



INTEGRATIVE PAIN
SCIENCE INSTITUTE

NUTRITION PROTOCOLS FOR REDUCING PAIN AND INFLAMMATION

A guide to naturally eliminate inflammation,
rebuild the microbiome and repair the gut.

How Nutrition Influences the Microbiome and Gut-Immune Health

Decades ago, inflammation was primarily caused by an acute injury or infection. Today, chronic medical conditions, including chronic pain, are the cause of more than half of all deaths worldwide. As practitioners, we are faced with modern medicine's greatest challenge: To overcome the pandemic of chronic health problems. In order to do this, the focus must be on supporting the body's innate ability to heal by recommending a healthy lifestyle intervention for those patients.

Inflammation is a hot topic in medicine and appears connected to almost every known chronic disease; from heart disease to cancer, diabetes to obesity, autism to dementia, chronic pain and even depression are linked to inflammation. As practitioners, we are trained to shut off inflammation with anti-inflammatory medications, corticosteroids, and increasingly more powerful immune suppressing medication with serious side effects, such as disease modifying anti-rheumatic drugs.

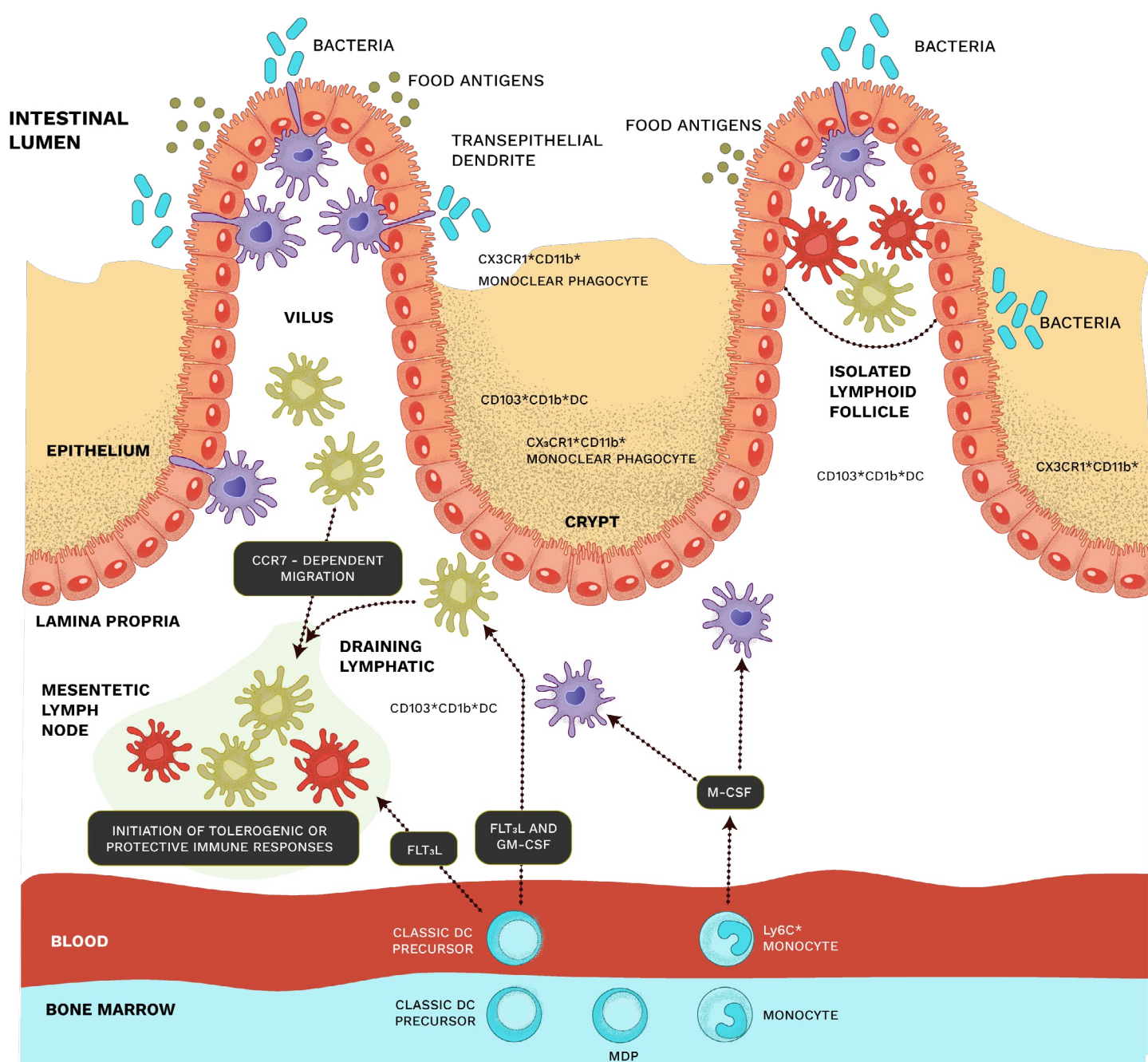
At the center of the inflammatory response is the immune system, and the immune system is intimately related to nutrition and gastrointestinal health.

The immune system is much more complicated than just white blood cells moving through the circulatory system waiting to attack a virus or bacteria. Did you know that eighty percent of the immune system is located in the digestive tract? This means that addressing gut health is a major focal point to assess and treat chronic pain and disease. Why is the majority of the immune system located in the intestine? The digestive tract houses the largest mass of lymphoid tissue in the human body called the GALT (gut associated lymphoid tissue). The GALT is made up of several types of lymphoid tissue that store immune cells, such as T and B lymphocytes, which carry out attacks and defend against pathogens. To fend off foreign invaders, the immune system lines the wall of the intestine with cells to



destroy pathogens trying to enter. If not stopped by the immune system, foreign invaders (also known as antigens) can pass through weak points in the intestinal wall and gain access to the circulatory and lymphatic system. These weak points, known as intestinal permeability (leaky gut), can lead to excess antigen exposure and chronic inflammation. Any discussion of the digestive tract must include not only food but also the impact food is having on gut and immune health.

A healthy and robust immune system is the number one defense system against inflammation, the link to all disease. The root to treating chronic pain begins in the gut for many patients.



Summary of Objectives for this Monograph

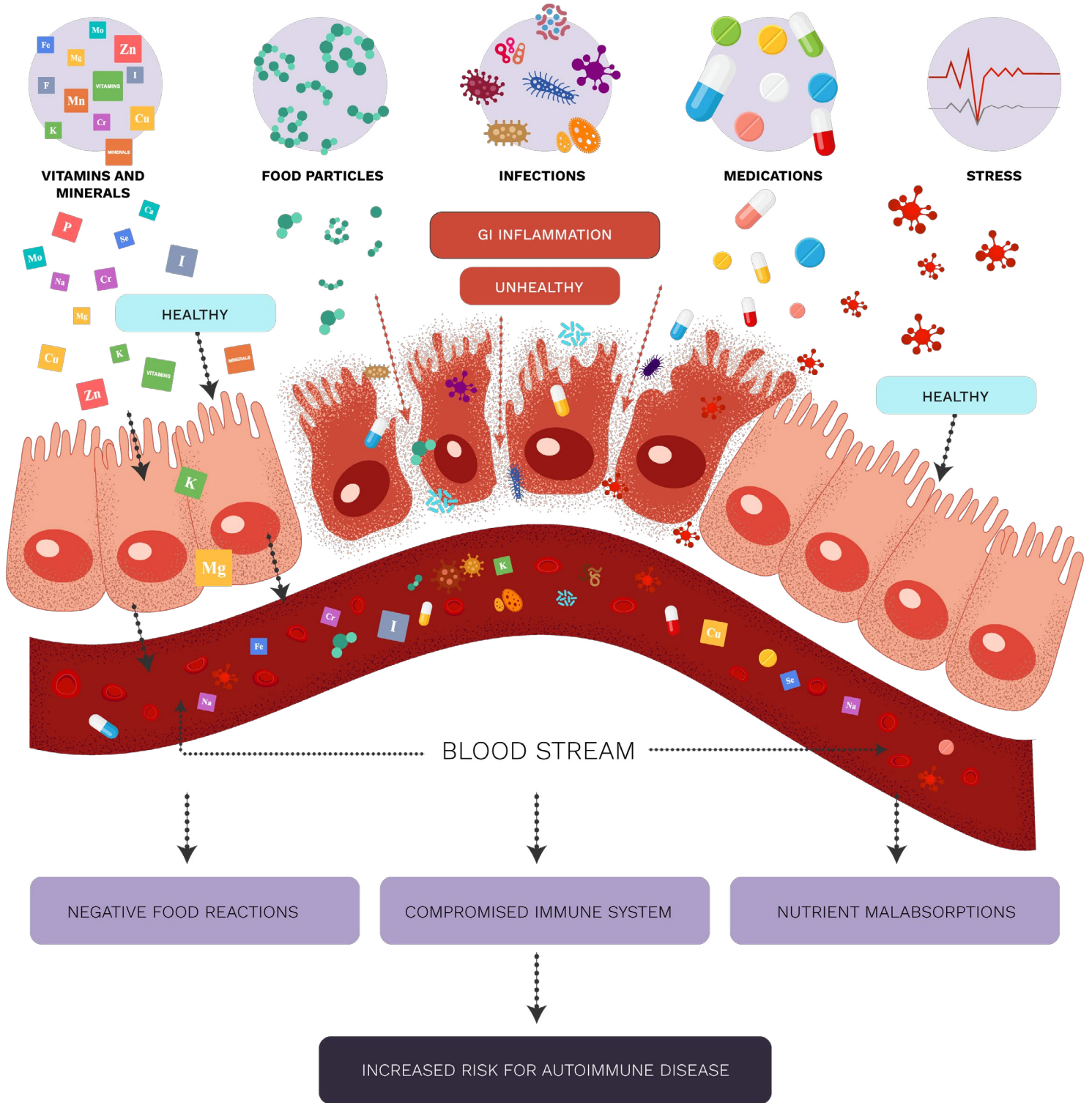
- ✓ Introduce functional nutrition as a means to decrease inflammation and pain.
- ✓ Introduce protocols for optimizing the immune system.
- ✓ Provide protocols for the rebuilding and restoring of gut-immune health.

Restoring Gut Health and Optimizing Nutrition

Rebuild Barrier Function

The first step in restoring gut health is to rebuild the intestinal barrier, and this is a foundational component of any functional nutrition approach. This consists of removing foods and other items that contribute to intestinal barrier damage. Depending on the patient or severity of the condition, the practitioner must learn to use food as medicine. The elimination of a single food (wheat) or component (gluten) can be used. Additional nutritional strategies and foods, such as nightshades and legumes, may be removed for a period of time to allow healing to take place. Besides the removal of inflammatory foods, the addition of those that contain immune supporting nutrients is extremely beneficial and may include vegetables, fruits, bone broth, organ meats, sea vegetables, and fermented foods. Lifestyle factors, such as sleep, exercise and movement, relaxation and stress buffering practices, should also be considered as part of the biopsychosocial model of pain care. Lifestyle factors either support healing of the intestinal barrier or contribute to its demise. In addition to diet, nutritional supplementation is used to repair the gut lining.





Nutrients That Support Intestinal Permeability

Nutrient	Dosing	Action
L-Glutamine	3-4 grams/day for 30-90 days	Amino acid used as primary fuel source for enterocytes to maintain gut barrier.
Probiotics	100 billion/ day for 30-90 days	Restore healthy gut flora and immune function.
Vitamin D	5000 IU/day	Promotes proper immune function and barrier integrity.

Rebalance the Microbiome

The bacteria that live in the gastrointestinal tract, collectively known as the microbiome, consist of more than 100 trillion bacteria. Overall, the number of bacteria in the gut is ten times greater than the number of cells in the human body. There are more than 500 species and more than 100 trillion bacteria that coexist and have coevolved with humans. A person is more microbiome than human. Because seventy percent of the cells that make up the body's immune system exist in the lining of the intestinal tract, the microbiome assists in immune-related responses.

Patients can use lifestyle choices, such as nutrition, to influence and maintain a healthy microbiome. The following all contribute to rebalancing the microbiome: increasing the number of plants in the diet provide fiber for beneficial bacterial to feed on, removing refined sugars decrease fuel opportunistic organisms, adding fermented foods simply adds beneficial bacteria, and avoiding antibiotics helps beneficial bacteria thrive.



Nutritional Support for the Microbiome

Multi-strain probiotics	25-100 billion CFU/day
Prebiotic FOS (fructooligosaccharides)	1000 mg TID

Keeping the gut-immune connection in mind, it is not surprising that an infectious agent can cause a cascade of immune responses. Options for treating a chronic microbial invasion include plant sources and extracts that have antimicrobial properties. Choosing the appropriate antimicrobial treatment may depend on the specific infection’s agent and information found on a stool analysis.

Common Antimicrobial Agents

Antimicrobial Agent	Dosing	Action
Berberine	200-900 mg/day	1-3 months
Oregano oil	300mg/day	2-4 weeks
Olive leaf extract	300-900 mg/day	1-3 months






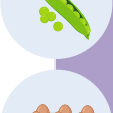
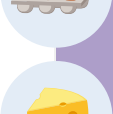

Clinical Pearl:







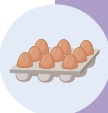

The microbiome has far reaching effects on systems biology. The gut-brain axis is the biochemical signaling that takes place between the gastrointestinal tract and the central nervous system. The gut-joint axis is the immune signaling that takes place between the gastrointestinal tract and the musculoskeletal system. Both axis influence pain.



Reduce (Eliminate) Antigens and Allergens

Diet is the foundation for restoring gut health, optimizing the immune system, and decreasing inflammation. There are many dietary options to choose from and being informed about the advantages and challenges of each is important for both practitioner and patient. The chart on the following page compares and contrasts the different diets and provides a template as to which foods to include and which should be avoided.

	Mediterranean	Whole Foods Diet	Paleo
 Pastured Meat	✓ Specifically lean meat	✓ <ul style="list-style-type: none"> Emphasis is placed on organic, pastured meat Organ meats encouraged for adequate fat soluble vitamins and minerals 	✓ <ul style="list-style-type: none"> Emphasis is placed on organic, pastured meat Organ meats encouraged for adequate fat soluble vitamins and minerals
 Vegetables	✓	✓ <ul style="list-style-type: none"> Fermented vegetables included for probiotic content 	✓ <ul style="list-style-type: none"> Fermented vegetables included for probiotic content
 Fruits	✓	✓	✓
 Nuts & Seeds	✓	✓ <ul style="list-style-type: none"> Nuts and seeds are permitted as long as they have been soaked or sprouted 	✓
 Unrefined Grains	✓	✓ <ul style="list-style-type: none"> All grains are acceptable as long as they have been soaked, sprouted, or fermented 	✗
 Legumes	✓	✓ <ul style="list-style-type: none"> All beans are encouraged after proper soaking in an acidic environment 	✗
 Eggs	✓	✓	✓
 Dairy	✓	✓ <ul style="list-style-type: none"> Dairy is acceptable only if it is raw, non-homogenized, and grassfed Fermented dairy products encouraged for probiotic content 	✗

	FODMAP Diet	Ketogenic Diet	Auto
 <p>Pastured Meat</p>	✓	✓ · Moderate meat consumption as to avoid gluconiogenesis	✓ · Emphasis is placed on organic, pastured meat · Organ meats encouraged for adequate fat vitamins and minerals
 <p>Vegetables</p>	✓ Fermented vegetables included for probiotic content Starches, tubers, and mucillagenous vegetables are avoided	✓ · Low carbohydrate varieties are allowed	✓ · Fermented vegetables included for probiotic content · Nightshades are excluded due to saponin content
 <p>Fruits</p>	✓	· Only low carbohydrate varieties are allowed	✓
 <p>Nuts & Seeds</p>	✓	✓	✗
 <p>Unrefined Grains</p>	✗	✗	✗
 <p>Legumes</p>	✓ White/Navy/Lima/black/kidney beans, lentils, split peas	✗	✗
 <p>Eggs</p>	✓	✓	✗
 <p>Dairy</p>	✓ Fermented versions, 30-day aged cheeses, butter and drycurd cottage cheese	✓ · High-Fat versions are prioritized	✗

Some of the nutritional approaches above have removed foods that patients and practitioners recognize as healthy. Foods or certain components of foods can illicit an immune response through the gastrointestinal tract and have a negative effect on barrier function. After the successful completion of a nutritional protocol, many of these potentially inflammatory foods can be successfully reintroduced into the diet.

Gluten	Exposure to gluten can activate zonulin in the intestine and contribute to intestinal permeability. Gluten is a general name for the proteins found in wheat, rye, barley and triticale (a cross between wheat and rye). Gluten helps foods maintain their shape, acting as glue that holds food together. Gluten can be found in many types of foods, even ones that would necessarily not be recognized or expected.
Lactose and Casein	Certain components of milk can lead to intestinal permeability, and many patients are intolerant due to insufficient lactase production. The casein protein found in dairy products can be confused by the human immune system as the protein gluten; this is a process called molecular mimicry.
Lectins	Lectins are a type of protein that can bind to cell membranes. They are sugar-binding and become the “glycol” portion of glycoconjugates on the membranes. They are abundant in legumes and grains. Soaking, sprouting, and fermenting decrease lectin content.
Lysozymes	Lysozyme, also known as muramidase, or glycoside hydrolase, is a powerful enzyme found in egg whites, which degrades the cell membrane of gram-negative bacteria. Lysozymes have the ability to bind with other proteins in the gut lumen and pass through the gastrointestinal cells (enterocytes) which illicit an immune response.
Nightshades	Members of the family Solanaceae, common nightshades, include white potatoes, eggplant, tomatoes, and peppers. These plants contain alkaloids (solanine, nicotine, capsaicin) that can be detrimental to the intestinal barrier.
Phytic Acid	This acid is present in the bran or hulls of all seeds and legumes, and it limits the body’s natural digestive enzyme activity and may bind to certain minerals, such as calcium, magnesium, copper, iron and zinc, causing possible nutrient deficiencies. Phytic acid can be decreased by soaking, sprouting, and fermentation.



Clinical Pearl:
Elevated C-Reactive protein levels can be an indication of high amounts of inflammation.

Reduce Inflammation

An anti-inflammatory diet is the foundation needed for reversing inflammation, pain, and chronic disease. Anti-inflammatory diets function to reduce chronic inflammation and optimize nutrition. The Western diet includes a large percentage of processed sugary foods and an omega-6 to omega-3 fatty acid ratio of 15:1. Consumption of high amounts of omega-6 fatty acids is pro-inflammatory. The table below is useful to help guide patients in making proper food choices to reduce inflammation.

Inflammatory Foods	Possible Inflammatory Foods	Anti-inflammatory Foods
Alcohol	*Eggs	Extra virgin olive oil
Caffeine	*Fish	Extra virgin coconut oil
Corn	Gluten-free	Organic fruits
Cheese	grains	Organic vegetables
Fast food	Meat	Organic herbs and spices
Fried food	*Shell fish	Raw seeds
*Milk	*Soy	
Omega-6 fats	*Tree nuts	
Polyunsaturated	Yogurt	
fats		
Processed meat		
*Peanuts		
Sugar		
Trans fats		
*Wheat		

* indicates 8 of the top allergens



Replenish Micronutrient Reserves

The standard Western diet, along with poor nutritional habits, can lead to a deficiency in one or more of the essential vitamins, minerals, and anti-oxidants. Maintaining adequate levels of micronutrients is critical for immune health. Micronutrients function to repair cellular damage and fuel immune cells. When one or more micronutrient deficiencies exist, the body's natural ability to heal may be compromised. This can lead to a reduced ability to fight infection and increased free radical activity, which results in systemic inflammation. Taking a high-quality daily multi-vitamin and mineral supplement is recommended in addition to a nutrient-rich daily diet.

While many people still believe that micronutrient deficiencies only occur in third world countries, the truth is they are common in a Western civilization due to poor nutrition. Below, you will find a few facts from assorted sources regarding the prevalence of micronutrient deficiency in America.

According to the United States Department of Agriculture:

- 9 out of 10 Americans are deficient in potassium
- 8 out of 10 are deficient in vitamin E
- 7 out of 10 are deficient in calcium
- 50% of Americans are deficient in vitamin A, vitamin C, and magnesium

According to the Center for Disease Control and Prevention (CDC):

- More than half of the general population is vitamin D deficient, regardless of age
- About 70% of elderly Americans are vitamin D deficient
- 90% of Americans of color are vitamin D deficient



When considering these statistics, the probability that a patient is included in at least one of the deficient groups is very high. Optimizing nutrition is a primary step in intervention.

Micronutrient	Signs of Insufficiency	Role in Immunity	Food Sources
Vitamin A	<ul style="list-style-type: none"> • Fatigue • Poor night vision • Recurrent infections • Inability to fight colds 	<ul style="list-style-type: none"> • Antiviral • Antibody response • Maintains barrier integrity of the skin, GI, and respiratory tract 	<ul style="list-style-type: none"> • Liver • Eggs • Carrots • Spinach • Kale • Cantaloupe
Vitamin C	<ul style="list-style-type: none"> • Bleeding gums • Fatigue • Slow wound healing • Skin easily bruises • Recurrent infections/colds 	<ul style="list-style-type: none"> • Enhances while blood cells function • Increases interferon • Is a natural anti-histamine • Reduces the frequency and severity of colds and flu 	<ul style="list-style-type: none"> • Cauliflower • Red/Green peppers • Broccoli • Brussels sprouts • Mustard greens
Vitamin D	<ul style="list-style-type: none"> • Bone pain • Muscle weakness • Inflammatory bowel disease • Osteomalacia 	<ul style="list-style-type: none"> • Modulate autoimmune response through T-regs • Increases levels of glutathione (antioxidant) to prevent free radical damage 	<ul style="list-style-type: none"> • Eggs • Mushrooms • Salmon • Sardines • Shrimp • Tuna
Selenium	<ul style="list-style-type: none"> • Cardiomyopathy • Tenderness or joint swelling • Inability to fight infection 	<ul style="list-style-type: none"> • Antiviral • Antioxidant • Enhances white blood cells and natural killer cells 	<ul style="list-style-type: none"> • Beef • Brazil nuts • Halibut • Legumes • Sardines • Shellfish
Zinc	<ul style="list-style-type: none"> • Slow wound healing • Poor circulation • Recurrent infections • Skin irritations (psoriasis/acne) • Poor appetite 	<ul style="list-style-type: none"> • Enhances cell-mediated immune response • Increased T-cells • Inhibits viral replication • Destroys microorganisms 	<ul style="list-style-type: none"> • Egg yolk • Ginger • Legumes • Nuts and seeds • Oysters • Sardines



Case Studies

Rheumatoid Arthritis

Marie is a 48 year-old female complaining of stiffness and swelling in the joints of the right carpal, metacarpal, and phalangeal joints of the right dominant hand. Patient also reported stiffness of both knees and recent antalgic gait pattern, especially after sitting for prolonged periods. She is a court stenographer and sits for a lengthy time daily. Diagnosed with rheumatoid arthritis five years ago, she has been medically managed with over-the-counter anti-inflammatories, glucocorticoids, and methotrexate. She also has mild complaints of pain consistent with IBS and reports stools are watery and/or loose.

Visit #1

Since the patient was diagnosed with rheumatoid arthritis over five years ago, it can be assumed that intestinal permeability and inflammation are present. In addition, the patient has taken and is currently taking a number of medications that cause intestinal barrier disruption. Many patients have not been informed about the gut-immune connection; therefore, patient education will be a critical component of the first visit, as well as education about nutrition and the various dietary strategies available. Physical therapy exercises were initiated for joint mobility, range-of-motion, and strength. After brief nutritional educational intervention describing the gut-immune and gut-joint connection and using motivational interviewing techniques, the patient agreed to a trial of a gluten-free and low sugar diet for 30-days. Patient was not ready to eliminate dairy, beans, grains or nightshade vegetables from her diet. She was already taking a high quality daily vitamin/mineral and open to adding certain key nutrients into her diet; she already went through a process of exposure and self-discovery from reading a few blog posts on the internet.



Intervention

- 100% gluten free diet for 30-days. Provided shopping guide, recipes, meal plans, and a complete list of foods and products that may contain gluten.
- Provided a list of sugar names and substitutes to avoid adding to food, as well as education to identify the names on packages, boxes, and prepared food items.

Nutrient Support	Dosing	Clinical Benefit
L-glutamine	3 grams daily	Amino acid used as primary fuel source for enterocytes
Omega-3 fatty acids	3 grams daily	Decrease inflammation
Multi-strain probiotic	100B CFU daily	Maintain microbiome & boost immunity

Visit #2

Patient successfully implemented a gluten free diet and reported a decrease in stiffness, resolution of swelling, and a loss of about five pounds. Due to the positive benefits of the lifestyle changes, the patient was open to further nutritional interventions.

Intervention

- Continue with gluten avoidance.
- Continue with current supplement protocol and add in nutrients.
- Elimination of dairy and nightshades from the diet for 30-days.
- Decrease PT to 1x/week and transition to gym.



Nutrient Support	Dosing	Clinical Benefit
Vitamin D	5000 IU daily	Tighten intercellular junction Enhance immune function
Glucosamine	500 mg/day	Protect cartilage Stimulate glycosaminoglycan production Stimulates chondrocytes Reduces oxidative stress
Chondroitin	300mg/day	Draws water into the joint for lubrication
Curcumin	2000 mg/day	Anti-inflammatory

*Patient instructed via email and 10-minute phone consult on challenge of reintroducing gluten, dairy, and nightshades at day 60. Nightshades were tested separately (tomatoes, peppers, eggplant).

Visit #3

Patient reported exacerbation of pain and stiffness with the reimplementation of gluten and dairy. Tomatoes and eggplant did not cause symptoms, although spicy peppers did cause loose bowels and joint pain. The patient should continue with all nutrient support (multi, D, probiotic, curcumin, glucosamine, chondroitin), except L-glutamine, and was instructed to avoid gluten and dairy for three more months and avoid spicy foods as much as possible. Follow-up visit scheduled.

Clinical Reflection

Autoimmune patients often present with obesity, inflammation, gastrointestinal symptoms and functional deficits. It is common to see IBS-D and dysbiosis, along with a poor diet, nutrient deficiencies, and polypharmacy. Traditional pharmaceutical medications have a negative impact on the microbiome and gut barrier function, thus a negative impact on the immune system. Multiple food sensitivities are also common. These can be assessed by a simple elimination diet or with food antibody testing. Once intestinal permeability is addressed, the multiple food sensitivities often resolve or the number of sensitives lessens.



Chronic Fatigue/Chronic Pain

Susan is a 38-year old corporate attorney who complains of headaches, fatigue, and multiple musculoskeletal complaints, including: neck, mid and lower back pain. She had the flu about six months ago and reports not being able to “bounce back.” During this time, she received the flu shot, as well as Ciprofloxacin for twelve days for a reported inner ear infection she obtained while swimming on vacation in the Caribbean. She is a successful attorney who often works twelve-hour days and has two children. She reports having good energy; she is a recreational runner, running three times per week, five miles each run. She notes increased fatigue, pain, and some lack of focus.

Visit #1

Antibiotic treatment can lead to detrimental side effects in patients, including ototoxicity, nephrotoxicity, gastrotoxicity, and tendinopathy. Antibiotics induce the formation of toxic reactive oxygen species (ROS) in bacteria. The bactericidal antibiotics, quinolones, cause mitochondrial dysfunction and ROS overproduction in cells. Mitochondria are most densely found in nervous and musculoskeletal tissue and can have profound impact on cellular energy production. Pain and fatigue are symptoms of poor mitochondrial function. Antibiotic use is associated with changes in the normal flora of the microbiome. Fluoroquinolone antibiotics can cause serious or disabling side effects. Ciprofloxacin should be used only for infections that cannot be treated with a safer antibiotic. Ciprofloxacin may cause swelling or tearing of a tendon (the fiber that connects bones to muscles in the body), especially in the Achilles tendon of the heel. Mitochondrial function and microbiome changes are addressed with nutrient support. Due to her use of Ciprofloxacin, the focus should first be on restoring and normalizing the microbiome. The patient was scheduled for testing, which included a full thyroid panel and vitamin D.



Intervention

- Education provided on whole food/Mediterranean diet.
- Education provided on sleep, minimum eight hours per night.
- Relaxation practices discussed.

Nutrient Support	Dosing	Clinical Benefit
L-glutamine	3 grams daily	Amino acid used as primary fuel source for enterocytes
Omega-3 fatty acids	3 grams daily	Decreases inflammation
Multi-strain probiotic	100B CFU daily	Maintain microbiome & boost immunity
Multivitamin/mineral	Twice daily	Nutrients for optimal cellular function
Alpha Lipoic Acid	500 mg/ day	Quench oxidative damage Recharges other antioxidants
B Complex	Once daily	Provides coenzymes for Krebs cycle
Glutathione	800 mg/ day	Antioxidant properties & detoxification

Visit #2

Patient reported complete resolution of symptoms and that energy was “steadily returning.” Full thyroid panel came back within in normal ranges and vitamin D levels were satisfactory. Patient was instructed to continue with Mediterranean diet and all nutrients. For long-term use she was advised on multivitamin/mineral, omega-3 fatty acids and probiotic and stress/ relaxation practices.

Clinical Reflection

Fatigue is often described by patients as a lack of energy, mental or physical tiredness, diminished endurance, and prolonged recovery after physical activity and pain. Fatigue is a hallmark symptom of mitochondrial dysfunction, making mitochondrial support an important mechanism for recovery. Proper nutrition and nutrients are essential to support mitochondrial function (mitochondrial enzymes and oxidative/nitrosative stress), mitochondrial energy metabolism (ATP production and fatty acid metabolism) and a healthy immune response.



Achilles Tear/Metabolic Syndrome

Anthony is a 65-year old retiree who enjoyed playing tennis; he recently suffered a partial Achilles tendon tear and reported to physical therapy for rehabilitation. Upon taking the patient’s vitals, his BMI was calculated to be 35.5 (220lbs, 5’6”) and blood pressure was recorded at 130/80mm/hg. The patient also reported that his doctor was monitoring his health over the last year because he was warned that he is a “borderline diabetic,” and the doctor placed him on a statin medication for high cholesterol. The patient’s lab values are below where the conventional values are compared with functional values. A 24-hour dietary recall consisted of a bagel with cream cheese and coffee in the morning, pizza and iced tea for lunch, coffee cake with coffee for a mid-afternoon snack, and pasta primavera with two glasses of merlot for dinner.

Measure	Patient	Conventional	Optimal
Total cholesterol	245 mg/dL	200 mg/dL	150-200 mg/d
LDL	190 mg/dL	<120mg/dL	<100 mg/dL
HDL	40 mg/dL	> 40 mg/dL men; >50 mg/dL women	> 55 mg/dL
HbA1C	6.6%	Normal=5.7%; Prediabetes = 5.7-6.4%; Diabetes > 6.5%	4.6-5.3%
Fasting Glucose	110 mg/dL	<100	70-90
Blood pressure	130/80 mm/Hg	Less than 120/80	_____



Visit #1

This patient has a diagnosis of metabolic syndrome. The five conditions described below are metabolic risk factors. You can have any one of these risk factors by itself, but they tend to occur together. You must have at least three metabolic risk factors to be diagnosed with metabolic syndrome.

- A large waistline. This also is called abdominal obesity or “having an apple shape”. Excess fat in the stomach area is a greater risk factor for heart disease than excess fat in other parts of the body, such as on the hips.
- A high triglyceride level (or on medicine to treat high triglycerides). Triglycerides are a type of fat found in the blood.
- A low HDL cholesterol level (or on medicine to treat low HDL cholesterol). HDL is sometimes called “good” cholesterol. This is because it helps remove cholesterol from the arteries. A low HDL cholesterol level raises the risk for heart disease.
- High blood pressure (or on medicine to treat high blood pressure). Blood pressure is the force of blood pushing against the walls of the arteries as the heart pumps blood. If this pressure rises and stays high over time, it can damage the heart and lead to plaque build-up.
- High fasting blood sugar (or on medicine to treat high blood sugar). Mildly high blood sugar may be an early sign of diabetes.

The patient was placed on a statin medication to lower his cholesterol. Statin medications have the following side effects on skeletal muscle function:



Side Effects of Statin Medications

- ✓ Statins alter the segmentation of myocytes and fibroblasts, which stimulates myotoxicity.
- ✓ Statins produce an imbalance in plasma lipids and decreased intracellular cholesterol attribute to decreased membrane viscosity and reduced cell proliferation.
- ✓ Statins have adverse effects on angiogenesis increased endothelial apoptosis.
- ✓ Statins affect vascularization, collagenization, inflammatory cell infiltration, and collagen construction.

A large percent of the first visit was spent on patient education around diet, proper nutrition, exercise, and longevity. A Mediterranean diet was reviewed with the patient, as well as portion control and macronutrient ratios. Education was provided regarding healthy snack options.

Intervention

- Physical therapy twice a week for Achilles rehabilitation.
- 100% whole food/Mediterranean diet.
- Three meals a day and one snack.
- Eat by portion control and proper servings based on macronutrient 40/30/30.
- Increase healthy fat intake via cold water fish and supplement with 3000 mg Omega-3s.
- No sweets, desserts, candy, and sugar.



At week # 4, when the patient’s gait pattern and weight-bearing normalized, he was placed on a walking program, 30-minutes four times per week, along with continued physical therapy.

At week # 8, the patient transitioned from a physical therapy program twice a week to a strengthening program, focusing on the larger muscle groups responsible for pushing, pulling, squatting, and lifting.

Clinical Reflection

By week #16, this patient lost 22 pounds and his waist circumference decreased to 34 inches. His lab values are reflected below. He requested his physician immediately remove him from statin therapy. He maintains his weight loss and healthy cardiometabolic profile, and he has also returned to playing tennis.

Measure	Patient	Conventional	Optimal
Total cholesterol	195 mg/dL	200 mg/dL	150-200 mg/d
LDL	110 mg/dL	<120mg/dL	<100 mg/dL
HDL	43 mg/dL	> 40 mg/dL men; >50 mg/dL women	> 55 mg/dL
HbA1C	5.4%	Normal=5.7%; Pre-diabetes = 5.7-6.4%; Diabetes > 6.5%	4.6-5.3%
Fasting Glucose	80 mg/dL	<100	70-90
Blood pressure	120/80 mm/Hg	Less than 120/80	_____

Diabetes and cardiovascular disease are two of the largest health concerns. Under the umbrella of inflammatory metabolic disease exists: Metabolic Syndrome, Syndrome X, Insulin Resistant Syndrome, Diabetes and pre-diabetes. The clustering of components driving cardiometabolic risk factors include: central obesity/adiposity, insulin resistance, increased inflammatory burden, and atherogenic dyslipidemia. An abundance of research is now available to show that specific dietary patterns, especially those that drive glycemic/insulin dysregulation and obesity, will profoundly increase cardiometabolic risk. Conversely, dietary interventions which reverse these physiological patterns are related to lower cardiometabolic risk and can be the basis of preventative and intervention strategies.



About Joe Tatta, PT, DPT, CNS

Dr. Joe Tatta is one of the pioneering experts in lifestyle interventions for treating persistent pain. A unique combination of physical therapist, nutritionist, and ACT trainer, he has 25+ years of experience in physical therapy, integrative models of pain care, leadership and private practice innovation. He holds a Doctorate in Physical Therapy, is a Board Certified Nutrition Specialist and has trained extensively in Acceptance and Commitment Therapy. Dr. Tatta is the Founder of the Integrative Pain Science Institute, a company dedicated to reinventing pain care through education, research and professional training.

He is chair of the Physiotherapy SIG at the Association for Contextual Behavioral Science, the parent organization of Acceptance and Commitment Therapy. He also volunteers his time on the the New York State Opioid Speakers Bureau and the New York Physical Therapy Association Opioid Alternative Task Force. In 2017 he was a key member of the APTA task force expanding nutrition as part of the scope of practice for physical therapists.

Dr. Tatta is author of the bestselling book, *Heal Your Pain Now* and host of *The Healing Pain Podcast*, featuring interviews and free training from respected pain experts.

Learn more by visiting www.integtativepainscienceinstitute.com

