alzheimer’s disease etiopathogenesis and pathophysiology.”12 “Oxidative stress has been recognized as a contributing factor in aging and in the progression of multiple neurodegenerative diseases including AD.

Blood Glucose Dysregulation: “Recently researchers proposed the term ‘Type-3-Diabetes’ for Alzheimer’s disease because of the shared molecular and cellular features among Type-1-Diabetes, Type-2-Diabetes, and insulin resistance associated with memory deficits and cognitive decline in elderly individuals.”13 Elevated blood glucose, no matter what the cause, will induce oxidative damage. Hyperglycemia cause the accumulation of advanced glycation end (AGE) products that lead to reactive oxygen species generation and cell damage. On the other end of the spectrum, insulin resistance causes mitochondrial dysfunction, which triggers an inflammatory response and the production of inflammatory cytokines such as IL-6, IL-1β, IL-18, tumor necrosis factor-alpha (TNF-α), alpha-1-antichymotrysin and C-reactive protein.

Neuroinflammation: Inflammation has been linked not only to neurodegenerative disease, but also primary and metastatic brain cancer.14 “The brain has been long regarded as an immunologically privileged site in which the presence of the blood-brain barrier restricts the entry of blood-borne immune and inflammatory cells to the central nervous system. Consequently, key functions in tissue homeostasis and immune defense were attributed to brain-resident cell-types, such as microglia and astrocytes.”15 The inflammatory environment of the body plays a significant role in the pathophysiology of neurodegenerative disorders. The predominate immune cells in the brain are the microglia, which is complemented by infiltrating immune cells caused by a compromised blood-brain barrier.

Blood-Brain Barrier Dysfunction: “The brain-blood barrier is formed by a tightly sealed monolayer of brain endothelial cells, which keeps neurotoxic plasma-derived components, RBCs, leukocytes, and pathogens out of the central nervous system.”16 “Total protein content in the central nervous system is inherently lower than plasma levels given the highly selective permeability of the blood-brain barrier. “Disruption of the blood-brain barrier gives rise to the intrusion of serum pathogenic T cells, immunoglobulin G and inflammatory cytokines into the central nervous system’s parenchyma.”17

What’s known is that blood-brain barrier function is altered in central nervous system pathology. “Alzheimer’s disease, multiple sclerosis, and central nervous system dysfunction in systemic infections are examples of conditions which are primarily neurodegenerative, neuro inflammatory, or systemic. In many cases it is not clear whether blood-brain barrier changes are the cause of effect of neuropathology, and it is possible that blood-brain barrier changes and neuropathology drive each other in a self-perpetuating manner, contributing to disease process.”18

Thyroid Dysfunction: “Alterations in the endocrine system have increasingly been linked to the pathogenesis of Alzheimer’s Disease and other dementias, insulin resistance, elevated cortisol, and low estrogen and testosterone levels have all been implicated in the development and/or progression of Alzheimer’s disease. (Continued on next page)
The Role of Environmental Contaminants in Neurodegenerative Disease: There is growing research that shows an association linking environmental contaminants with neurodegenerative disease, in particular Alzheimer’s Disease. Environmental factors possibly include inorganic and organic hazards, exposure to toxic metals, pesticides, industrial chemical, and air pollutants. Long-term exposures to these environmental contaminants together with bioaccumulation over an individual’s life-time are speculated to induce neuroinflammation and neuropathology paving the way for developing Alzheimer’s Disease.

Daily Blue-light Exposure: “Humans are exposed to increasing amounts of light in the blue spectrum produced by light-emitting diodes, which can interfere with normal sleep cycles. The LED technologies are relatively new; therefore, the long-term effects of exposure to the blue light across the lifespan are not understood.” A recent study on the effects of blue light on a Drosophila melanogaster model reported that blue light caused an accelerated aging phenotype with damage to the retinal cells, brain neurodegeneration and impaired locomotion.

Brain-Derived Neurotropic Factor and its Clinical Implications: “Brain-derived neurotrophic factor (BDNF) plays an important role in neuronal survival and growth, serves as a neurotransmitter modulator, and participates in neuronal plasticity, which is essential for learning and memory.” It is known that the level of BDNF is decreased in many neurodegenerative diseases. BDNF is widely expressed in the central nervous system and gastrointestinal system as well as in lungs, heart, spleen, liver, fibroblasts vascular smooth muscle cells and thymic cells. As side from its neuroprotective role, BDNF is involved in energy homeostasis. “A positive correlation between blood plasma levels of BDNF, low-density lipoprotein cholesterol, adipose tissue, body mass index and triglyceride was reported.” BDNF appears to be intimately related to glucose metabolism and therefore, type 2 diabetes. It’s known that high levels of glucose, but not insulin, inhibit the output of BDNF in the human brain and that low levels of BDNF are associated with impaired glucose metabolism.

It has also been reported that there appears to be an interaction between omega-3 fatty acids and BDNF, which may be associated with cytoprotective actions. The positive effects of the proper level of omega-3 fatty acids may be associated with a prevention of degradation of the phospholipid membranes; reduction of oxidative stress that helps maintain synaptic plasticity; and normalization of levels of BDNF and its downstream effectors synapsin I and CREB (cAMP response-element binding protein), which are important in learning, memory and LTP (long-term potential - persistent strengthening of synapses based on recent patterns of activity). From an integrative medicine perspective, assessing RBC membrane and plasma fatty acid should be part of the preventive care strategy. Other factors known to increase the expression of BDNF include exercise and certain botanical medicines.

A special chapter on the Integrative Medicine Approach to Neurodegeneration and Dementia may be found in Dr. Sodano’s soon to be released book, Integrative and Functional Medicine Approach to Basic and Advanced Laboratory Interpretation: Clinician’s Desk Reference.

About the Author
Dr. Wayne Sodano is a Board-Certified Chiropractic Internist, Diplomate of the American Clinical Board of Nutrition, Certified Functional Medicine Practitioner, and practices Traditional Naturopath. He is a former instructor of the DABCI program and currently dedicates his time to research and development in the areas of integrative and functional medicine as the Director of Medical Education at the College of Integrative Medicine (www.CollegeofIntegrativeMedicine.org). He frequently lectures live through other venues nationwide and internationally. Dr. Sodano is the author of Integrative Medicine Approach to Thyroid Disorders: Clinician’s Desk Reference and the soon to be released book Integrative and Functional Medicine Approach to Basic and Advanced Laboratory Interpretation: Clinician’s Desk Reference. He is also creator of iMedLogics a comprehensive patient history analysis and patient management software program (www.iMedLogics.com).

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Of course, while low reactivity is important, equally important, if not more so, is clinical efficacy in terms of muscle building and other key anabolic functions. Which combination of amino acids would perform the best? To answer this question, I turned to the published papers of a researcher whose work on muscle, protein, and amino acids I have followed for years, Robert Wolfe. Dr. Wolfe is considered one of the world’s experts in the use of supplemental protein and amino acids to improve health, particularly in relation to building muscle in sarcopenic (muscle loss) patients. Among his many papers, Dr. Wolfe has been involved in the publication of several that have demonstrated that the use of specific amino acid combinations is not equal but superior to equivalent amounts of protein powder in terms of promoting anabolic responses and gains in whole body protein. The specific amino acid combination often used in these papers is all nine essential amino acids plus either arginine or the arginine precursor, citrulline.

What follows is a review of the latest paper published by Dr. Wolfe and his collaborators on the use of an amino acid formula similar to the one mentioned above in comparison to a whole protein product to stimulate whole body protein and anabolic responses in an ailing population (older women with heart failure). As you will see, contrary to the expectations of many in the nutritional community, the amino acid product actually performed better than the whole protein product.

In “Consumption of a specially-formulated mixture of essential amino acids promotes gain in whole-body protein to a greater extent than a conventional meal replacement beverage specifically targeting support of heart failure patients” by Kim et al (Kim IY et al. Nutrients, Vol. 11, 2019) the authors constructed a study to determine the validity of the following:

“In the current study we have assessed the anabolic response in individuals with heart failure by means of the measurement of whole-body protein synthesis and breakdown. We have tested the hypothesis that a low-calorie essential amino acid (EAA)-based dietary supplement will induce a significantly greater gain in whole-body net protein balance than a conventional meal replacement beverage specifically targeting support of heart failure patients.”

To do the above, eight women aged 80 ± years with heart failure participated in a randomized cross-over study. All were prescribed at least one of the following medications:

to cause a significant increase in the intracellular amino acid concentrations.”

Another advantage of the HiEAA formula is that, unlike the LoEAA formula, it adds virtually no calories to the diet:

“The advantage of the HiEAA per calorie ingested is particularly clinically relevant. A nutritional approach to increasing lean body mass in heart failure that adds significantly to caloric intake is likely to be counterproductive. Heart failure is usually accompanied by obesity, as reflected by the BMI (32.7 ± 5.9) and body composition (45.5 ± 3.2% body fat) of our subjects, so any additional caloric intake is undesirable.”

Next Kim et al discuss the value of the non-essential amino acid, arginine, the conversion amino acid from citrulline:

“…arginine becomes an essential amino acid in the older adults. Arginine supports protein synthesis as well as the production of nitric oxide. Nitric oxide is responsible for regulation of blood pressure and regional blood flow.”

Furthermore:

“An increase in nitric oxide production coinciding with an increase in plasma EAA concentrations should help distribute the ingested EAAs to muscle by increasing muscle blood flow.”

The next quote I would like to feature from the Kim et al paper discusses two clinical implications of the HiEAA formulation:

“The greater anabolic efficiency of the HiEAA has potential clinical implications. First, a greater anabolic response sustained over time will translate to an amelioration of the loss of muscle mass and function that commonly occurs in both aging and heart failure. Second, an EAA-based formulation places minimal stress on the kidney, because the production of two major by-products of amino acid metabolism (i.e., ammonia and urea) is limited because non-essential amino acids, including glutamine and alanine, are reincorporated into protein at an accelerated rate rather than being oxidized.”

As a result:

“The resulting impact on the production of ammonia and urea minimizes the metabolic burden on the kidneys, and this may be particularly relevant to individuals with heart failure who often have reduced renal function as compared to healthy older adults.”

Kim et al conclude their paper with the following over-
view statement:
“We conclude that a recommended dose of the HiEAA effectively stimulated an anabolic response in older females with heart failure. A single serving of a popular meal replacement targeting individuals with heart failure (LoEAA) also induced an anabolic response, but the response to the HiEAA was approximately 2.5-fold greater. The anabolic response of the HiEAA was also greater when normalized for the amino acid and caloric contents of the two beverages. The greater net gain in body protein following consumption of the HiEAA largely resulted from a greater suppression of protein breakdown, with a marginally greater stimulation of protein synthesis as compared to the LoEAA. Functional benefits of habitual consumption of the HiEAA would be expected to become evident over time, without adding significantly to daily caloric intake.”

SOME FINAL THOUGHTS
While the Kim et al study may be the latest that demonstrates exceptional value of supplemental amino acids in maintaining and optimizing muscle mass and function compared to whole proteins, it is far from the only study, of which many involve the work of Dr. Wolfe. Because of this, I am somewhat surprised that amino acid supplementation in accordance with Dr. Wolfe’s precepts has not been more widely appreciated in the supplement industry and the clinical nutrition community in particular. It is my intention to do everything I can to make the clinical nutrition community more aware of the work by Dr. Wolfe and his colleagues.

About the Author
Dr. Moss graduated from the University of Michigan Dental School in 1974 and practiced dentistry in Grand Rapids, Michigan up to 1985. For the last 25 years he has operated Moss Nutrition Products which supplies the Moss Nutrition Professional Line of supplements to practitioners. Since 2000 he has served as adjunct faculty at the University of Bridgeport Nutrition Institute. He teaches Vitamin and Mineral classes, recently adding an Assessment in Nutrition course. Dr. Moss’s newsletters of review and commentary on different subjects relating to functional medicine and clinical nutrition are regularly featured in the journals Nutritional Perspectives and The Original Internist.
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by: Brandon M. Lundell, DC, APC, DABCI, IFMCP, DIACA, DAACA

According to the Endocrine Society, there is no longer any reasonable scientific doubt that the countless everyday chemicals humans are exposed to from womb to tomb can create serious, long-lasting health problems. Everything from beauty products, cleaning supplies, gasoline fumes, plastics in food products, pesticides and herbicides, industrial chemicals used to make computers, couches, cell phones and batteries all find their way into the environment and into virtually every human and animal cell. But there is still a large gap with what to do with the scientific information, and how to translate that into actionable steps in a clinical setting – namely, both testing for and treating exposure-related illness. The first and foremost answer is always education, of the public and of the battle-front clinicians who see the problems in their patients and who are weary of treating symptoms, seemingly on an endless (and often expensive), merry-go-round of symptoms with those suffering from chronic degenerative ailments. Diseases ranging from Autism, Obesity, Diabetes, Autoimmune, PCOS, Infertility, Depression, Anxiety and Dementia all have fairly robust data to support the role our modern chemical conundrum play in the development and advancement of these diseases. So what can be done about it, NOW?

The precautionary principle in epidemiology states that when making public health decisions, we must not wait until all the data is finalized before acting, if there is enough evidence that acting now will save lives. With Endocrine Disrupting Chemicals (EDC), this evidence has existed for decades. As Bradford Hill stated in 1965: "All scientific work is incomplete - whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. That does not confer upon us a freedom to ignore the knowledge we already have or postpone the action that it appears to demand at a given time." Recently, at the Environmental Health Symposium in Scottsdale, some of the legendary researchers and clinicians who have long studied the health effects on chemicals, and how to treat them clinically, convened and shared some insights that can help the clinician both evaluate and support recovery from some of these health issues. A few highlights will be discussed here.

Our Stolen Future – 2019
One of the authors of Our Stolen Future, (arguably the most important environmental health book ever published), Dr. Pete Myers, gave some updated information on the inadequacy of current testing methods used to set standards of safety by the US Government. Three principles he highlighted are 1. Extremely low doses (less than 1 part per billion) that are far below EPA safety standards, do have serious and long-lasting effects on human health. 2. Events that happen in the womb (i.e. exposure to certain chemicals like BPA, even if just once), do not stay in the womb. They last a lifetime through cellular and epigenetic changes. 3. The testing methods and principles used to set safety standards are outdated and often scientifically “wrong.”

Many scientists and clinicians do not fully understand or appreciate the current understanding of low-dose exposure and their health effects. In traditional toxicology, safe levels are set using a standard linear, monotonicity curve, meaning that if one level is seen as safe, then everything below that level is assumed safe as well. This is known as the dose-response curve. But current scientific studies have demonstrated a non-monotonicity of EDC’s. Let’s take tamoxifen as an example (studies have also confirmed this for BPA, Phthalates, Petrochemicals and Heavy Metals as well). Tamoxifen, when taken in large amounts such as those prescribed for breast cancer, has been shown to inhibit breast cancer cell growth. With the recent understanding of how prescription drugs are seeping their way into our water supply, concerned scientists are asking “are there detrimental effects at extremely low levels, such as those found in the environment?” According to one study, the answer is, quite profoundly, yes. Tamoxifen at levels of parts per billion (ppb) which are often found in drinking water, actually stimulate breast cancer growth. Other chemicals such as BPA, which has an EPA safe level 20,000 x’s higher than what is found to actually cause metabolic and reproductive harm, are also in the water supply of virtually every municipality in the United States. The detrimental effects of BPA and other EDC’s are actually worse at

(Continued on next page)
lower levels than higher levels.\(^7\) The point here is that very low levels do matter - a lot. The public and health care community must be educated on these effects as well as simple, effective measures that can reduce exposure and lifelong consequences. Public policy and industry changes have been known to be slow to act. So, for now, avoidance and detoxification strategies are the most immediate means to mitigate the ill effects of EDC’s.

**Neuro-Endocrine Disruption (NEDC’s)**

Endocrine-affecting chemicals can severely alter the brain and neurological development and function as well. Much has been written and researched in the last 35 years about the hormonal impacts of EDC’s. Chemicals such as DDT, BPA, BPB, BPS and Phthalates have been shown to affect insulin receptors, create obesity, cause mesenchymal stem cells to differentiate into lipocytes instead of bone or muscle early in development and affect reproductive organs and fertility\(^8\). Only fairly recently has the interplay between hormones, chemicals and neurodevelopment been more clearly understood.

It was observed early in endocrine disruption research that there are sex-differences in neurobehavioral outcomes of humans and animals exposed to certain chemicals. Autism and ADD/ADHD are clear examples of this sex-bias, affecting both occurrence and severity of disease. Autism has been shown to affect males 4:1\(^9\). This is called the Organization Hypothesis and describes the influence hormones and EDC’s have on the development and function of the Central Nervous System in a sex-specific manner, and how even small perturbations of pro-estrogenic and anti-androgenic chemicals interfere with nerve cell structure and signaling in the developing brain.

Bisphenol A (BPA) and Phthalate esters (PE) are two of the most powerful dis-organizers of brain development. BPA is known to be pro-estrogenic and PE’s are known to be anti-androgenic. Both are found in almost all humans.\(^10\) Early in brain development, sex steroids begin to affect the differentiation in a region-specific matter. The male brain is almost entirely dependent on testosterone and its derivatives (androstenedione, DHT etc.) for certain structures to develop, namely the frontal and pre-frontal cortex, amygdala and hippocampus\(^11\). These regions affect speech, comprehension, intelligence and social-mirroring neurons. Mothers with higher amounts of BPA and PE’s in their blood are at higher risk for their babies (male or female) to develop neurobehavioral disorders\(^11,12\).

To be clear - it is not all hormones and NEDC’s fault. Developmental and adult neurological diseases are complex and multifactorial. Cytokines, glucocorticoids, epinephrine, serotonin, dopamine, mRNA, autophagy, essential fatty acids, microbial toxins such lipopolysaccharides and many other cell messengers affect brain development and function\(^12\). For example, maternal CRP and methylation status has been associated with autism\(^13\). It is always important to address the many factors of disease predisposition and development. However, it is time that NEDCs take their rightly place as a top consideration in fetal and developmental health interventions, as well as all chronic health conditions.

**Testing Methods for Human Exposure**

With the advent of better testing methods, scientific understanding and interpretation, as well as commercially available products that can evaluate a large number of chemical by-products in human blood and urine, testing patients is now easier and more economically viable. Choosing the right population to test is important. While everyone could probably benefit, assessing cost-benefit in any test is prudent. Fertility and preconception planning would be one population that would benefit greatly from early testing and treatment before conception. Several companies such as Great Plains Labs, Doctor’s Data, ZRT labs and U.S. Biotek offer environmental health panels. In this author’s practice, they are utilized daily as part of a complete workup for conditions such as fertility, fibromyalgia, diabetes, dementia, autism, autoimmune, mood disorders, digestive complaints, chronic pain and more.

**Treatment Options – Case Study**

When high levels of plastics, petrochemicals, industrial solvents, pesticides etc. are found, the first principle is to find and remove the source. Recently, a patient presented with chronic fatigue, joint pain and anxiety. Upon full history and physical evaluation, one of the abnormalities that showed were high levels of MTBE/ETBE, a petroleum bi-product found in fuels and exhaust. She was in the 99\(^{th}\) percentile in urine levels meaning that almost no one tests higher than she did. She lived near a large freeway and several busy roads. After discussing this, she realized her health problems actually started within a few months of moving to this area. She was unable to change locations right away so she invested in air purifiers to clean the indoor air, get to fresh air outside the city as often as possible and to bolster her biotransformation and elimination defenses. Infrared sauna was instituted at 30 min 3x/week, exercise was increased to 5x/week in fresher air. She was also found to be deficient in selenium and glutathione, which was also contributing to a hypothyroid state (TSH=5.4). She was given N-acetyl cysteine, milk thistle, CO q 10, Lipoic Acid, Quercetin, grape seed extract (Continued on next page)
and sulforaphane to support detoxification. Flavonoids such as quercetin and sulforaphane are exceptional at supporting detoxification and mitigating the cellular damage of chemicals and work extremely well with N-acetyl cysteine\textsuperscript{14,15,16}. These represent a cornerstone in EDC-exposure treatment. Many other treatments are available to the practitioner and can be utilized as needed.

Prevention is Primary
Prevention starts with education and avoidance. If that is not possible, then early detection and treatment is the next defense against full-blown disease. EDC’s are real threats to human health and fertility. As integrative and alternative practitioner’s it is our privilege and, indeed, moral obligation to advance human health in as many ways as we are trained and can provide this exceptional service.

For those clinicians so inclined, it is important to learn more about the pathophysiology if EDC’s and the many nuances in recognizing this most serious of public health threats. More on this topic and other endocrine-related clinical pearls are covered in many of Dr. Lundell’s courses either live or online.

About the Author:
Dr. Lundell has been practicing and teaching functional, integrative health and medicine for over 15 years. He uses laboratory, physical and history findings to uncover the source of ill-health and organ system dysfunction. His practice style is truly integrative – taking the best western medicine has to offer and combining it with the most effective natural-first therapies.

He has developed a certification course for licensed healthcare practitioners called Nutritional Pathology, providing educational tools and resources to help doctors improve the lives of even their toughest cases. Classes cover laboratory evaluations, endocrinology, autoimmune, gastroenterology, neurology, genetics/epigenetics, toxicology, environmental health and more.

He serves as clinical science advisor to the nutraceutical industry and has developed several unique and effective formulations that have been used in thousands of practices worldwide. Dr. Lundell can be reached at his office in Longmont, Colorado: Harmony Healing Center. 303-651-1502. Or visit: www.DrBrandonLundell.com

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Spinal Manipulative Therapy vs Opioids for Improvement of Physical Function in Patients with Chronic Low Back Pain
A Review of the Available Evidence
by Adrian Isaza, PhD, DC, DABCI, DACBN

INTRODUCTION
In 2007, Rhee, et al, conducted a retrospective study on 13,760 patients who had back surgery and found that patients with LBP who had surgery were significantly more likely to use narcotic drugs within 1 week of procedure than those patients without surgery. In contrast, patients with LBP who had chiropractic services for LBP were less likely to take narcotic drugs within 7 days after services compared to those without chiropractic services. The same study also found that patients with LBP who took narcotic medications were significantly more likely than patients not taking narcotics to have an emergency room visit within 30 days after the initial narcotic drug prescription dates. The subjects with LBP who used narcotic medications were more likely to have additional coexisting health conditions and used more health care services than non-using patients with LBP.1

In 2016, Weeks, et al, carried out a cross sectional analysis at the hospital referral region level correlating the per-capita supply of DCs and spending on chiropractic manipulative therapy (CMT) with several measures of per-capita opioid use by younger, disabled Medicare beneficiaries. This study revealed that a higher per-capita supply of Chiropractors and Medicare spending on CMT were inversely associated with younger, disabled Medicare beneficiaries obtaining an opioid prescription.2 In 2018, Whedon, et al, performed a retrospective cohort study in New Hampshire which revealed that among New Hampshire adults with office visits for non-cancer low-back pain, the likelihood of filling a prescription for an opioid analgesic was significantly lower for recipients of services delivered by doctors of chiropractic compared with non-recipients.3 Also, in 2018, Lisi, et al, published a cross sectional analysis involving over 14,000 veterans who received chiropractic treatment. This study showed that nearly one-third of veterans receiving VA chiropractic services also received an opioid prescription, yet the frequency of opioid prescriptions was lower after the index chiropractic visit than before.4

While the aforementioned studies evaluated the likelihood of taking narcotics between patients who received and didn’t receive chiropractic treatment, it didn’t compare the individual effects on physical function between SMT and opioids.

The purpose of this study is to compare the efficacy in improving physical function between spinal manipulative therapy and opioids for the treatment of nonspecific chronic low back pain.

METHODS
Spinal manipulative therapy and opioids were compared in improving physical function after 1 month of treatment. A search of literature reviews for the treatment of chronic low back using chiropractic and opioids was made using the Cochrane collaboration software program, review manager (RevMan)(RevMan 2008). A search of literature reviews, systematic reviews and meta-analysis using the pubmed and google scholar database was also performed. Chiropractic and opioids were compared in physical function improvement after 1 month of chiropractic treatment. An inclusion and exclusion criteria was performed. Only reviews evaluating studies with high quality of evidence was included for chiropractic efficacy in reducing disability after 1 month. The ratings for the quality of evidence for each literature review were performed by their respective authors.

RESULTS
One review evaluating 7 randomized controlled trials totaling 835 participants was found for SMT efficacy in improving physical function in patients with low back pain after 1 month of treatment. Moreover, 1 review of 4 studies comprising 1895 subjects was found for opioid efficacy improving physical function in patients for low back pain. After 1 month of treatment, SMT was more efficient than strong opioids at improving physical function using high quality of evidence reviews only.

DISCUSSION
A topic not mentioned in this study was the safety of chiropractic treatment. In 2005, Hawk, et al, conducted a systematic review and concluded that adverse effects of spinal manipulation for all ages and conditions were rare, transient, and not severe.5

In 2009, Gouveia, et al, conducted a systematic review (Continued on next page)
and found that for the years of 1966 to 2007, the frequency of serious adverse events varied between 5 strokes/100,000 manipulations to 1.46 serious adverse events/10,000,000 manipulations and 2.68 deaths/10,000,000 manipulations. There is no robust data concerning the incidence or prevalence of adverse reactions after chiropractic. (19) The study by Rubinstein, et al, found that most of the observed adverse events were musculoskeletal related, transient in nature, and of mild to moderate severity. (6)

CONCLUSION

Spinal manipulative treatment is more effective than strong opioids at improving physical function after 1 month of treatment. Based on the safety burden surrounding opioids, physicians may want to consider chiropractic treatment for nonspecific chronic low back pain in order to reduce disability caused by chronic low back pain. Further studies confirming these findings are warranted.

About the author:

Adrian Isaza is both a physician and an academic. As an academic he authored a chapter of the book “The Role of Functional Food Security in Global Health”. He also teaches graduate students at Everglades University for the Alternative Medicine Degree program.

Adrian holds a diplomate in diagnosis awarded by the American Board of Chiropractic Internists and a diplomate in nutrition awarded by the American Clinical Board of Nutrition. Moreover, he is a Certified Chiropractic Acupuncture Practitioner and has a masters degree in medical science.

He recently obtained his PhD in medical sciences and practices medicine full time in Tampa, Florida. Dr. Isaza has published over 30 papers advocating the use of alternative medicine.

References


Table 1

| Reviews for spinal manipulation vs non-recommended therapies (light soft tissue massage, no treatment, waiting list control) on physical function for chronic low back pain on physical function after one month of treatment |

Table 2

| Reviews for strong opioids vs placebo: effect on physical function for chronic low back pain |

Figure 1

Spinal manipulation vs strong opioids effect on physical function after one month of spinal manipulative treatment
The Gut-Brain Axis in Health and Disease

by: Robert G. Silverman, DC, DACBN, DCBCN, MS, CCN, CNS, CSCS, CIISN, CKTP, CES, HKC, FAKTR

The matrix of the microbiome, the gut, and the brain—the gut-brain axis—is a new paradigm for understanding health. When the matrix is functioning well, the body and mind function well. When the matrix is out of balance, physical health issues such as arthritis, diabetes, gut issues such as IBS and IBD, food sensitivities, liver problems, inflammation, musculoskeletal disorders, and autoimmune diseases can arise. Mental health suffers, and neurodegenerative disorders can develop.

The Role of the Vagus Nerve
The vagus nerve (tenth cranial nerve) is the longest cranial nerve. In Latin, the word “vagus” means wandering, an appropriate way to describe the path of this nerve. It runs from the brain stem to the transverse colon. Along the way, it innervates the larynx, esophagus, lungs, trachea, heart, and most of the digestive tract. The brain and gut feed-back and feed-forward loops are linked by the vagus nerve.

The long, convoluted pathway means the vagus is the main nerve of the parasympathetic nervous system, often called the rest and digest system. This is the autonomic system that helps the body conserve energy by slowing the heart rate (rest). The vagus nerve modulates digestion through the migrating motor complex and relaxes the ileocecal valve and other sphincter muscles in the gut (digest). The messages the vagus nerve transmits to the brain from the gut microbiome also impact the hypothalamus-pituitary axis, which in turn controls the neuroendocrine system, mood, and the immune response.

Talking ‘bout You
The vagus nerve link is bidirectional. About 80 percent of the messages sent along the vagus superhighway go from the gut to the brain; about 20 percent go in the other direction. What are they talking about?

Signals from the gut microbiome and from the gut itself tell the brain what’s going on down there; signals from the brain tell the gut what changes to make in response. The gut tells the brain about the production, expression, and turnover of neurotransmitters such as serotonin and GABA and growth factors such as BDNF (brain-derived neurotrophic factor). The gut also reports on the production of intestinal barrier chemicals and tight junction integrity, the modulation of enteric sensory afferents, bacterial metabolites, and mucosal immune regulation. The brain responds with messages that tell the gut to alter mucus and biofilm production, motility, intestinal permeability, and immune function.

For example, when vagus afferent nerve fibers within the gut detect inflammatory cytokines and other indicators, such as tumor necrosis factor, created by the gut bacteria, they pass the message to the brain. The brain responds by stimulating the production of anti-inflammatory neurotransmitters that regulate the immune response.

The Role of Gut Bacteria in Brain Health
Recent research confirms the idea that gut health and brain health are tightly linked. Metabolites excreted by gut bacteria are sensed by afferent nerve endings in the gut; their level is reported to the brain via the vagus nerve. Bacterial metabolites include some substances that are very similar to brain neurotransmitters such as dopamine. In other words, microbial metabolites can interact with the brain and influence behavior and feelings.

The human gut contains over a thousand bacteria species. Trillions of individual bacterium are in the gut, meaning the human body contains more bacteria just in the gut than cells in the entire body. The gut microbiome weighs in at about three pounds. It contains 20 million bacteria genes; the human body has only about two thousand. And the gut contains far more neurotransmitter chemicals than the brain itself. In fact, about 90 percent of the body’s serotonin is produced in the gut by enterochromaffin (EC) cells. The process is highly dependent on the presence of gut bacteria. The bacteria grow and produce metabolites within the gut that stimulate the EC cells to produce serotonin.

Gut bacteria metabolites may also be important in a number of neurodegenerative diseases. In autism, for example, gut microbiota appear to alter the immune system and metabolism. People with autism often have
higher intestinal permeability and show a higher antigenic load from gut bacteria. Their gut biome bacteria are less diverse, and Candida is twice as abundant.

People with autism also have higher than usual levels of LPS (lipopolysaccharides, also known as endotoxin) in their blood. LPS is released from the outer cell walls of gram-negative bacteria when they are destroyed. LPS leads to inflammation that carries over from the digestive tract to the bloodstream.

The presence of antibodies against LPS in the blood indicates that the endotoxin has infiltrated the systemic circulation through the intestinal wall—the well-known leaky gut syndrome. LPS elicits a strong immune response that may be closely related to autism symptoms. Similarly, elevated LPS from intestinal permeability is noted in brain disorders such as Alzheimer’s disease, cognitive decline, dementia, and mood disorders.

**Damaged Gut Bacteria**

When the gut bacteria are damaged or out of balance, the health consequences can be severe. What causes the damage? The chief culprit is the Standard American Diet (SAD), which loads the gut with highly processed foods that are high in chemical additives, sugar, and bad fats and low in fiber. Exposure to the herbicide glyphosate (Roundup), found throughout the modern food system, is another significant cause of damage—this chemical kills beneficial gut bacteria and damages the microvilli. Glyphosate may also break down the bloodstream barrier and allows LPS and other toxins to enter the brain. Other common culprits include antibiotics and other medications, alcohol, toxic environmental chemicals such as glyphosate pesticides, and that all-purpose gut destroyer, stress. Even healthy foods can be to blame if they contain gluten or lactose or are high in lectins (an indigestible protein found in beans and nightshade plants such as peppers).

The damage is chiefly caused by lipopolysaccharides (LPS) cytolethal distending toxins (CDT). Some harmful gram-negative gut bacteria, such as *E. coli* and *Shigella* species, produce these toxins. Poor diet and all the other gut stressors allow these bacteria to crowd out more beneficial gram-positive bacteria, leading to chronic gut dysbiosis. LPS CDT toxins can penetrate the intestinal barrier, enter the bloodstream, and stimulate the IgG, IgA, and IgM immune responses.

What all this come down to is: Gut on fire, brain on fire. The loop is initiated by intestinal inflammation. That leads to the production of inflammatory cytokines that cross the blood-brain barrier and activate brain microglia (the brain’s immune system), causing inflammatory degeneration. At the same time, macrophages in the intestines are also activated, leading to degeneration in the enteric nervous system. The result? An ongoing cycle of inflammatory neurodegeneration throughout the brain-gut axis. The early symptoms are subtle. There’s no pain because the brain has no pain receptors and the inner lining of the gastrointestinal mucosa contains no pain fibers. The symptoms are bloating, followed immediately by brain fog.

**SIBO: Small Intestine Bacterial Overgrowth**

The small intestine is a harsh environment for bacteria. Some do thrive there, but the bulk of the gut bacteria are found in the colon. Small intestine bacterial overgrowth (SIBO) happens when colon bacteria travel to the small intestine and take hold, or when the bacteria naturally found in the small intestine increase too much. SIBO symptoms include bloating and flatulence, diarrhea or constipation, abdominal pain, nausea, and fatigue.

SIBO can be a complication of conditions such as diabetes, IBS, and concussion, but it can also occur as a result of antibiotic use, proton pump inhibitor (PPI) use, low stomach acid, decreased bile acids, and alcohol use. A low-fiber diet such as SAD slows movement in the small intestine and can lead to SIBO. Just getting older and being female are risk factors.

The excess bacteria in the small intestine can gobble up butyrate in the colon.

Stress reduction techniques, such as meditation, mindfulness, and yoga are helpful and easily learned. What works best is highly individual, however, and anything that relieves stress safely is helpful.

Regular exercise is equally important (and also helpful for reducing stress). Panutrients before they can be absorbed. In addition, CDTs from the harmful bacteria damage the epithelial layer, causing leaky gut from damaged tight junctions, damage to the blood-brain barrier (BBB), and systemic inflammation.

**Restoring the Balance**

The gut-brain axis can be knocked out of alignment, but it’s also robust. With careful attention, the balance can be restored using the Super 7(R) Action Plan.

*Reset.* The first action step is to reset the diet, lifestyle, and mindset of patients. The key dietary component is an anti-inflammatory diet, one that is free of GPS: gluten, processed foods, and sugar. The ketogenic diet is ideal for this, because it resets the diet by removing carbohydrates and fueling the brain with ketone bodies instead of glucose. The ketone bodies are key to manu-
facturing BDNF and helping to reset brain function. The keto diet may not be appropriate or accessible for all patients, however. A reasonable alternative is a modified Mediterranean diet that is free of GPS and DNA (dairy, nicotine, and artificial sweeteners).

In addition to the basic diet, adding 8 to 10 grams (two teaspoons) of MCT oil from coconut oil is very helpful. MCT oil has been shown to have antimicrobial and antifungal effects that can help restore a better balance of beneficial gut bacteria while also providing the nutrients needed to make tincts that are inactive should be strongly encouraged to increase their activity level, aiming for 10,000 steps a day. For patients who are already moderately active, encourage increasing the activity level to 15,000 steps a day. In addition, daily resistance training and flexibility exercises should be encouraged.

Remove. Remove foods that are damaging the gut. In addition to removing foods related to individual intolerances and allergies, processed foods, sugar, dairy, and gluten should be removed to allow the gut to heal and inflammation to subside. At the same time, remove unwanted pathogens to restore beneficial gut bacteria. Serum-derived bone immunoglobulins (SBI) help prevent immune activation by binding microbes and toxins, leading to decreased inflammation and less tissue damage.

Berberine HCL activates the enzyme AMPK (AMP-activated protein kinase), sometimes called the body’s metabolic master switch. In the gut, it improves tight junction dysfunction, helping to heal the damage of leaky gut syndrome. Berberine is also highly effective for treating dysbiosis and dyslipidemia. It is the first supplement to turn to for the patient with serious imbalance of the gut microbiome.

Concentrated aromatic oils such as thyme oil, oregano oil, sage leaf, or lemon balm leaf are natural antibiotics. Allicin (garlic) extract is a natural antifungal.

A thorough liver cleanse is also helpful to remove accumulated toxins.

Replace. People with gut dysbiosis often need to replenish and replace digestive enzymes and stomach acid. Paradoxically, symptoms often attributed to excess stomach acid may actually be caused by low gastric acidity.

To improve acidity, titrate betaine HCL with pepsin up to a warming dose. Pancreatic enzymes can be dosed with each meal to improve insufficiency. A comprehensive enzyme complex that includes amylase, papain, trypsin, and lipase helps promote healthy digestive function.

Regenerate. After the diet has been reset and the toxins removed, the damaged intestinal mucosa need help to regenerate and repair the intestinal wall. The amino acid glutamine is key to this process. Overall, glutamine protects muscle tissue and supports immune function during periods of immune and muscular stress. In the gut, it supports the integrity of intestinal mucosal cells and helps restore tight junctions. Other nutrients that may be helpful include omega-3 fatty acids (to improve bacterial diversity, downregulate TLR4, and attenuate the NF-kB pro-inflammatory signaling pathway). Other tools for regenerating the mucosa include curcumin, N-acetyl glucosamine (NAG), ginger, aloe vera, grass-fed collagen peptides, zinc carnosine, MSM, okra powder, glucosamine HCL, branched-chain amino acids, and pro-resolving mediators (PRM).

Re-inoculate. In gut dysbiosis, the bacterial balance is disrupted. Re-inoculating the gut with high-quality prebiotics and probiotics can help restore beneficial bacteria and crowd out harmful bacteria. Fiber is crucial to resetting the microbiome—it is the fertilizer that makes a healthy microbiome flourish.

Fructooligosaccharides (FOS), found in complex soluble fiber, act as prebiotics that nurture the growth of beneficial bacteria in the colon. The FOS inulin is particularly valuable for reaching the distal (left descending) portion of the colon. Supplements of FOS powder containing inulin ensure regular and controlled dosing.

Probiotics should be chosen for the specific beneficial bacteria in the formulation. Included should be Bifidobacterium lactis (decreases LPS translocation), Lactobacillus salivarius (improves tight junctions), L. acidophilus and B. lactis (helps with IBS and bloating), L. rhamnosus (improves mood through vagus mediation), and B. longum (improves noninfectious chronic, low-grade gut inflammation and vagal integrity).

Reintroduce. When the symptoms of dysbiosis are reduced or gone, foods removed earlier in the process can be gradually reintroduced. Continue to avoid GPS and DNA and fried foods. Continue to avoid foods shown by testing to cause allergic responses.

Retain. Retaining the gains in gut integrity and overall physical and mental health is an ongoing process. Avoiding a poor diet, lack of movement, and stress takes commitment and knowledge. Help your patients by educating them and supporting them as they seek to gain and retain improved health. Going forward, gains can be retained with a daily multivitamin plus phytonu-
trients, vitamin D with vitamin K, omega-3 fatty acids, a quality probiotic, and green drinks. Follow GPS and DNA. Regular exercise is a must.

The gut-brain axis is complex and, in today’s toxic world, easily damaged. A thorough understanding of how the brain and the gut are linked gives practitioners the ability to treat the damage with relative ease by guiding patients through the needed changes to diet and lifestyle. The reward? What every practitioner wants: A patient restored to vigorous physical and mental health.

About the Author:
Dr. Robert Silverman is a chiropractic doctor, clinical nutritionist, national/international speaker, author of Amazon’s #1 bestseller “Inside-Out Health”, founder and CEO of Westchester Integrative Health Ctr. The ACA Sports Council named Dr. Silverman “Sports Chiropractor of the Year” in 2015. His extensive list of educational accomplishments includes six different degrees in clinical nutrition.

Dr. Silverman is on the advisory board for the Functional Medicine University and is a seasoned health and wellness expert on both the speaking circuits and within the media, as well as a frequent health expert contributor on national blogs such as Consumer Health Digest. He has appeared on FOX News Channel, FOX, NBC, CBS, ABC, The Wall Street Journal, NewsMax. He was invited as a guest speaker on “Talks at Google” to discuss his current book. A frequent speaker on well as a frequent health expert contributor on national blogs and mainstream publications, Dr. Silverman is a thought leader in his field and practice.

Dr. Silverman was the principle investigator on a Level 1 laser FDA study. His new book, Superhighway to Health is expected to be published in February 2020.

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