

# Understanding Your Cellular Nutrition Assays

**restore**  
HYPER WELLNESS + CRYOTHERAPY



# A MESSAGE FROM OUR FOUNDER

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My interest in food as medicine goes back almost 50 years. I spent a great deal of time outdoors in my youth and was enchanted by what I saw as the perfection and beauty of the natural world, which gave me the conviction that good quality food could create health and happiness; and conversely, poor quality food could slowly kill. That conviction eventually drew me to undertake the project of perfecting the method of the Alcat test, to identify which foods are good for any particular person and which are not. Food quality is essential; but, every bit as critical is the compatibility of the food for each and every individual.

That project began in 1986 and I have continued it to this day. For those of you who may not know, the Alcat test is an automated way to determine how an individual's peripheral immune cells (i.e., live, white blood cells in the blood) react or do not react when confronted with a food, chemical, medicinal herb, drug; or, other substance. Testing is conveniently performed outside the body, that is, "ex vivo".

This method was already confirmed in the 1930's and 40's through clinical studies conducted by allergists such as Theron Randolph, Herbert Rinkle, and others. Randolph, particularly, took lengthy and extensive histories on each of the patients that came to his Chicago practice during the 1930's and concluded:

***Usually, neither the patients nor their physicians have suspected food allergy as the root of their problem because most food allergy, by its very nature, is masked and hidden. It is hidden from the patient, hidden from his or her family, and hidden from the medical profession in general. It is said that often the solution to a difficult problem is right in front of your nose, but you cannot see it. In the case of food allergy, the source of the problem is literally in front of you, in the form of some commonly eaten substance that is bringing on and perpetuating chronic symptoms.\****

\*Please note that what Dr. Randolph referred to as, "food allergies" we now call food sensitivities, or, intolerances.

So, the concept and crude methodology for evaluation of leukocyte reactions to foods, ex vivo, already existed when I entered the field. What we did was automate the process, making it more reliable and built a structure to deliver it economically. I'm happy with the outcomes. Many hundreds of thousands of people from around the world have been profoundly helped by this technology. I cannot think of a better answer to our health care crisis than the implementation of this technology on a broader scale.

Along the way I heard about a lab that was doing something similar. They were looking at a sub set of white blood cells (the lymphocytes) to see if the specific memory cells would undergo a favorable proliferative response, when stimulated to do so, in the presence of different alterations of the micro-nutrient content (basically, vitamins, minerals, amino and essential fatty acids) in the culture medium, also ex vivo.

It should be mentioned that there are basically two broad types of immune system cells: innate immune cells, which are the first line of defense; and cells of the specific or "adaptive" branch of the immune system.

The Alcat Test for Food and Chemical Sensitivities looks at both categories; but, it is mainly the innate immune system cells that underlie food and chemical sensitivities. They are by far the more numerous, respond more quickly, and live for a shorter period of time. The specific immune cells, which are the lymphocytes, only become activated when the innate immune cells need an extra boost, be that through antibody production or the ability to directly kill infected cells. The specific immune cells are pathogen specific, meaning, they recognize only one pathogen, hence the name; and, are capable of dividing into exact replicas of themselves in order to buttress the attack. However, once the threat has passed, they go back to their resting state and reduce in number. Their ability to divide or “proliferate” determines how quickly we quell the pathogen next time it comes around. And that ability to do so is dependent upon its intracellular nutrient stores. Hence, measurement of cell proliferation, when stimulated to do so (by a mitogen, i.e., “mitosis generator) can provide a functional measurement of not only the lymphocytes’ respective individual micronutrient stores but also reflect the nutritional status of all somatic cells.

I found this approach fascinating and I learned that the inventor of this test, William Shive, worked at Experimental Sciences, University of Texas in Austin. Since I lived in Austin I reached out to see if he would entertain a visit. We met shortly thereafter and had numerous follow up meetings to discuss how our methods of cellular measurement might improve his assay; and, toward that end, we began collaboration. This continued until Dr. Shive’s untimely death. We have since continued our efforts over the past 20 years and have finally succeeded in bringing about a test that is broader, less time consuming, more accurate, and more economical. We hope you find it beneficial.

For this I honor the important pioneering work performed by Dr. Shive and his collaborators and am grateful for the extraordinary achievements of my research and nutrition teams, and thank them for their untiring work.

**Roger Deutsch, CEO**  
*Cell Science Systems, Corp.*

**N.B.**

I still strongly believe in meeting our nutritional requirements through consumption of wholesome, fresh, organically produced food; however, in today’s world one may greatly benefit by taking appropriate supplements; and, this test can offer valuable guidance as to which supplements to take.

The Alcat Test for Food and Chemical Sensitivities and the Alcat method for assessment of micronutrient deficiencies, go hand in hand. They both measure a different functional response of the immune system; one test telling you what not to eat and the other telling you what you should eat.

**However, some gastrointestinal disorders can impair absorption of nutrients, even if adequately consumed. For this reason we have created a test panel to assess genetic risk for Celiac and Crohn’s, along with markers to assess current disease states. It’s called the CICA (Celiac, IBS, Crohn’s Array) and can be ordered along with an Alcat test at a reduced cost.**

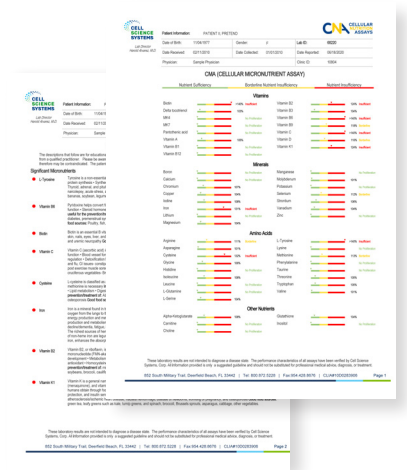


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# Understanding Your Cellular Micronutrient Assay Test Results



## Why Assess Micronutrient Status?

Nutrients are vital to health. They are required for every metabolic process in the body including:

- Energy generation
- Production of cells, tissues, organs, bones, genetic material, and teeth
- Protective mucous membranes
- Immune cells function and structures
- Synthesis of important compounds such as neurotransmitters, enzymes, hormones, and other functional proteins

Essential nutrients—vitamins, minerals, trace elements, water, phytonutrients, amino acids, and essential fatty acids— must be obtained from what we ingest. We must obtain these nutrients from food or in supplement form because the human body cannot produce them at all or in quantities sufficient to meet metabolic needs.

In order to promote optimal health, assessing nutrient status regularly is key to understanding what to address regarding the ideal dietary intake for an individual.

Metabolism and all biochemical reactions take place intracellularly (within cells). Nutrients- vitamins, minerals, amino acids, and fatty acids are utilized within cells to produce energy and to manufacture enzymes, hormones, neurotransmitters, and proteins in order to sustain life. Micronutrients in particular—vitamins, minerals, and phytonutrients— are the driving force or the “spark” behind these metabolic reactions. An insufficiency of any of the nutrients involved can contribute to a disruption in cell metabolism.





# Cellular Micronutrient Assay (CMA)

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Functional cellular nutrient analysis assesses the impact of individual nutrients on cellular function. The CMA (Cellular Micronutrient Assay) directly measures the effect of specific micronutrients on the ability of T and B lymphocytes to reproduce when stimulated with a mitogen (an agent that causes mitosis/cell division). When the body has an infection, it increases production of the T and B lymphocytes (memory cells) that “recognize” and combat that specific invader. The faster these cells reproduce the faster infection is overcome. The ability of these cells to multiply is driven by our nutrient stores. Cells need nutrients in order to grow and multiply. Those nutrient requirements are unique to each individual and are impacted by many factors. Stress, genetics, high energy output in sports, pregnancy, recent infection, toxic burden, sleep patterns, etc., all play a role.

## **Intracellular vs. serum and plasma assessment**

Measurement of micronutrients in plasma or serum is a reflection of their levels in circulation and outside of cells, not a reflection of nutrient levels within the cell where they have the most functional impact. Serum/plasma levels of nutrients are prone to daily fluctuations and are not necessarily a complete and perfect indication of intracellular nutrient status. Therefore, assessing micronutrients and their impact on cellular function at the cellular level is preferred as it provides insight into an individual’s long-term nutritional status (6 months) versus short-term variability.

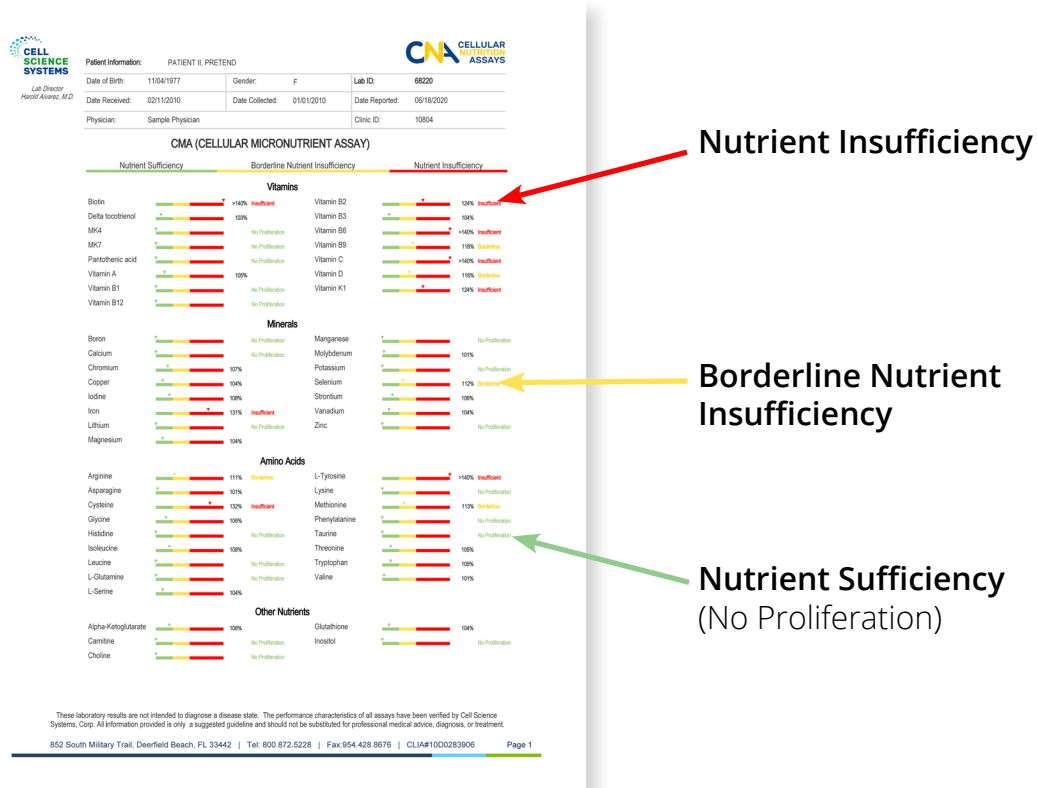
# How the CMA Works

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- ✓ Lymphocytes are separated from the patient's whole blood.
- ✓ The patient's own serum is then added back to the lymphocytes.
- ✓ Cells are stimulated with a mitogen (mitosis generator) and baseline proliferation rates are determined. The lymphocytes' growth rate stimulated by the mitogen (as determined by intracellular metabolic activity) without the addition of micronutrients, is defined as the patient's baseline.
- ✓ Micronutrients are added to the lymphocytes/culture one at a time. Proliferation rates (metabolic activity) after nutrient additions are compared to the patient's baseline proliferation rate. The single independent variable is the presence of a specific micronutrient and in this way it is determined if that specific micronutrient enhances proliferation and to what degree.
- ✓ The nutrients that enhance the cellular functional response to the mitogenic stimuli are reported as a nutrient insufficiency and borderline nutrition insufficiency. The enhancement of the mitogen-induced proliferation rate (marked or moderate response) indicates a suboptimal quantity of that particular nutrient within the patient's cells, and an "insufficiency/borderline insufficiency" of that nutrient.



## The CMA Results Report



The proliferation rate after an addition of each individual micronutrient is reported as a % of the patient's baseline proliferation rate.

A **Nutrient Insufficiency** means that the cells' proliferation rate was 120% or greater of the patient's baseline cellular proliferation rate. The significant increase in metabolic activity and optimal function, very likely indicates insufficient functional stores of the nutrient responsible for the increased proliferation rate.

A **Borderline Nutrient Insufficiency** means that the cells' proliferation rate was between 110-119% of the patient's baseline cellular proliferation rate. The moderate increase in metabolic activity and function indicates probable borderline insufficient functional stores of the nutrient responsible for the increased proliferation rate.

**Nutrient Sufficiency** means that the cells' proliferation rate was not above the patient's baseline cellular proliferation rate, likely indicating sufficient functional stores of the nutrient added.



# Micronutrients Tested in the CMA

## Amino Acids

In the pages that follow, you will find descriptions of the nutrients tested in the Cellular Micronutrient Assay, their important functions, and foods that are considered good sources of them. Please keep in mind that overt deficiencies of these nutrients are not common in Western societies. However, insufficient micronutrient status or subclinical deficiencies are, in fact, commonplace.

*The descriptions that follow are for educational purposes only. Statements are not to be interpreted as treatment recommendations and do not take the place of advice from a qualified practitioner. Please be aware that botanicals and high doses of certain nutrients may interact with medications, botanicals, and medical diagnoses, and therefore may be contraindicated. The patient is encouraged to seek guidance and an individualized food and supplement plan from a qualified nutrition practitioner.*

Amino Acid	Description	Important for	May be useful for prevention/ treatment of	Good Food Sources
<b>Arginine*</b> (L-Arginine)	L-arginine is an amino acid, a building block for protein synthesis, and is best known for its effects on the vascular system.	<ul style="list-style-type: none"> <li>• Vasodilation – dilatation and relaxation of blood vessels</li> <li>• Wound healing and enhancement of the immune system</li> <li>• Ammonia detoxification</li> </ul>	anal fissure, congestive heart failure, erectile dysfunction, pre-eclampsia, sickle cell disease, esophageal spasm, infertility, interstitial cystitis, and Raynaud's disease	meat, poultry, fish, dairy products, peanuts, nuts, seeds, whole grains, legumes, and chocolate.
<b>Asparagine</b> (L-Asparagine)	L-asparagine is a non-essential amino acid required for the synthesis of many important cellular proteins and other amino acids.	<ul style="list-style-type: none"> <li>• Energy production</li> <li>• Brain and nervous system function</li> <li>• Metabolism of ammonia</li> </ul>	fatigue	poultry eggs, dairy, fish, meat, nuts, seafood, seeds, potatoes, asparagus, soy, and whole grains
<b>Cysteine*</b> (L-Cysteine HCL)	L-cysteine is classified as a "semi-essential" amino acid manufactured from methionine. It is made in small amounts by the liver, but the availability of methionine is necessary.	<ul style="list-style-type: none"> <li>• Protein synthesis</li> <li>• Support of the synthesis of glutathione, the body's "master antioxidant"</li> <li>• Immune support</li> <li>• Lipid metabolism</li> <li>• Digestive support</li> <li>• Vascular support</li> <li>• Antioxidation</li> <li>• Anti-inflammation</li> <li>• Nerve protection</li> <li>• Detoxification</li> </ul>	Alzheimer's disease, Parkinson's disease, arthritis, poor intestinal health, dementia, multiple sclerosis, male infertility, and osteoporosis	beef, pork, chicken, sunflower seeds, walnuts, and soy
<b>Glutamine*</b> (L-Glutamine)	Glutamine is the most abundant free amino acid in the body, it is produced primarily in skeletal muscle and released into the circulation.	<ul style="list-style-type: none"> <li>• Protein, DNA, RNA, and neurotransmitter synthesis</li> <li>• Fuel source cells that line the small intestine</li> <li>• Fuel source for immune cells, such as macrophages</li> <li>• Maintaining nitrogen balance</li> <li>• Preventing the burning of other amino acids for energy</li> </ul>	acquired immunodeficiency syndrome, alcohol addiction, burns, gastroenteritis, pancreatitis, and peptic ulcer, and for preventing infections following intense exercise	meat, chicken, fish, cheese, milk, yogurt, legumes, and lentils

**\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.**

# Micronutrients Tested in the CMA

## Amino Acids

Amino Acid	Description	Important for	May be useful for prevention/ treatment of	Good Food Sources
<b>Glycine</b>	Although not considered "essential" because it is made from serine, glycine is considered a conditionally essential amino acid because there are many metabolic demands for it- including heme biosynthesis, collagen formation, and its role in digestion, detoxification and neurotransmitter action.	<ul style="list-style-type: none"> <li>• Collagen formation</li> <li>• Heme synthesis</li> <li>• Detoxification</li> <li>• Glutathione synthesis</li> <li>• Energy source/synthesis of glucose</li> <li>• Brain neurotransmitter effect/CNS function</li> <li>• Anti-cancer</li> <li>• Antioxidation</li> </ul>	<ul style="list-style-type: none"> <li>• Schizophrenia</li> <li>• Stroke</li> <li>• Seizures</li> <li>• Memory and cognitive performance in psychosis risk syndrome</li> <li>• Cystic fibrosis</li> <li>• Gout</li> <li>• Insomnia</li> <li>• Venous leg ulcers</li> <li>• Certain types of cancer</li> </ul>	gelatin, protein rich foods including meat, fish, dairy, and legumes
<b>Histidine</b>	Histidine, an essential amino acid, is involved in a wide range of metabolic processes in the body, and is needed for growth and tissue repair.	<ul style="list-style-type: none"> <li>• Protection of nerve cells</li> <li>• Metabolism of the neurotransmitter, histamine</li> <li>• Immune, gastric, and sexual function</li> <li>• Manufacturing of red and white blood cells</li> <li>• Protection of tissues against radiation and heavy metals</li> </ul>	rheumatoid arthritis, allergic diseases, ulcers, and anemia caused by kidney failure or kidney dialysis	beef, lamb, pork, poultry, fish, cheese, nuts, seeds, eggs, legumes, soybeans, quinoa, and whole grains.
<b>Isoleucine*</b> (L-Isoleucine)	Isoleucine is a branched chain amino acid important for energy production and tissue repair.	<ul style="list-style-type: none"> <li>• Blood clotting</li> <li>• Muscle and tissue repair</li> <li>• Energy production</li> <li>• Protein synthesis</li> <li>• Regulation of blood glucose</li> </ul>	anorexia, mania, tardive dyskinesia, prevention of muscle breakdown during exercise, and exercise fatigue	meat, fish, eggs, nuts seeds, lentils, peas, soy
<b>Leucine*</b>	Leucine is a branched chain amino acid effective at inducing insulin release from the pancreas and providing energy during exercise. It is one of the body's nine essential amino acids.	<ul style="list-style-type: none"> <li>• Regulation of blood glucose</li> <li>• Growth hormone production</li> <li>• Fuel for the body</li> <li>• Protection, repair, recovery of muscle</li> </ul>	muscle soreness and fatigue from exercise, muscle wasting, atherosclerosis, and obesity	meat, dairy, nuts, legumes, eggs, brown rice, soybeans, whole wheat
<b>Lysine*</b>	Lysine is an essential amino acid that plays an important role in the production of enzymes and hormones, as well as the growth and development of bones and muscles.	<ul style="list-style-type: none"> <li>• Building muscle protein</li> <li>• Increasing collagen production and tissue repair</li> <li>• Supporting the production of enzymes, antibodies, and hormones</li> <li>• Promoting calcium absorption</li> <li>• Immune support</li> </ul>	recurring herpes simplex infections/ cold sores, diabetes, high triglycerides, and stress	meat, fish, poultry, dairy, eggs, soybeans, and legumes. Note: a significant amount of lysine is destroyed by harsh cooking techniques like high temperature baking, grilling, and frying.

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*

# Micronutrients Tested in the CMA

## Amino Acids

Amino Acid	Description	Important for	May be useful for prevention/ treatment of	Good Food Sources
<b>Methionine*</b>	Methionine is an essential amino acid that is involved in the synthesis of important protein molecules and other amino acids.	<ul style="list-style-type: none"> <li>• The support of detoxification of toxins and heavy metals</li> <li>• Antioxidant function</li> <li>• Digestive support</li> <li>• The availability of folate</li> <li>• The support of healthy liver function</li> <li>• Reduction of histamine in blood</li> <li>• Exercise recovery, connective tissue production, and cardiovascular health</li> <li>• Hair and nail strength</li> </ul>	pancreatitis, Parkinson's disease, urinary tract infections, and diaper rash	Brazil nuts, meat, poultry, fish, yogurt, cheese, eggs, legumes, soybeans, sesame seeds, and grains
<b>Phenylalanine</b>	Phenylalanine is an essential amino acid used by the body to produce proteins and neurotransmitters.	<ul style="list-style-type: none"> <li>• Mood and appetite regulation</li> <li>• Mental function</li> <li>• Pain tolerance</li> </ul>	depression, attention deficit-hyperactivity disorder (ADHD), Parkinson's disease, chronic pain, osteoarthritis, rheumatoid arthritis, alcohol withdrawal symptoms, and vitiligo	meat, seafood, eggs, cheese, milk, peanuts, pumpkin seeds, bananas, whole grains, brewer's yeast, almonds, corn, avocados
<b>Serine</b> (L-serine)	L-serine is a nonessential amino acid that is synthesized from the amino acid, glycine. It is especially important to proper functioning of the brain and CNS.	<ul style="list-style-type: none"> <li>• Synthesis of proteins and neurotransmitters</li> <li>• Metabolism of fats</li> <li>• Muscle formation</li> <li>• Healthy cognition</li> <li>• Formation of phospholipids for every cell in the body</li> <li>• Formation and maintenance of myelin sheath- protecting nerve cells</li> <li>• RNA and DNA function</li> <li>• Maintenance of a healthy immune system</li> </ul>	schizophrenia, Parkinson's disease, depression, fibromyalgia, and chronic fatigue syndrome.	meat, poultry, fish, legumes, soybeans
<b>Taurine*</b>	Taurine is a sulfur-containing non-essential amino acid important in the metabolism of fats.	<ul style="list-style-type: none"> <li>• Protection of cell membranes</li> <li>• Hydration and electrolyte balance in cells</li> <li>• Detoxification and antioxidant function</li> <li>• Formation of bile salts, which play an important role in digestion</li> <li>• Cardiac contractility</li> <li>• Immune health</li> <li>• Growth and development of the central nervous system and eyes</li> </ul>	congestive heart failure, diabetes, cirrhosis, NAFLD, myotonic dystrophy, and retinitis pigmentosa	The main dietary sources of taurine are animal foods such as fish, meat, and dairy.

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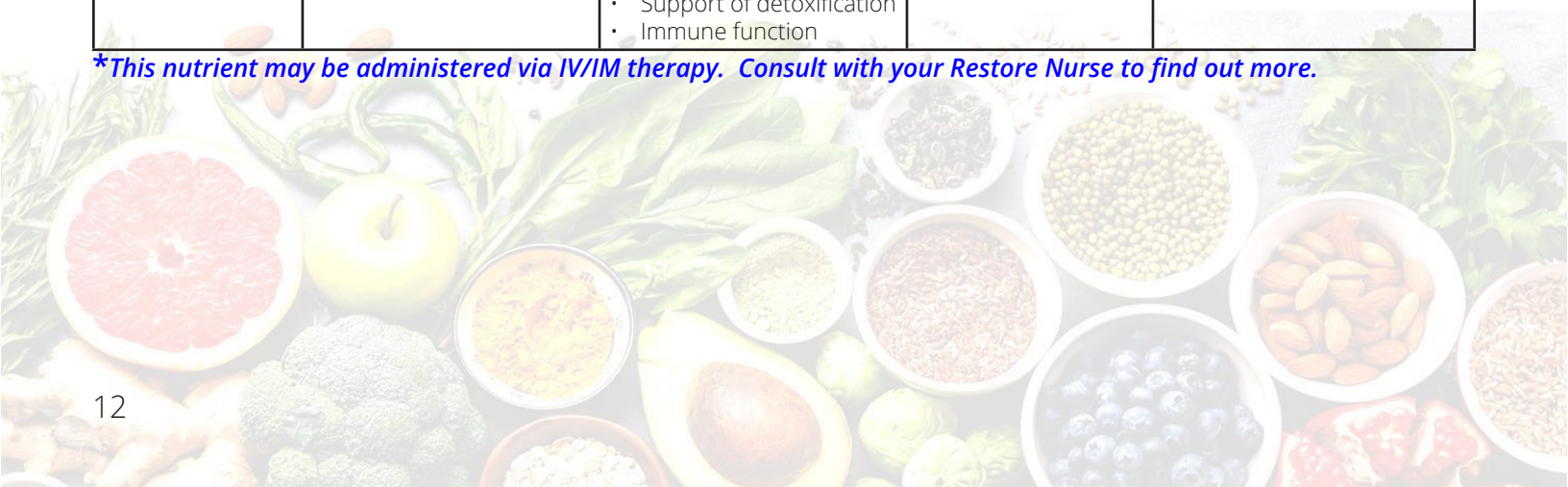


# Micronutrients Tested in the CMA

## Amino Acids

Amino Acid	Description	Important for	May be useful for prevention/ treatment of	Good Food Sources
<b>Threonine</b>	Threonine is an essential amino acid used as a building block for proteins.	<ul style="list-style-type: none"> <li>• Nervous system function</li> <li>• Digestion</li> <li>• Fat metabolism in the liver</li> <li>• Formation of collagen , tooth enamel, health of the skin</li> <li>• Immune function</li> </ul>	ALS, exercise capacity in congestive heart failure, pain, disability, and spasticity in MS	cottage cheese, watercress, sesame seeds, nuts, legumes, soy, meat and fish, lentils, eggs, dairy products
<b>Tryptophan</b>	L-tryptophan is an essential amino acid. The body absorbs tryptophan from dietary protein, converts it to 5-hydroxytryptophan which is then converted to serotonin. Tryptophan absorption into the brain is influenced by dietary intake.	<ul style="list-style-type: none"> <li>• Serotonin synthesis</li> <li>• GI support- regulation of motility</li> <li>• Blood glucose support</li> <li>• Neurotransmitter balance- mood and sleep support</li> </ul>	Premenstrual dysphoric disorder (PMDD), smoking cessation, anxiety, bipolar disorder, cognitive impairment, depression, insomnia, migraine, obsessive-compulsive disorder, pain, restless legs syndrome,gout,H-pylori,sleep apnea, seasonal affective disorder.	Animal proteins contain the highest concentrations of tryptophan, oats, bananas, dried prunes, milk, tuna fish, cheese, bread, chicken, turkey, peanuts, and chocolate, eggs, spirulina, sesame seeds, beans, potatoes. Consumption of carbohydrate may enhance tryptophan availability to cross the blood brain barrier. NOTE: Supplementing with tryptophan and 5 HTP is contraindicated in patients taking SSRI medications.
<b>Tyrosine</b>	Tyrosine is a non-essential amino acid that is synthesized in the body from an essential amino acid, phenylalanine.	<ul style="list-style-type: none"> <li>• Building block for protein synthesis</li> <li>• Synthesis of the brain chemicals, dopamine, norepinephrine, and epinephrine</li> <li>• Regulation of mood, appetite, pain sensitivity</li> <li>• Thyroid, adrenal, and pituitary function</li> </ul>	depression, ADHD, cognitive performance and memory, narcolepsy, acute stress, alcohol, heroine, and cocaine withdrawal	poultry, fish, avocados, almonds, cheese, milk, yogurt, bananas, soybean, legumes, nuts, seeds, and some grains
<b>Valine*</b>	Valine is one of the three branched chain amino acids (BCAAs).	<ul style="list-style-type: none"> <li>• Growth and tissue repair, muscle health</li> <li>• Energy production</li> <li>• Blood glucose regulation</li> <li>• Support of the CNS and cognition</li> <li>• Support of detoxification</li> <li>• Immune function</li> </ul>	stress, anxiety, appetite regulation, and alcohol related brain issues	dairy products, meat, fish, nuts, seeds, lentils, mushrooms, sesame seeds, soy protein, leafy greens, and whole grains.

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*



# Micronutrients Tested in the CMA

## Vitamins

Vitamin	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Biotin*</b> (Vitamin B7)	Biotin is an essential B vitamin also known as vitamin B7.	<ul style="list-style-type: none"> <li>The conversion of carbohydrates, proteins and fats into energy.</li> <li>Health of skin, nails, eyes, liver, and nervous system.</li> </ul>	diabetes, brittle nails, seborrheic dermatitis of infancy, MS, and uremic neuropathy	meat, fish, egg yolks, liver, poultry, dairy products, seeds, nuts, sweet potatoes, spinach, and broccoli
<b>Cobalamin*</b> (Vitamin B12)	Vitamin B12 is a group of compounds called cobalamins.	<ul style="list-style-type: none"> <li>DNA (genetic material) synthesis</li> <li>Red blood cell formation</li> <li>Nervous system and immune system function</li> <li>Metabolism of homocysteine</li> </ul>	issues of the skin, ears/nose/throat, issues associated with aging, and certain conditions/disorders of the cardiovascular, gastrointestinal, musculoskeletal, immune, and nervous systems	vitamin B12 is found almost exclusively in animal products- meat, poultry, fish, eggs, and dairy products. Beef liver and clams are the highest sources. B12 fortified breakfast cereals and nutritional yeasts.
<b>Delta gamma tocotrienol</b>	Delta tocotrienol is a natural form of vitamin E. Vitamin E is a group of eight fat soluble compounds that include four tocopherols (alpha, beta, gamma and delta) and four tocotrienols (alpha, beta, gamma, and delta). Studies suggest that tocotrienols can provide health benefits distinct from alpha-tocopherol, the most well known form of vitamin E. Tocotrienols have greater fluidity which makes it easier for the body to incorporate them into cell membranes, especially delta-tocotrienol.	<ul style="list-style-type: none"> <li>Antioxidation</li> <li>Antiaging</li> <li>Anti-inflammatory</li> <li>Anticancer</li> <li>Brain health</li> <li>Bone health</li> <li>Cardiovascular effects</li> <li>Prevention of platelet aggregation</li> <li>Hypolipidemic effects</li> <li>Neuroprotective effects</li> </ul>	hyperlipidemia, certain types of cancer, atherosclerotic heart disease, metabolic syndrome. NAFLD, Parkinson's disease, osteopenia/ osteoporosis	palm oil, rice bran , annatto seeds. The most potent source, annatto beans/ pods are not edible but supplemental sources often derive tocotrienols from the annatto bean. Supplementation is normally necessary.
<b>Folate</b> (Vitamin B9)	Vitamin B9, more commonly known as folate (naturally-occurring form of B9) or folic acid (a synthetic form), is a water-soluble vitamin that is part of the B vitamin family.	<ul style="list-style-type: none"> <li>Growth and development</li> <li>Homocysteine and vitamin B12 metabolism</li> <li>Brain and CNS function</li> <li>Immune system function</li> <li>Cardiovascular support</li> <li>Red blood cell production</li> <li>Reproductive health</li> </ul>	Alzheimer's disease, cardiovascular disease, homocysteine lowering, anemia, migraines, restless legs, dermatitis, autism, depression, cognitive decline/dementia, age-related macular degeneration, birth defects, diarrhea, hearing loss, osteoporosis, cervical dysplasia, ulcerative colitis, and recurrent miscarriages	spinach and other leafy greens, green vegetables, beets, banana, melon, legumes, yeast, mushrooms, oranges and tomato juice.
<b>Nicotinamide*</b> (Niacin, Vitamin B3)	Vitamin B3 occurs naturally in two forms, niacin (aka nicotinic acid) and niacinamide (aka nicotinamide). All the body's tissues convert niacin into its active form, nicotinamide adenine dinucleotide which is required for more than 400 enzymes to drive metabolic processes.	<ul style="list-style-type: none"> <li>Conversion and release of energy from carbohydrate, protein, and fat</li> <li>Brain function</li> <li>Influence on serum lipid levels (niacin form only)</li> <li>Regulation of blood glucose (niacin form only)</li> </ul>	certain cardiovascular, dermatological, and psychiatric issues as well as disorders in hearing, olfactory, taste, addictions, osteoarthritis, ADHD, and insomnia	meat, chicken, fish, whole grains, nuts, legumes, and dairy products

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*



# Micronutrients Tested in the CMA

## Vitamins

Vitamin	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Pantothenic Acid*</b> (Vitamin B5)	Pantothenic acid, also called vitamin B5, plays a vital role in converting food to energy.	<ul style="list-style-type: none"> <li>• Metabolism of carbohydrate, protein, and fat</li> <li>• Synthesis of cholesterol</li> <li>• Digestion</li> <li>• Immune function</li> </ul>	acne vulgaris, allergic rhinitis, and adrenal insufficiency	meat, chicken, organ meats, whole grains, legumes, and some vegetables
<b>Pyridoxine*</b> (Vitamin B6)	Pyridoxine helps convert food into fuel and is a cofactor for more than 50 different enzymes.	<ul style="list-style-type: none"> <li>• Metabolism of fats and proteins</li> <li>• Nerve function</li> <li>• Steroid hormone function</li> <li>• Arterial integrity</li> <li>• Immune function</li> <li>• Synthesis of niacin from tryptophan</li> <li>• Breakdown of homocysteine</li> </ul>	atherosclerosis, hair loss, acne, Meniere's disease, taste disorders, vertigo, neurological conditions, gestational diabetes, premenstrual syndrome, anxiety, ADHD cognitive decline, depression, and possibly some protection from certain toxin induced issues	poultry, fish, organ meats, potatoes, banana, seeds, soybeans, spinach, whole grains, legumes
<b>Riboflavin*</b> (Vitamin B2)	Vitamin B2, or riboflavin, is an essential vitamin involved in vital metabolic processes. It is a component of two major coenzymes flavin mononucleotide (FMN-aka riboflavin-5-phosphate) and flavin adenine dinucleotide (FAD).	<ul style="list-style-type: none"> <li>• Normal cell function, growth and development</li> <li>• Metabolism of carbohydrate, protein, and fat for energy production</li> <li>• Cofactor needed to produce glutathione, a very important antioxidant</li> <li>• Homocysteine metabolism</li> <li>• Promotes iron metabolism</li> <li>• Metabolism of steroids and certain drugs</li> </ul>	migraines, Parkinson's disease, hyperhomocysteinemia, and psoriasis	turkey, sardines, eggs, legumes, soybeans, broccoli, cauliflower, Brussels sprouts, peppers, root vegetables, and squash
<b>Thiamine*</b> (Vitamin B1)	Vitamin B1, thiamin, or thiamine functions plays an important role in energy metabolism, growth, development, and function of cells.	<ul style="list-style-type: none"> <li>• As a cofactor for enzymes that play a role in energy production</li> <li>• Support of the nervous system, muscles, heart, brain, and digestive system.</li> </ul>	epilepsy, Parkinson's disease, sciatica, back pain, CHF, cognitive decline, diabetes, fibromyalgia, and hepatitis	Whole grains, meat, fish
<b>Vitamin A</b>	Vitamin A is a broad group of fat soluble retinoids, including retinol, retinal, retinoic acid, retinyl esters and several provitamin A carotenoids (example, beta carotene). There are two forms of vitamin A: retinoids (found in animal foods) and carotenoids (found in plant foods)	<ul style="list-style-type: none"> <li>• Growth and development</li> <li>• Immune function</li> <li>• Vision</li> <li>• Maintenance of epithelial and mucosal tissues –skin, GI tract, respiratory tract, conjunctiva, nose and genitourinary tract</li> <li>• Cell to cell communication</li> <li>• Reproduction</li> <li>• Antioxidant and anti-inflammation</li> </ul>	acne, eczema, warts, wrinkles, hearing loss, olfactory dysfunctions, certain infectious diseases, night blindness, conjunctivitis, bronchopulmonary dysplasia, burns, cancer, diabetes, peptic ulcer, and more	dairy products, shrimp, eggs, salmon, halibut, scallops, sardines, tuna, cod, and chicken. Sources of provitamin A carotenoids (converted in the body to vitamin A) include carrots, spinach, sweet potato, kale, greens, cantaloupe, and other fruits and vegetables.
<b>Vitamin C*</b>	Vitamin C (ascorbic acid) is a water soluble vitamin that is essential for human survival.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-inflammation</li> <li>• Immune function</li> <li>• Blood vessel formation</li> <li>• Muscle formation</li> <li>• Collagen production</li> <li>• Brain Health/neurotransmitter production</li> <li>• Absorption of iron</li> <li>• Blood lipid regulation</li> <li>• Detoxification</li> </ul>	allergic rhinitis, asthma, cardiovascular issues, certain types of cancer, cold and flu, GI issues- constipation, gallstones, gastritis, UTIs, muscle cramps, dysfunctional uterine bleeding, glaucoma, depression, diabetes, obesity, post exercise muscle soreness, and sinusitis	citrus fruits, raspberries, strawberries pineapple, kiwi, cantaloupe, greens, cruciferous vegetables-Brussels sprouts, broccoli, squash, green beans, carrots, potatoes, tomatoes, peppers

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*

# Micronutrients Tested in the CMA

## Vitamins

Vitamin	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Vitamin D*</b>	Vitamin D, known as the "sunshine" vitamin, is a fat soluble vitamin produced by the body in response to sun exposure; it is naturally present in few foods. It functions as a prohormone.	<ul style="list-style-type: none"> <li>Calcium absorption in the gut</li> <li>Bone development, bone mineralization, bone health</li> <li>Regulation of serum calcium and phosphorous levels</li> <li>Neuromuscular and immune function and maturation of white blood cells</li> <li>Cell growth</li> <li>Enhancement of insulin secretion/action</li> <li>Reduction of inflammation</li> </ul>	eczema, colds, hepatitis C, osteomalacia/osteoporosis, asthma, burns, cancer, CHF, Crohn's disease, depression, diabetes ,fatigue, Parkinson's disease, PCOS, lupus, and more	oily fish -salmon, sardines, herring, mackerel, and tuna, cod liver oil , fortified milk, eggs, liver
<b>Vitamin K1</b>	Vitamin K is a general name of a family of compounds with a common chemical structure- Vitamin K1 (phyloquinone or phytonadione), vitamin K2 (menaquinone), and vitamin K3 (menadione- no longer used in fortified foods/supplements). Vitamin K1 is the primary source of vitamin K that humans obtain through foods.	<ul style="list-style-type: none"> <li>Regulation of blood clotting</li> <li>Transport of calcium and bone metabolism</li> <li>Potential antioxidant protection, and insulin sensitivity support, protection of cells lining blood vessels</li> </ul>	atherosclerosis/ ischemic heart disease, nausea hemorrhagic disease of newborns, vomiting of pregnancy, and osteoporosis	green tea, leafy greens such as kale, turnip greens, and spinach, broccoli, Brussels sprouts, asparagus, cabbage, other vegetables.
<b>Vitamin K2 (MK4)</b>	Vitamin K is a general name of a family of compounds with a common chemical structure- Vitamin K1 (phyloquinone or phytonadione), vitamin K2 (menaquinone), and vitamin K3 (menadione- no longer used in fortified foods/ supplements). Vitamin K2 is a group of compounds which are classified according to their chemical structures- MK4 through MK13. MK4, MK7, and MK9 are the most well studied menaquinones. Menaquinones, mostly originating from bacteria, are present in various animal based and fermented foods. Menaquinones are also produced by bacteria in the gut. MK4 is produced from vitamin K1 (phyloquinone).	<ul style="list-style-type: none"> <li>Regulation of bone demineralization</li> <li>Directs calcium deposits to bones instead of soft tissue</li> <li>Anti-inflammation</li> <li>Anticoagulation</li> <li>Antioxidation</li> <li>Supports bone growth and development</li> <li>Supports cardiovascular health</li> <li>Insulin sensitivity, energy utilization</li> </ul>	beta-thalassemia, rheumatoid arthritis, cirrhosis, hepatitis, myelodysplasia, cardiovascular issues, osteoporosis, Alzheimer's disease, cognitive decline, wrinkles, diabetes, metabolic syndrome, arthritis, neurological issues, certain types of cancer, kidney disease, kidney stones, PCOS, anxiety, depression, postmenopausal bone loss, and cavities	dietary vitamin K2 is found in some fermented foods (ie, natto, cheese) where the specific menaquinone compound that is formed depends on the bacterial species and fermentation conditions. So not all fermented foods have the same menaquinone profile. An individual's dietary intake of vitamin K2 can vary greatly based on food selection and geography. MK4 is typically found in eggs, grass-fed meat, chicken, soft cheese, butter, liver (goose, chicken) chicken
<b>Vitamin K2 (MK7)</b>	Vitamin K is a general name of a family of compounds with a common chemical structure- Vitamin K1 (phyloquinone or phytonadione), vitamin K2 (menaquinone), and vitamin K3 (menadione- no longer used in fortified foods/ supplements). Vitamin K2 is a group of compounds which are classified according to their chemical structures- MK4 through MK13. MK4, MK7, and MK9 are the most well studied menaquinones. Menaquinones, mostly originating from bacteria, are present in various animal based and fermented foods. Menaquinones are also produced by bacteria in the gut.	<ul style="list-style-type: none"> <li>Regulation of bone demineralization</li> <li>Directs calcium deposits to bones instead of soft tissue</li> <li>Anti-inflammation</li> <li>Anticoagulation</li> <li>Antioxidation</li> <li>Supports bone growth and development</li> <li>Supports cardiovascular health</li> <li>Insulin sensitivity, energy utilization</li> </ul>	beta-thalassemia, rheumatoid arthritis, cirrhosis, hepatitis, myelodysplasia, cardiovascular issues, osteoporosis, Alzheimer's disease, cognitive decline, wrinkles, diabetes, metabolic syndrome, arthritis, neurological issues, certain types of cancer, kidney disease, kidney stones, PCOS, anxiety, depression, postmenopausal bone loss, and cavities	Dietary vitamin K2 is found in some fermented foods (ie, natto, cheese) where the specific menaquinone compound that is formed depends on the bacterial species and fermentation conditions. So not all fermented foods have the same menaquinone profile. An individual's dietary intake of vitamin K2 can vary greatly based on food selection and geography. MK7 is found in natto, fermented soy foods

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*



# Micronutrients Tested in the CMA

## Minerals

Mineral	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Boron</b>	Boron is a trace mineral that is not yet classified as an essential nutrient for humans but is gaining acceptance as one.	<ul style="list-style-type: none"> <li>• Bone formation/health</li> <li>• Mineral, calcium metabolism</li> <li>• Membrane function</li> <li>• Synthesis of steroid hormones (estradiol, testosterone, dehydroepiandrosterone, and 1,25-dihydroxyvitamin D.</li> <li>• Reproduction and development</li> <li>• Brain function</li> <li>• Antimicrobial</li> <li>• Antioxidation</li> <li>• Insulin and energy substrate metabolism</li> <li>• Immunity</li> </ul>	dysmenorrhea, osteoarthritis (preliminary evidence), osteoporosis (preliminary evidence), prostate, cervical, and lung cancer, and age-related cognitive decline (preliminary evidence). Topically, boric acid, the most common form of boron, is used as an astringent, to prevent skin infection, and as an ophthalmological irrigant. Another form of boron, sodium pentaborate pentahydrate, is used to prevent radiation dermatitis (preliminary evidence). Intravaginally, boron is used for vaginal candidiasis	fruit, vegetables, tubers, and legumes. Prune juice, avocado, raisins, peaches, grape juice, apples, pears, peanuts, , peanut butter, refried beans, grapes, oranges, lima beans.
<b>Calcium</b>	Calcium is a mineral essential for good health. The most abundant mineral in the body, almost all calcium (99%) is stored in bones and teeth where it supports their strength. The body uses this reservoir to maintain a tightly regulated calcium blood level.	<ul style="list-style-type: none"> <li>• Strength of bones and teeth</li> <li>• Muscle tone and contraction</li> <li>• Cardiovascular and nervous system function</li> <li>• Absorption of protein and fat</li> <li>• The release of hormones and enzymes that impact almost every function in the body</li> <li>• Cellular communication</li> <li>• Tissue repair</li> <li>• pH balance</li> </ul>	brittle nails, leg cramps in pregnancy, pre-eclampsia, obesity, osteoporosis, PMS, and periodontal disease.	milk, yogurt, cheese, kale, broccoli, Chinese cabbage, collard greens, mustard greens, turnip greens, salmon and sardines canned with bones, calcium fortified tofu, sesame seeds, blackstrap molasses
<b>Chromium*</b>	Chromium is a mineral required by humans in trace amounts.	<ul style="list-style-type: none"> <li>• Insulin function</li> <li>• Antioxidation</li> <li>• Serotonin function</li> <li>• Carbohydrate, protein, and fat metabolism</li> </ul>	bipolar disorder, dementia/ cognitive decline, diabetes/ gestational diabetes, metabolic syndrome, depression, hyperlipidemia, PCOS, reactive hypoglycemia	The content of this mineral in foods is substantially impacted by agricultural and manufacturing processes. whole grains- oats, barley, eggs, brewer's yeast, beef, chicken, bananas, lobster, shrimp, mushrooms, broccoli, green beans, tomatoes, Romaine lettuce, and cheese
<b>Copper*</b>	Copper is an essential trace mineral found in all body tissues.	<ul style="list-style-type: none"> <li>• Red blood cell formation (along with iron), anemia prevention</li> <li>• Myocardial contractility</li> <li>• Maintenance of the health of blood vessels, nerves</li> <li>• Immune support, wound healing</li> <li>• Generation of energy from carbohydrate</li> <li>• Antioxidation (cofactor for SOD-superoxide dismutase)</li> <li>• Anti-inflammation support</li> <li>• Bone and tissue integrity</li> <li>• Cholesterol and glucose regulation</li> </ul>	aortic aneurysm, burns, osteoporosis, peptic ulcer, RA, and disorders of taste	organ meats, seafood, nuts, especially cashews and walnuts, seeds, especially sesame and sunflower seeds, legumes, lentils. soybean, shiitake mushrooms, greens, asparagus, summer squash, wheat-bran cereals, and whole-grains and cocoa.

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*

# Micronutrients Tested in the CMA

## Minerals

Mineral	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Iodine</b>	Iodine is an essential component of the thyroid hormones, triiodothyronine (T3) and thyroxine (T4), essential to control energy production/utilization in just about every cell in the body.	<ul style="list-style-type: none"> <li>• Thyroid hormone production</li> <li>• Essential for growth</li> <li>• Metabolism</li> <li>• Protein synthesis</li> <li>• Skeletal and CNS development</li> </ul>	if deficient in iodine- hearing, hypothyroidism, and improvement in cognition. If not deficient iodine may be useful for treating fibrocystic breast changes, cyclical mastalgia, and hyperthyroidism	sea vegetables, fish and seafood, iodized salt, dairy products, eggs.
<b>Iron</b>	Iron is a mineral found in trace amounts in every cell in the body. Most of the iron in the body is found in the hemoglobin of red blood cells that carries oxygen from the lungs to the tissues of the body and in myoglobin, a protein providing oxygen to muscles. It also functions in several key enzymes in energy production and metabolism, including DNA synthesis.	<ul style="list-style-type: none"> <li>• Oxygen transport</li> <li>• Growth and development</li> <li>• Immune activity</li> <li>• Energy production and metabolism</li> <li>• Hormone, neurotransmitter, and DNA synthesis</li> </ul>	ADHD, cognitive decline/ dementia, fatigue, infertility, and restless leg syndrome.	iron exists in foods in two forms, heme iron and nonheme iron. The richest sources of heme iron are oysters, liver, lean red beef, poultry, tuna, and salmon. Non-heme iron is harder for the body to absorb. Sources of non-heme iron are legumes, whole grains, nuts, dried fruit, and greens. Consuming these foods with vitamin C rich foods and/or heme sources of iron, enhances the absorption of nonheme iron.
<b>Lithium</b>	Lithium is a trace mineral that is present in the diet, mainly in grains and vegetables. Some people use lithium supplements as medicine -lithium is available as an FDA approved prescription medication for use in psychiatric conditions. Supplements contain much smaller quantities than prescribed medication.	<ul style="list-style-type: none"> <li>• Modulation of the nervous system function</li> <li>• Modulation of neurotransmitter activity- GABA, serotonin, melatonin</li> <li>• Modulation of circadian rhythms</li> <li>• May be required for normal metabolism and neural communication</li> </ul>	bipolar disorder, depression, schizophrenia, impulsive aggressive behavior associated with ADHD.	depending on geographical location due to uneven distribution of lithium in the earth's crust: cereals, potatoes, tomatoes, cabbage, and some mineral waters. It may also be found in some spices such as nutmeg, coriander seeds, or cumin. Small amounts also found in foods from animal origin like sardines and egg yolks. IMPORTANT: Lithium interacts with a number of herbs, supplements, medications, and medical conditions. Lithium supplementation should only be used with guidance and monitoring by a qualified practitioner.
<b>Magnesium*</b>	Magnesium is an essential mineral, a cofactor in more than 300 cellular reactions, and necessary for the synthesis of energy.	<ul style="list-style-type: none"> <li>• Structural integrity of teeth and bones Energy, DNA, RNA, and protein synthesis Essential fatty acid metabolism</li> <li>• Glutathione (antioxidant) synthesis</li> <li>• Immune support</li> <li>• Transport of calcium and potassium ions across cell membranes</li> <li>• Muscle contraction and nerve function</li> <li>• Regulation of heart rhythm</li> <li>• Regulation of blood glucose</li> <li>• Blood pressure regulation</li> <li>• Regulation of stress response</li> </ul>	angina, arrhythmias, CHF, hypertension, stroke, brittle nails, Meniere's disease, olfactory issues, gastrointestinal issues, constipation, fibromyalgia, headaches, migraines, muscle cramps (especially nocturnal), anxiety, depression, cognitive decline, fatigue,menstrual cramps, PMS, and glucose tolerance.	spinach, Swiss chard, beet greens, turnip greens, summer squash, pumpkin seeds, sesame seeds, sunflower seeds, cashews, almonds, barley, buckwheat, brown rice, quinoa, millet, wheat germ, kidney beans, soybean flour, tofu.

\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.

# Micronutrients Tested in the CMA

## Minerals

Mineral	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Manganese*</b>	Manganese is an essential mineral which plays a role in the production of cartilage and bone matrix. Although important for maintaining good health, manganese can be toxic at high levels.	<ul style="list-style-type: none"> <li>• Metabolic and enzymatic reactions to process carbohydrate, amino acids, and cholesterol</li> <li>• Bone and cartilage health and development</li> <li>• Antioxidant function</li> <li>• Wound healing</li> <li>• Collagen formation</li> </ul>	osteoporosis, epilepsy, tardive dyskinesia, and sexual dysfunction in females	cloves, whole grains, tea, nuts, seeds, legumes, and leafy green vegetable, cinnamon, berries, garlic, basil
<b>Molybdenum</b>	Molybdenum is an essential trace mineral. It serves mainly as a cofactor for over 50 enzymes and aids in the metabolism of proteins and the production of genetic materials. Humans need only very small amounts of molybdenum, which are easily attained through a health promoting eating pattern.	<ul style="list-style-type: none"> <li>• The breakdown of toxic substances</li> <li>• Antioxidation and anti-inflammatory support</li> <li>• Liver and digestive support</li> </ul>	asthma, chronic aches and pains, sulfite and chemical sensitivities, allergies, insomnia, tooth decay, MS, lupus, eczema, and gout	legumes, lentils, nuts, grains, cheese, organ meats
<b>Potassium</b>	Potassium is a mineral and the most abundant intracellular cation. It helps regulate fluid balance as well as mineral balance in and out of body cells. Potassium plays a role in blood pressure regulation by limiting the effect of sodium, muscle contraction, electrolyte balance, neuronal transmission, and muscle contraction. Potassium is absorbed in the small intestine and excreted primarily in the urine, and body potassium levels are regulated in large part by the kidneys. Potassium is also excreted to some extent in the feces and sweat. Note: Increasing potassium intake may be dangerous in people with end stage renal disease and renal insufficiency, with certain endocrine disorders, and with certain medications. Individuals are encouraged to consult their health practitioners regarding potassium intake under these circumstances.	<ul style="list-style-type: none"> <li>• Muscle and nerve activity</li> <li>• Regulation of blood pressure</li> <li>• Fluid balance</li> <li>• Neurotransmitter release</li> <li>• Cell excitability</li> <li>• Hormone secretion</li> <li>• Heart rate</li> <li>• Tone of vasculature and smooth muscle</li> <li>• Acid-base equilibrium</li> <li>• Insulin sensitivity</li> </ul>	<ul style="list-style-type: none"> <li>• Atherosclerosis/ischemic heart disease</li> <li>• Congestive heart failure</li> <li>• Fatigue</li> <li>• Hypertension</li> <li>• Hyperthyroidism</li> <li>• Muscle cramps</li> <li>• Postural hypotension</li> <li>• Stroke</li> <li>• Kidney stones</li> <li>• Bone loss</li> </ul>	Obtaining potassium from foods is preferred, so be sure to discuss dietary supplements with a health care provider before taking any. Good food sources include: avocado, banana, mango, corn, legumes, potatoes, tomatoes, broccoli, spinach, leafy greens, carrots, pumpkin, raisins, cantaloupe, quinoa.
<b>Selenium*</b>	Selenium is an essential trace mineral found in soil, water, and some foods.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-inflammatory</li> <li>• Immune function enhancement</li> <li>• Antiviral</li> <li>• Reproductive support</li> <li>• Thyroid hormone metabolism</li> <li>• DNA synthesis</li> </ul>	burns, depression, certain types of cancer, cardiovascular disease, CHF, dementia/cognitive decline, Down syndrome, hepatitis, male infertility, lymphedema, myotonic dystrophy, oral leukoplakia, Osgood-Schlatter, and thyroiditis	seafood and organ meats. Brazil nuts, sunflower seeds, brown rice, shiitake mushrooms, chia seeds, lima beans, cabbage, spinach

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*



# Micronutrients Tested in the CMA

## Minerals

Mineral	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Strontium</b>	Strontium is a trace mineral found in bone and connective tissue.	<ul style="list-style-type: none"> <li>• Bone formation and quality</li> <li>• Prevention of bone resorption</li> <li>• Increase bone mineral density</li> <li>• Anti-arthritis</li> <li>• Dental support</li> </ul>	osteoporosis, fractures, metastatic bone cancer, osteoarthritis, dental hypersensitivity, and dental caries.	spices, seafood, whole grains, root and leafy vegetables, legumes, drinking water, supplemental from- capsules, tablets. NOTE: Supplementation with strontium should be according to practitioner guidance. High dose strontium supplementation has adverse effects and is NOT recommended. Strontium supplementation is contraindicated in CVD, cerebrovascular disease, peripheral artery disease, renal disease, thromboembolic disorders.
<b>Vanadium</b>	Vanadium is a trace mineral. It is found in foods as well as in all body tissues. Highest concentrations are found in the liver, kidney, and bone.	<ul style="list-style-type: none"> <li>• Blood glucose transport and metabolism</li> <li>• Bone growth</li> <li>• Lipid support</li> <li>• Dental support</li> </ul>	dental caries, impaired glucose tolerance, diabetes	mushrooms, shellfish, black pepper, parsley, dill seed, buckwheat, grains, safflower oil, beer, wine, drinking water, supplemental from- capsules, tablets. NOTE: Prolonged high dose supplementation may cause kidney damage. Vanadium supplementation is contraindicated in renal disease. Supplement only with practitioner guidance.
<b>Zinc*</b>	Zinc is an essential mineral involved in numerous aspects of cellular metabolism. It is a major component of over 300 metabolic enzymes.	<ul style="list-style-type: none"> <li>• Immune function and wound healing</li> <li>• Protein and DNA synthesis</li> <li>• Growth and development</li> <li>• Proper sense of taste and smell, visual function, hearing</li> <li>• Antioxidation and anti-inflammation</li> <li>• Protection of cell membranes</li> <li>• Production of stomach acid</li> </ul>	acne, brittle nails, warts, hearing, olfactory and taste disorders, colds, gastroenteritis, age-related macular degeneration, anorexia nervosa, ADHD, depression, RA, psoriatic arthritis, BPH, body odor, cirrhosis, cancer, and more.	oysters, meat, poultry, seafood, legumes, nuts, seeds, peanuts, egg yolks, whole grains, wheat bran, wheat germ, fruit, and dairy products.

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*



# Micronutrients Tested in the CMA

## Nutrients

Nutrient	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Alpha-ketoglutarate</b>	AKG (alpha-ketoglutarate) is a crucial intermediate of the Krebs cycle and is necessary for multiple metabolic processes in the body.	<ul style="list-style-type: none"> <li>• Growth and development</li> <li>• Bone formation</li> <li>• Wound healing</li> <li>• Healing of muscle tissue</li> <li>• Fuel for cells of GI tract</li> <li>• Energy for cell processes, regulates amino acid concentration, enhances protein synthesis, control of lipid levels</li> <li>• Immune support</li> <li>• Antioxidation (as precursor to glutamate and glutamine)</li> </ul>	improving amino acid metabolism in dialysis, exercise tolerance, inhibition of cellular pathways involved in the aging process, obesity, bacterial overgrowth, intestinal disorders, lung function, mental fatigue..	supplementation
<b>Carnitine*</b>	L-carnitine is a derivative of the amino acids, methionine and lysine, and is synthesized in the liver, kidneys, and brain. It plays a key role in energy production and is found in almost every cell of the body. Only L-carnitine is biologically active and is the form found in food. It is concentrated in skeletal and cardiac muscle tissues.	<ul style="list-style-type: none"> <li>• Mitochondrial function and energy production</li> <li>• Immune, brain, liver, and cardiac function</li> <li>• Elimination of toxic compounds</li> <li>• Blood lipid levels- reduction of triglycerides, increase in HDL</li> </ul>	certain cardiovascular issues and common diagnoses such as asthma, celiac disease, cirrhosis, IBD, diabetes, erectile dysfunction, NAFLD, fatigue, PCOS, COPD, and more.	animal foods such as meat, fish, poultry, and dairy products (mostly in whey).
<b>Choline*</b>	Choline is an essential nutrient needed for many steps in metabolism. It is not classified as a vitamin or a mineral. It is often grouped with the vitamin B complex due to its similar properties and functions.	<ul style="list-style-type: none"> <li>• Early brain development</li> <li>• Cell membrane structural integrity and signaling</li> <li>• Production of neurotransmitter, acetylcholine</li> <li>• Memory, mood, and muscle control</li> <li>• Gene expression</li> <li>• Lipid transport and metabolism</li> <li>• Brain and nervous system functions</li> </ul>	hypercholesterolemia, depression, memory loss, cognitive decline, and liver disease.	meat, poultry, fish, dairy products, and eggs. Cruciferous vegetables, kidney beans, soybeans, nuts, seeds, and whole grains.
<b>Glutathione*</b>	Glutathione is produced in the liver from the amino acids, glycine, cysteine, and glutamic acid. It is considered the body's "master antioxidant".	<ul style="list-style-type: none"> <li>• DNA synthesis and repair</li> <li>• Metabolism of toxins and carcinogens</li> <li>• Immune support</li> <li>• Prevention of oxidative cell damage</li> <li>• Protein and prostaglandin synthesis</li> <li>• Transport of amino acids</li> <li>• Antioxidation,-fights free radicals</li> <li>• Antiviral</li> <li>• Anti-inflammation</li> </ul>	cancer, Parkinson's disease, neurodegenerative disorders, flu, AMD, glaucoma, cataracts, diabetes, heart disease, asthma (not inhaled glutathione), lung disease, liver disease, GI disease, CFS, and side effects of chemotherapy	Fruit, vegetables, and meat but glutathione is poorly absorbed from the GI tract. Consuming foods used in cysteine production is recommended- onions, garlic, chives, leeks. Supplementing with N-acetyl L Cysteine can boost glutathione levels. Glutathione can be taken IV or in liposomal supplemental form.

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*

# Micronutrients Tested in the CMA

## Nutrients

Nutrient	Description	Important for	May be useful for prevention/treatment of	Good Food Sources
<b>Inositol*</b>	Inositol is structurally similar to glucose. It was once considered to be part of the B vitamin complex but now known to be produced in the human body so is now referred to as a pseudovitamin. Inositol is present in two forms, myo-inositol and D-chiro-inositol.	<ul style="list-style-type: none"> <li>• Cell membrane components, cell signaling</li> <li>• Lipoprotein components</li> <li>• Proper function of hormones</li> <li>• Possibly enhancing insulin sensitivity</li> </ul>	Alzheimer's disease, bronchopulmonary dysplasia (BPD), depression, diabetes (d-chiro inositol)/gestational diabetes, NAFLD, OCD, panic attacks, and PCOS	whole grains, buckwheat, peanuts, legumes, nuts, seeds, grapefruit, other citrus fruits, and cantaloupe

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*





# Cellular Micronutrient Assay (CMA)

## What does it mean to be deficient in a nutrient?



Many factors impact nutritional status: food and beverage intake, digestion, absorption, age, disease states, stress, medications, exposure to toxins, genetics, and activity level.

A **nutritional deficiency** is defined as an inadequacy of nutrients in cells or tissues, resulting from inadequate dietary intake or altered digestion, absorption, or metabolism.

Nutrient deficiency diseases described in the early 1900s represent the end stage result of prolonged nutrient insufficiency. However, more recent discoveries reveal that years of subclinical nutrient insufficiency (without classic symptoms of deficiency) can cause a less recognizable progression of chronic disease. Insufficiency at the cellular level can be seen without the individual expressing symptoms of overt deficiency or disease. If the need for particular nutrients is not addressed, the insufficiency may progress to early stage disease.

Nutrient insufficiencies and deficiencies can lead to chronic disease, a well-established fact. Such

consequences can be mitigated or prevented using targeted nutrition support with an individualized food and supplement routine.

## We have an abundant food supply, how could we *not* meet nutrient needs?

The Standard American Diet, which consists of highly processed foods, is inherently calorie rich yet nutrient deficient. Many individuals are NOT consuming the daily recommended amount of fruits and vegetables and insufficient micronutrient intake has been well documented. Intake of several nutrients falls below 50% of recommended levels in the United States. The National Health and Nutrition Examination Surveys (NHANES) consistently reveal that the U.S. population does not meet recommended intake levels for several nutrients including magnesium, calcium, zinc, vitamins A, B6, C, and D.

- Nutrients can become depleted due to growing conditions, harvest timing and methods, prolonged transportation, storage, processing, and cooking. Modern farming techniques have resulted in a decrease in the nutrient content of many foods. Decreased nutrient levels in crops are thought to result from a shift to plants that produce higher yields at the expense of lower nutrient content. Nutrient-depleted soil yields nutrient-depleted crops.
- Nutrient malabsorption is often seen in people with gastrointestinal diseases, small intestinal bacterial overgrowth, hypochlorhydria (low stomach acid), and pancreatic enzyme deficiency.

## Cellular Micronutrient Assay (CMA)

- Inherited enzyme defects may produce insufficient availability of certain essential nutrients. Impaired conversion of a vitamin to its active coenzyme form can also lead to an increased requirement for the vitamin.
- Many nutrients, particularly vitamins, must be in their active form in order to carry out metabolic functions. Some individuals may require the active form of a nutrient due to genetic variations such as single nucleotide polymorphisms (SNPs). Most commercial brands of dietary supplements do not incorporate the bioactive form of nutrients and therefore may not be utilized optimally.
- Certain medications can promote nutritional depletion and deficiencies.
- Chronic illness can result in nutritional deficiencies. Patients with compromised gastrointestinal function, inflammation, and/or dysbiosis often have elevated nutrient requirements that may not be met from what is consumed. Individuals may fail to meet their nutrient needs despite adequate intake if they are unable to sufficiently absorb, transport, process, or utilize nutrients due to GI dysfunction.



### Should I take supplements?

It is always best to focus on food first! Supplementing a poor eating pattern will not undo the detrimental effects of the constant consumption of an eating pattern based on highly processed foods devoid of the nutrients found in whole, unpackaged, unprocessed foods. If the eating pattern is much like the SAD (Standard American Diet), it is necessary to work to change that. Supplements alone will not replace the benefits of a plant-based eating pattern.

However, supplements can help fill in nutrient gaps and replete nutrients that show up as insufficient in the CMA. There is no “one size fits all” approach to nutrition and the same is true for nutrition supplementation. Nutrient form, recommended dosage, and length of supplementation period should all be taken into consideration. Individuals should seek the assistance of a qualified nutrition practitioner for a personalized nutrition and supplementation routine. Dosing recommendations for nutrients can vary depending on current nutritional status, medical conditions, genetic traits, exposure to toxins, increased need for detoxification, age, gender, increased metabolic demands, pregnancy, lactation, etc. A qualified practitioner must take into account all pertinent factors of an individual’s history and CMA/APA results within the context of a thorough nutrition assessment before determining individual nutrient needs and appropriate interventions.

It is important to choose appropriate products that are optimally formulated, safe, pure, accurately labeled, and that adhere to CGMPs. Check on a manufacturer’s third-party certification or call the company to obtain verification that they are following CGMPs. Individual requirements, tolerances, sensitivities, preferences, and even genetic makeup must all become part of an effective supplement plan.



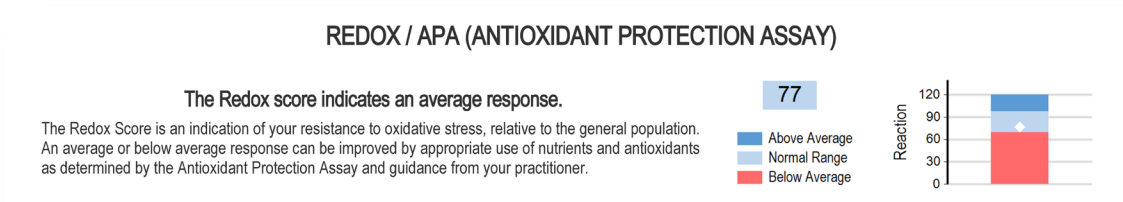
# Understanding Your Redox Assay Results

Oxidative stress is a significant contributor to chronic disease. "Redox" (reduction-oxidation) is a chemical reaction involving the increase and decrease in oxidation that occurs during metabolic reactions. A prolonged imbalance of oxidants and antioxidants, and its association with physiological damage and chronic disease, has prompted the need for measuring redox imbalances and antioxidant capacity within cells.

The Redox Assay is a measurement of the cells' resistance to oxidative stress and its overall antioxidant capacity.

## How the Redox Assay Works

A free radical generating system (H<sub>2</sub>O<sub>2</sub>) is added to the lymphocytes. Depending on the functional antioxidant capacity of the tested cells, peroxide may diminish cells' growth rates and/or damage cells to the point of cell death (apoptosis or necrosis). The cells' ability to resist oxidative damage and prevent further damage to cells is determined and compared to that of the general population.



## Test Report

The color coded report reflects the results of antioxidant function.

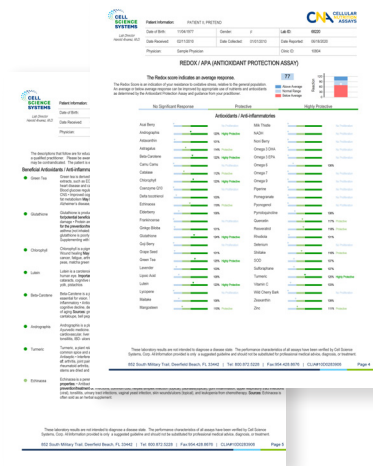
**Red range**= the Redox Score indicates a below average response.

**Light blue range**= the Redox Score indicates an average response.

**Blue range** = the Redox Score indicates an above average response.

Improvement of antioxidant function may be achieved by appropriate use of nutrients and antioxidants as determined by the Antioxidant Protection Assay as well as guidance from the healthcare practitioner.

# Understanding Your Antioxidant/Anti-Inflammatory Protection Assay Results



Oxidation, a chemical reaction caused by free radicals, can be very damaging to cells, tissues, and organs.

**Oxidative stress** occurs when there is an imbalance between the formation and the removal of free radicals due to their overproduction and/or an impaired ability to neutralize them or repair the damage they create. When the body is unable to neutralize free radicals, cell membranes, tissues, and circulating lipids will undergo oxidative damage.

The body is under constant attack from oxidative stress. Substances that create free radicals can be found in the food and water we consume, the air we breathe, and the medicines we take. Consuming fried foods and industrial vegetable oils; smoking; alcohol consumption;

chronic psychological stress; poor sleep; sedentary lifestyle; and exposure to environmental toxins, pesticides, heavy metals, radiation, and air pollution, have been associated with free radical and oxidative damage.

Oxidative damage is recognized as an underlying factor in many chronic diseases including autoimmune disease, cardiovascular disease, type 2 diabetes, chronic kidney disease, neurodegenerative diseases, and cancer.

An **antioxidant** is a substance that prevents oxidation and protects cells from damage caused by the impact of free radicals. The body produces some antioxidant enzyme systems on its own to scavenge free radicals, but in insufficient quantities. Obtaining antioxidants from a whole-foods eating pattern that emphasizes plenty of colorful fruits and vegetables is the best way to boost antioxidant levels in the body. Supplementing with antioxidants (with practitioner guidance) may also be helpful but it is important to start with food first. Other nutrients in plants called phytonutrients may work “in concert” with the antioxidant compounds to provide benefit. This benefit may not be obtained from simply taking supplements.

An imbalance in available antioxidants contributes to chronic inflammation, an underlying factor in a number of disorders including arthritis, diabetes, cardiovascular disease, gastrointestinal dysfunction, and cancer. Many nutrients play both an antioxidant and an anti-inflammatory role in protecting cells and tissues from damage and destruction. Monitoring sufficiency of these nutrients is an important step in managing and preventing chronic disease.



# Antioxidant Protection Assay (APA)

The Antioxidant Protection Assay (APA) determines which specific antioxidant nutrients may be beneficial and support the patient’s cells to resist oxidative stress.

## How it works

Single antioxidants are added to the patient’s cells and serum in the presence of oxidative stress molecules. This process is repeated for each individual antioxidant. Specific antioxidants that support recovery of patients’ lymphocytes from the effect of the oxidative stress are reported as highly protective or protective.

## Test Report

**“Highly Protective”** indicates a proliferation rate of greater than 120% of patient’s baseline = significant protection from cell damage.

**“Protective”** indicates a proliferation rate of 110-120% of the patient’s baseline = protection from cell damage.

**“No Significant Response”** indicates up to 109% of the patient’s proliferation rate = no significant protection from cell damage.





# Antioxidant/Anti-Inflammatory Nutrients Tested in the APA

The pages that follow include descriptions of the antioxidant nutrients, enzymes, botanicals, pigments, and phytonutrients as well as the anti-inflammatory fatty acids that are tested in the Antioxidant Protection Assay.

*The descriptions that follow are for educational purposes only. Statements are not to be interpreted as treatment recommendations and do not take the place of advice from a qualified practitioner. Please be aware that botanicals and high doses of certain nutrients may interact with medications, botanicals, and medical diagnoses, and therefore may be contraindicated. The patient is encouraged to seek guidance and an individualized food and supplement plan from a qualified nutrition practitioner.*

Antioxidant	Description	Important for/ Potential Beneficial Properties	May be useful in the treatment or prevention of	Sources
<b>Beta-Carotene</b>	Beta-Carotene is a pigmented, fat-soluble compound called a carotenoid. It is converted in part to vitamin A in the body. It is converted to retinal which is essential for vision. Then converted to retinoic acid, it is used in growth and cell differentiation.	<ul style="list-style-type: none"> <li>• Anti-inflammatory</li> <li>• Antioxidant</li> <li>• Tumor cell growth inhibition</li> <li>• Cardiovascular protection</li> <li>• Immune enhancing</li> </ul>	cognitive decline, dementia, AMD, breast cancer, GERD, sunburn, retinitis pigmentosa, erythropoietic protoporphyria, rash from sun exposure, and signs of aging	green leafy vegetables-spinach, kale, collard greens, orange-yellow fruits and vegetables- sweet potato, carrots, pumpkin, squash, cantaloupe, bell peppers, broccoli, asparagus
<b>Catalase</b>	Catalase is a key antioxidant enzyme in the body's defense against oxidative stress. It converts free radicals into hydrogen peroxide which ultimately breaks down to stable and safe water and oxygen.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-aging and anti-degenerative</li> <li>• Longevity support</li> <li>• Fat metabolism</li> <li>• Support of DNA integrity</li> </ul>	degenerative disease, mitochondrial dysfunction, cardiac issues, and cataracts	wheat and barley grass, alfalfa, Brussels sprouts, leeks, onions, broccoli, parsnips, zucchini, spinach, kale, radishes, carrots, red peppers, turnips, cucumbers, celery, avocado, potato, and red cabbage, kiwi, peaches, cherries, apricots, bananas, watermelon, pineapple
<b>Coenzyme Q10</b>	Coenzyme Q10 is a fat-soluble compound that is synthesized in the body with the highest levels in the heart, liver, kidneys, and pancreas. It is present in small amounts in some foods. It's chemical structure is similar to vitamin K.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Analgesic</li> <li>• Membrane stabilization</li> <li>• Anti-aging</li> <li>• Anti-inflammatory</li> <li>• Cofactor in energy synthesis</li> <li>• Immune support</li> </ul>	mitochondrial dysfunction, Alzheimer's disease, AMD, eye disorders, cardiovascular disease, CHF, cardiomyopathy, myocardial infarction, hyperthyroidism, infertility, neuropathy, fibromyalgia, hypertension, migraines, NAFLD, Parkinson's disease, Huntington's disease, pre-eclampsia, PCOS, and respiratory illness	As supplements, there are two forms of CoQ10 that are available, the oxidized form (ubiquinone) and the reduced form (ubiquinol) . Food sources include meat, poultry, fish, soy, nuts, fruit, vegetables, eggs, and dairy.
<b>Delta gamma tocotrienol</b>	Delta tocotrienol is a natural form of vitamin E. Vitamin E is a group of eight fat soluble compounds that include four tocopherols (alpha, beta, gamma and delta) and four tocotrienols (alpha, beta, gamma, and delta). Studies suggest that tocotrienols can provide health benefits distinct from alpha-tocopherol, the most well known form of vitamin E. Tocotrienols have greater fluidity which makes it easier for the body to incorporate them into cell membranes, especially delta-tocotrienol.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Antiaging</li> <li>• Anti-inflammatory</li> <li>• Anticancer</li> <li>• Brain health</li> <li>• Bone health</li> <li>• Cardiovascular effects</li> <li>• Prevention of platelet aggregation</li> <li>• Hypolipidemic effects</li> <li>• Neuroprotective effects</li> </ul>	hyperlipidemia, certain types of cancer, atherosclerotic heart disease, metabolic syndrome. NAFLD, Parkinson's disease, osteopenia/ osteoporosis	palm oil, rice bran , annatto seeds. The most potent source, annatto beans/pods are not edible but supplemental sources often derive tocotrienols from the annatto bean. Supplementation is normally necessary.

# Antioxidant/Anti-Inflammatory Nutrients Tested in the APA

Antioxidant	Description	Important for/ Potential Beneficial Properties	May be useful in the treatment or prevention of	Sources
<b>Glutathione</b>	Glutathione is produced in the liver from the amino acids, glycine, cysteine, and glutamic acid. It is considered the body's "master antioxidant".	<ul style="list-style-type: none"> <li>DNA synthesis and repair</li> <li>Metabolism of toxins and carcinogens</li> <li>Immune support</li> <li>Prevention of oxidative cell damage</li> <li>Protein and prostaglandin synthesis</li> <li>Transport of amino acids</li> <li>Antioxidation,-fights free radicals</li> <li>Antiviral</li> <li>Anti-inflammation</li> </ul>	cancer, Parkinson's disease, neurodegenerative disorders, flu, AMD, glaucoma, cataracts, diabetes, heart disease, asthma (not inhaled glutathione), lung disease, liver disease, GI disease, CFS, and side effects of chemotherapy	Fruit, vegetables, and meat but glutathione is poorly absorbed from the GI tract. Consuming foods used in cysteine production is recommended- onions, garlic, chives, leeks. Supplementing with N-acetyl L Cysteine can boost glutathione levels. Glutathione can be taken IV or in liposomal supplemental form.
<b>Lipoic Acid</b>	Lipoic acid is synthesized by humans and is present in a wide range of foods.	<ul style="list-style-type: none"> <li>Antioxidation</li> <li>Anti-inflammatory</li> <li>Regeneration of other antioxidants- vitamin E, vitamin C, and glutathione</li> <li>Endocrine support, glucose regulation</li> <li>Anti-obesity</li> <li>Antiviral</li> <li>Cardiovascular support</li> <li>Vascular support</li> <li>Neurological support</li> <li>Bone support</li> </ul>	aging skin associated with sun damage, cognitive decline, diabetes, insulin resistance, erectile dysfunction, glaucoma, NASH, peripheral neuropathy, burning mouth syndrome, obesity, hepatitis, migraines, myopathy, taste disorders, vitiligo, and wound healing	red meat, organ meats, spinach, broccoli, potatoes, yams, carrots, beets, and yeast
<b>Lutein</b>	Lutein is a carotenoid vitamin, lutein is related to beta-carotene and is one of two major carotenoids (and zeaxanthin) found as a color pigment in the human eye.	<ul style="list-style-type: none"> <li>Antioxidation</li> <li>Light filter</li> <li>Ocular protection</li> </ul>	AMD, cataracts, cognitive decline, certain types of cancer, CVD, and diabetes	kale, spinach, broccoli, corn, kiwi, grapes, orange juice, squash, egg yolk, pistachios
<b>NADH*</b>	NADH is the reduced form of nicotinamide adenine dinucleotide (NAD), a coenzyme involved in a variety of reactions within the body. NADH is synthesized in the body from vitamin B3 and is involved in mitochondrial energy production.	<ul style="list-style-type: none"> <li>Energy generation</li> <li>Antioxidation</li> <li>Cardiovascular support</li> <li>Lipid lowering</li> <li>Antihypertensive</li> <li>Dopaminergic</li> </ul>	CVD, Parkinson's disease, Chronic Fatigue Syndrome	Supplemental from- capsules, tablets.
<b>Pyroloquinoline</b>	PQQ is a micronutrient that resembles the B vitamin family. It acts as an antioxidant, protecting cells (specifically mitochondria) from damaging free radicals.	<ul style="list-style-type: none"> <li>Antioxidation</li> <li>Mitochondrial protection and formation</li> <li>Neuroprotectant</li> <li>Growth and development</li> <li>Cardiovascular support</li> <li>Cognitive support (learning and memory)</li> <li>Anti-inflammatory</li> <li>Energy production</li> </ul>	pain, inflammation, sleep difficulties, cognitive issues, dementia, Parkinson's disease, fatigue, and elevated LDL cholesterol	tofu, natto, miso, spinach, fava bean, carrots, papaya, kiwi, green peppers, parsley, green tea, potato, sweet potato, cabbage, banana, tomato, egg yolk, orange, celery

*\*This nutrient may be administered via IV/IM therapy. Consult with your Restore Nurse to find out more.*

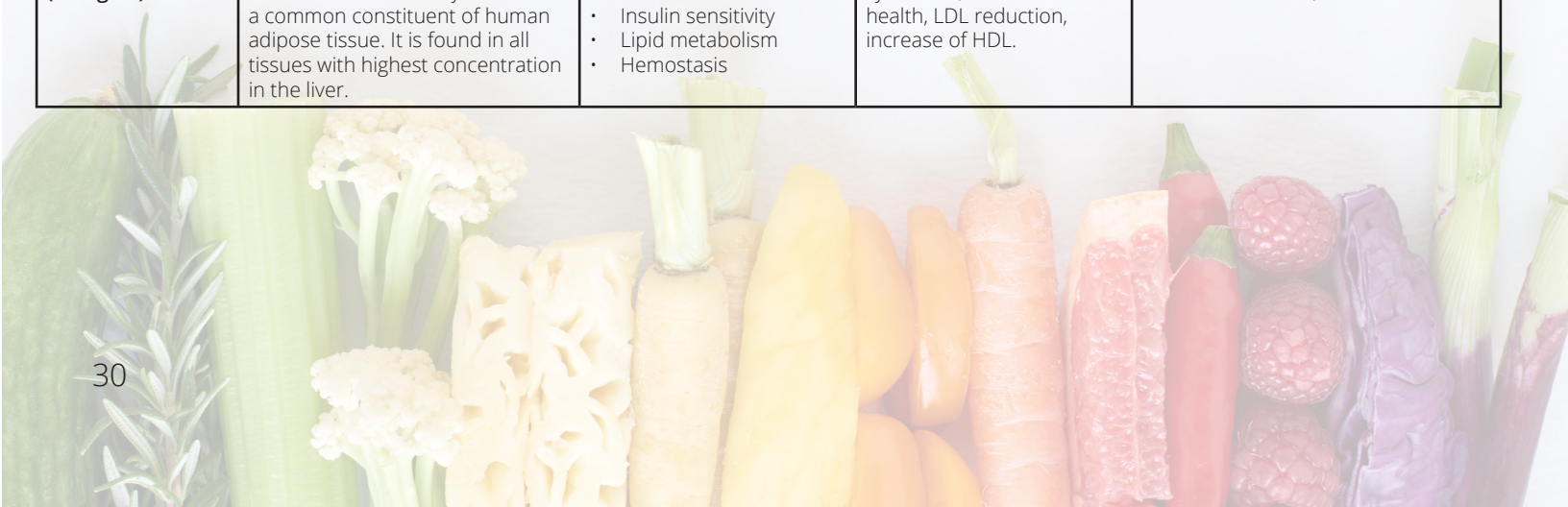


# Antioxidant/Anti-Inflammatory Nutrients Tested in the APA

Antioxidant	Description	Important for/ Potential Beneficial Properties	May be useful in the treatment or prevention of	Sources
<b>Selenium</b>	Selenium is an essential trace mineral found in soil, water, and some foods.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-inflammatory</li> <li>• Immune function enhancement</li> <li>• Antiviral</li> <li>• Reproductive support</li> <li>• Thyroid hormone metabolism</li> <li>• DNA synthesis</li> </ul>	burns, depression, certain types of cancer, cardiovascular disease, CHF, dementia/cognitive decline, Down syndrome, hepatitis, male infertility, lymphedema, myotonic dystrophy, oral leukoplakia, Osgood-Schlatter, and thyroiditis	seafood and organ meats. Brazil nuts, sunflower seeds, brown rice, shiitake mushrooms, chia seeds, lima beans, cabbage, spinach
<b>Superoxide Dismutase (SOD)</b>	Superoxide Dismutase (SOD) is an essential enzyme found in all living cells. SOD catalyzes the conversion of superoxide to oxygen and hydrogen peroxide, reducing damage from ROS, harmful oxygen molecules.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-inflammatory</li> </ul>	bronchopulmonary dysplasia, interstitial cystitis, gout, osteoarthritis, RA, familial ALS, Parkinson's disease, Alzheimer's disease, heart damage after MI, dengue fever, cancer, Down's syndrome, sports injuries, cataracts, radiation therapy, neurological disorders, and corneal ulcers	yeast, spinach, chicken liver, broccoli, Brussels sprouts
<b>Vitamin C</b>	Vitamin C (ascorbic acid) is a water soluble vitamin that is essential for human survival.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-inflammation</li> <li>• Immune function</li> <li>• Blood vessel formation</li> <li>• Muscle formation</li> <li>• Collagen production</li> <li>• Brain health/ neurotransmitter production</li> <li>• Absorption of iron</li> <li>• Blood lipid regulation</li> <li>• Detoxification</li> </ul>	allergic rhinitis, cardiovascular issues, sinusitis, GI issues- constipation, gallstones, gastritis, cold and flu, UTIs, muscle cramps, dysfunctional uterine bleeding, glaucoma, depression, asthma, certain types of cancer, diabetes, obesity, and post exercise muscle soreness	citrus fruits, raspberries, strawberries, pineapple, kiwi, cantaloupe, greens, cruciferous vegetables- Brussels sprouts, broccoli, squash, green beans, carrots, potatoes, tomatoes, peppers
<b>(Eicosapentaenoic acid) EPA</b>	Eicosapentaenoic acid (EPA), one of the three main omega-3 fatty acids, is a long-chain polyunsaturated fatty acid that is found in the tissues of oily fish and marine mammals. EPA is often used in conjunction with docosahexaenoic acid (DHA) for a variety of conditions. Omega 3 fatty acids are important components of cell membranes. All of these fatty acids contain "double bonds"- connections that make them flexible and interactive but also more susceptible to damage. EPA has five double bonds.	<ul style="list-style-type: none"> <li>• Cell membrane stability and fluidity</li> <li>• Anti-inflammatory – proper function of the body's inflammatory system depends on prostaglandins (messaging molecules). Many of the prostaglandins are made from EPA and tend to be anti-inflammatory.</li> <li>• Antiplatelet</li> <li>• Decrease in blood viscosity</li> <li>• Cardiovascular effects</li> <li>• Immunomodulatory</li> <li>• Reduction in serum triglycerides</li> <li>• Neurological effects</li> </ul>	atherosclerosis/ ischemic heart disease, cardiac arrhythmias, CHF, hypertension, hypertriglyceridemia, raynaud's disease, eczema, psoriasis, IBD-Crohn's disease, ulcerative colitis, migraines, multiple sclerosis, anxiety, ADHD, bipolar disorder, cognitive function, depression, rheumatoid arthritis, asthma, BPH, cancer, NAFLD, periodontal disease, PCOS, and more.	The body can convert some ALA (alpha-linolenic acid) to EPA but in only very small quantities. Therefore, getting EPA from foods or dietary supplements is the only practical way to increase levels of EPA in the body. Most fish (cod, haddock, mackerel, sardines, ocean trout, whiting, tuna, salmon, halibut, flounder, grouper, red snapper, sole, rainbow trout) and sea plants are good sources. The omega-3 fatty acid content of farmed fish is generally lower than that of wild fish. Other grass fed animal sources that supply some EPA-eggs, dairy, meats .

# Antioxidant/Anti-Inflammatory Nutrients Tested in the APA

Antioxidant	Description	Important for/ Potential Beneficial Properties	May be useful in the treatment or prevention of	Sources
<b>Docosahexaenoic acid (DHA)</b>	Docosahexaenoic acid (DHA) one of the three main omega-3 fatty acids, is a long-chain polyunsaturated fatty acid that is found in the tissues of oily fish and marine mammals. DHA is often used in conjunction with eicosapentaenoic acid (EPA) for a variety of conditions. Omega 3 fatty acids are important components of cell membranes. All of these fatty acids contain "double bonds"- connections that make them flexible and interactive but also more susceptible to damage. DHA has six double bonds. Proper function of the nervous system, including the brain, depends on the presence of DHA.	<ul style="list-style-type: none"> <li>• Cell membrane stability and fluidity</li> <li>• Anticancer</li> <li>• Anti-inflammatory</li> <li>• Brain/CNS development and function- DHA accounts for 9-12% of the brain's total weight.</li> <li>• Cardiovascular effects</li> <li>• Decrease in blood viscosity</li> <li>• Immunomodulatory</li> <li>• Neurologic effects</li> <li>• Protection of retinal function</li> </ul>	atherosclerosis/ ischemic heart disease, cardiac arrhythmias, CHF, hypertension, hypertriglyceridemia, raynaud's disease, eczema, psoriasis, IBD-Crohn's disease, ulcerative colitis, migraines, multiple sclerosis, anxiety, ADHD, slower neurological development in children. bipolar disorder, cognitive function, depression, rheumatoid arthritis, asthma, BPH, cancer, NAFLD, periodontal disease, PCOS, retinitis pigmentosa, visual acuity, and more.	The body can convert some ALA (alpha-linolenic acid) to DHA but in only very small quantities. Therefore, getting DHA from foods or dietary supplements is the only practical way to increase levels of DHA in the body. Most fish (cod, haddock, mackerel, sardines, ocean trout, whiting, tuna, salmon, halibut, flounder, grouper, red snapper, sole, rainbow trout) and sea plants are good sources. The omega-3 fatty acid content of farmed fish is generally lower than that of wild fish. Other grass fed animal sources that supply some DHA-eggs, dairy, meats .
<b>Linoleic Acid (omega-6)</b>	Linoleic Acid, an omega-6 fatty acid, is considered an essential fatty acid because humans are not able to synthesize it. All of the other biologically active omega-6 fatty acids can be made from linoleic acid. Omega 6 fatty acids are considered by some to be pro-inflammatory. The relationship between omega-6 fatty acids and inflammation is complex as some may be metabolized to pro-inflammatory arachidonic acid but also to prostaglandin E1 which is has anti-inflammatory activity. Consumption of large amounts of linoleic acid and other polyunsaturated fatty acids increases oxidative stress. Excessive consumption of omega 6 fatty acids is best avoided.	<ul style="list-style-type: none"> <li>• Cardiovascular effects</li> <li>• Dermatologic effects</li> <li>• Maintenance of epidermal water barrier of the skin</li> <li>• Cell membrane fluidity, structure, and function</li> <li>• Anti-inflammatory, pro-inflammatory</li> </ul>	atherosclerosis/ ischemic heart disease, hypercholesterolemia, hypertension, eczema, pruritus, scleroderma, dyslexia, essential tremor, multiple sclerosis, alcohol hangover, BPH, obesity, periodontitis, rheumatoid arthritis, atopic dermatitis.	safflower oil, sunflower oil, wheat germ oil, hempseed oil, corn oil, soybean oil, peanut oil and canola oil
<b>Palmitoleic acid (omega-7)</b>	Palmitoleic acid is a non-essential, monounsaturated fatty acid that is a common constituent of human adipose tissue. It is found in all tissues with highest concentration in the liver.	<ul style="list-style-type: none"> <li>• Anti-inflammatory</li> <li>• Anti-thrombotic effects</li> <li>• Insulin sensitivity</li> <li>• Lipid metabolism</li> <li>• Hemostasis</li> </ul>	stroke, diabetes, metabolic syndrome, cardiovascular health, LDL reduction, increase of HDL.	macadamia oil, macadamia nuts, buckthorn seed oil, marine sources



# Antioxidant/Anti-Inflammatory Nutrients Tested in the APA

Antioxidant	Description	Important for/ Potential Beneficial Properties	May be useful in the treatment or prevention of	Sources
<b>Oleic Acid (omega-9)</b>	Oleic acid is an omega 9 fatty acid that is considered non-essential since it can be manufactured in the body but research indicates that increasing consumption of omega 9 fatty acids may be beneficial. It is an unsaturated fatty acid that is the most widely distributed and abundant fatty acid in nature, occurring naturally in the fats and oils of both animals and vegetables.	<ul style="list-style-type: none"> <li>• Anti-inflammatory</li> <li>• Cardiovascular effects</li> <li>• Brain function</li> <li>• Cholesterol, lipid, and blood pressure lowering</li> <li>• Dermatological effects-skin repair</li> <li>• Immune support</li> <li>• Fat metabolism</li> <li>• Insulin sensitivity</li> <li>• Cell membrane structure</li> </ul>	Age related cognitive decline, type 2 diabetes, cardiovascular disease, hyperlipidemia, hypertension, Alzheimer's disease, ulcerative colitis, infections, skin conditions.	Plant oils such as olive oil, almonds/ almond oil, hazelnuts, avocado oil, pecans, macadamia nuts, apricot kernel oil, cashews, cheese, beef, eggs, sesame oil, sunflower oil, argan oil, grapeseed oil.
<b>Zinc</b>	Zinc is an essential trace mineral involved in numerous aspects of cellular metabolism. It is a major component of over 300 metabolic enzymes	<ul style="list-style-type: none"> <li>• Immune function and wound healing</li> <li>• Protein and DNA synthesis</li> <li>• Reproduction</li> <li>• Growth and development</li> <li>• Proper sense of taste and smell, visual function, hearing</li> <li>• Antioxidation and anti-inflammation</li> <li>• Protection of cell membranes</li> <li>• Hormone function</li> <li>• Production of stomach acid</li> </ul>	acne, brittle nails, warts, hearing, olfactory and taste disorders, colds, influenza, certain viruses, upper respiratory infections, gastroenteritis, age-related macular degeneration, anorexia nervosa, ADHD, depression, RA, psoriatic arthritis, BPH, urinary tract infections, body odor, cirrhosis, cancer, Wilson's disease.	Oysters, meat, poultry, seafood, legumes, nuts, seeds, peanuts, egg yolks, whole grains, wheat bran, wheat germ, fruit, and dairy products

**IMPORTANT:** Identified adverse food reactions- allergies, sensitivities, and intolerances- should be avoided even if these cellular tests have shown those food sources of micronutrients/botanicals to be "beneficial". The CMA and APA test the responses of B and T lymphocytes, not antibodies (IgE-mediated allergies) or cells of the innate immune system (Alcat Test). Patients and practitioners are encouraged to carefully read all product/supplement labels and avoid all ingredients that are contraindicated for any reason.



# Botanicals & Phytonutrients Tested in the APA

Botanical/ Phytonutrient	Description	Potential Beneficial Properties	May be useful for prevention/treatment of	Sources
<b>Acai Berry</b>	Acai berry is a palm tree widely distributed in the northern area of South America, particularly the Brazilian Amazon region. The fruit of acai is round, dark purple in color, and edible	<ul style="list-style-type: none"> <li>• Anti-inflammatory</li> <li>• Antibacterial</li> <li>• Antioxidant</li> <li>• Anticancer</li> <li>• Blood glucose support</li> <li>• Cardiovascular support</li> <li>• Immune support</li> </ul>	hypercholesterolemia, metabolic syndrome/weight loss and obesity, diabetes, detoxification, aging skin, and for improving general health	fruit can be consumed raw or as a juice. As supplement can be found in powders, tablets, and capsules
<b>Andrographis</b>	Andrographis is a plant that is native to South Asian countries such as India and Sri Lanka. Known as the “King of bitters”, it is commonly used in Ayurvedic medicine.	<ul style="list-style-type: none"> <li>• Analgesic</li> <li>• Antibacterial</li> <li>• Anti-viral</li> <li>• Anti-inflammatory</li> <li>• Antiplatelet</li> <li>• Anticancer</li> <li>• GI, cardiovascular, liver support</li> <li>• Blood glucose regulation</li> <li>• Immunomodulatory</li> </ul>	common cold, influenza, tonsillitis, IBD- ulcerative colitis, and RA	supplementation
<b>Astaxanthin</b>	Astaxanthin is a naturally occurring carotenoid pigment found in nature primarily in salmon, trout, shrimp, and lobster. It is similar to beta-carotene in structure. It gives salmon, shrimp, and lobster their pink-red color.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-asthmatic</li> <li>• Anti-cancer</li> <li>• Anti-inflammation</li> <li>• Cardiovascular protection</li> <li>• GI and liver protection</li> <li>• Immune support</li> <li>• Fat metabolism</li> </ul>	Alzheimer’s disease, dementia, Parkinson’s disease, CVD, obesity, certain types of cancer, sunburn, fatty liver, reflux due to H. pylori, hyperlipidemia, RA, and wrinkled skin	Salmon, trout, shrimp, lobster
<b>Astragalus Extract</b>	Astragalus comes from the root of a perennial plant in the legume family that grows in the northern and eastern parts of China as well as in Mongolia and Korea. There are more than 2,000 species of astragalus but most astragalus supplements contain Astragalus membranaceus. Astragalus contains a variety of active constituents including more than 40 saponins, several flavonoids, polysaccharides, trace minerals, amino acids, and coumarins. – Astragalus is also called huang qi or milk vetch.	<ul style="list-style-type: none"> <li>• Antibacterial</li> <li>• Anti-inflammatory</li> <li>• Antioxidant</li> <li>• Antiviral</li> <li>• Bone support</li> <li>• Cardiovascular support</li> <li>• Fertility –increase in sperm motility</li> <li>• Blood glucose support</li> <li>• Liver and kidney protective</li> <li>• Immune support</li> <li>• Vasorelaxant</li> <li>• Wound healing</li> </ul>	common cold, upper respiratory infections, fibromyalgia, diabetes, blood pressure, heart disease, weakness, arthritis, hepatitis, breast and lung cancer, asthma, and anxiety	The root of the astragalus plant is put in soups, teas, extracts, and capsules.



# Botanicals & Phytonutrients Tested in the APA

Botanical/ Phytonutrient	Description	Potential Beneficial Properties	May be useful for prevention/treatment of	Sources
<b>Camu Camu</b>	Camu Camu is a berry that grows in the Amazonian rainforest. Is one of the best food sources of vitamin C. It contains phytonutrients, minerals, serine, leucine and valine as well as carotenoids.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-inflammation</li> <li>• Immune support</li> <li>• Gut health</li> <li>• Antimicrobial</li> </ul>	Diabetes, diabetes complications, inflammation, overweight/obesity, hypertension.	The fruit itself is extremely acidic and sour. In order to increase palatability, dilution and sugar is added. Supplemental form-powder, capsules, tablets is most often used.
<b>Chlorophyll</b>	Chlorophyll is a pigment that gives plants their green color.	<ul style="list-style-type: none"> <li>• Anti-aging</li> <li>• Anti-cancer</li> <li>• Antiviral</li> <li>• Deodorant</li> <li>• Wound healing</li> </ul>	acne, herpes simplex virus and shingles, lung and other types of cancer, pancreatitis, skin cancer, fatigue, arthritis, and fibromyalgia	greens, chlorella, spirulina, alfalfa, parsley, broccoli, green cabbage, asparagus, green beans and peas, matcha green tea, wheat grass, algae and supplemental form.
<b>Echinacea</b>	Echinacea is a perennial wildflower native to North America and is closely related to sunflowers, daisies, and ragweed.	<ul style="list-style-type: none"> <li>• Antibacterial</li> <li>• Antifungal</li> <li>• Anti-inflammatory</li> <li>• Anti-oxidant</li> <li>• Anti-vital</li> <li>• Immune stimulating</li> <li>• Wound healing</li> </ul>	infections, common cold, herpes simplex infection (topical), psoriasis(topical), gum inflammation, upper respiratory tract infections (viral), tonsillitis, urinary tract infections, vaginal yeast infection, skin wounds/ulcers (topical), and leukopenia from chemotherapy.	Echinacea is often sold as an herbal supplement.
<b>Elderberry</b>	Elderberry is the dark purple berry of the European or Black elder, found in warmer areas of North America, Europe, Asia, and Northern Africa. A rich source of flavonoids, quercetin, rutin, phytosterols, carotenoids, and vitamins and minerals, the berries are cultivated for medicinal and food purposes.	<ul style="list-style-type: none"> <li>• Antioxidant</li> <li>• Immunological support</li> <li>• Anti-inflammatory</li> </ul>	shorten duration of common cold, influenza, and constipation	Cooked elderberries are used as a flavoring in foods and wine. Elderberries are also in foods like jams and pies. Available in supplemental form as well
<b>Frankincense</b>	Frankincense is the hardened gum resin extruded from the trunk of the <i>Boswellia carteri</i> tree.	<ul style="list-style-type: none"> <li>• Anti-inflammatory</li> <li>• Anti-bacterial</li> <li>• Antiviral</li> <li>• Anti-anxiety</li> <li>• Antiseptic, disinfectant</li> <li>• Immune enhancing</li> <li>• Memory enhancing</li> <li>• Hormone balancing</li> <li>• Digestive aid</li> </ul>	pain and inflammation, asthma, acne, signs of aging, Crohn's disease, IBS, diabetes, cancer, osteoarthritis, depression, anxiety, leaky gut, gas, and constipation	topically, aromatherapy

# Botanicals & Phytonutrients

## Tested in the APA

Botanical/ Phytonutrient	Description	Potential Beneficial Properties	May be useful for prevention/treatment of	Sources
<b>Ginkgo Biloba</b>	Ginkgo biloba is a large tree with fan-shaped leaves with radiating veins. It is one of the oldest living tree species in the world. Native to temperate Asia, including China, Japan, and Korea, but is now cultivated in Europe and the United States. It is the last remaining species of a primitive family of gymnosperms called Ginkgoaceae.	<ul style="list-style-type: none"> <li>• Anticancer</li> <li>• Anticoagulant/antiplatelet</li> <li>• Blood glucose support</li> <li>• Anti-inflammation</li> <li>• Antimicrobial</li> <li>• Antioxidant</li> <li>• Cardiovascular support</li> <li>• Lipid lowering</li> <li>• Neurological support</li> </ul>	anxiety, Alzheimer's disease, mixed dementias, PMS, schizophrenia, tardive dyskinesia, vertigo, AMD, altitude sickness, metastatic colorectal cancer, depression, diabetic retinopathy, dyslexia, fibromyalgia, gastric cancer, glaucoma, hemorrhoids, ovarian cancer, PAD, Raynaud's syndrome, vitiligo <sup>7</sup>	tea and extracts supplementation via tablets and capsules
<b>Goji Berry</b>	Goji berry, also known as wolfberry, is a nutrient rich bright orange-red berry that comes from a shrub native to China and distributed in Asia, the Mediterranean, North America, and Australia. The root bark and sweet, red fruits of goji are used in traditional Chinese medicine.	<ul style="list-style-type: none"> <li>• Anticancer</li> <li>• Blood glucose support</li> <li>• Antifatigue</li> <li>• Antimicrobial</li> <li>• Antioxidant</li> <li>• Cardiovascular support</li> <li>• Hepatoprotective</li> <li>• Immune support</li> </ul>	<ul style="list-style-type: none"> <li>• Diabetes</li> <li>• Dry eye</li> <li>• Athletic performance</li> <li>• Sleep quality</li> <li>• Fatigue</li> <li>• Mood support</li> <li>• Overweight</li> <li>• Glaucoma</li> <li>• Fertility</li> <li>• Hyperlipidemia</li> </ul>	goji berries can be eaten raw, cooked, or dried. Often found in herbal teas and wines.
<b>Grape Seed</b>	Grape Seed extract is derived from the ground up seeds of red wine grapes. is used as a dietary supplement. It contains antioxidant compounds, oligomeric proanthocyanidin.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Circulation support</li> <li>• Lipid lowering</li> <li>• Anti-allergic, immune support</li> <li>• Anti-arthritis</li> <li>• Antibacterial</li> <li>• Anticancer</li> <li>• Antifungal</li> <li>• Anti-inflammatory</li> <li>• GI support, laxative, expectorant</li> <li>• Antiviral</li> <li>• Bone support</li> <li>• Wound healing</li> </ul>	signs of aging, fibromyalgia, certain types of cancer, hyperlipidemia, chronic venous insufficiency, diabetes-related eye disease, ocular stress, wound healing, NAFLD, and PMS	grapes, oil, supplemental form
<b>Green Tea Extract</b>	Green tea is derived from the plant, Camellia sinensis. Green tea extract is simply green tea leaves prepared as a supplement. Green tea and its extracts, such as ECGC (Epigallocatechin gallate), a polyphenol, have been studied for their antioxidant effects and possible protective impact against heart disease and cancer.	<ul style="list-style-type: none"> <li>• Immune support</li> <li>• Anti-inflammatory</li> <li>• Antioxidant</li> <li>• Anticoagulant/antiplatelet</li> <li>• Blood glucose regulation</li> <li>• Antilipemic</li> <li>• Antiviral</li> <li>• Bone support</li> <li>• Regulation of blood pressure</li> <li>• Protective against certain types of cancer</li> <li>• Stimulation of CNS</li> <li>• Improved cognitive performance</li> <li>• Reduction in dental plaque</li> <li>• Diuretic</li> <li>• Enhancement of muscular endurance in exercise</li> <li>• Increase in calorie and fat metabolism</li> </ul>	elevated blood pressure, high cholesterol, heart disease, Insulin resistance, obesity, Alzheimer's disease, Parkinson's disease, cancer, inattentiveness, genital warts, and inflammation	tea, supplemental form, capsules

# Botanicals & Phytonutrients Tested in the APA

Botanical/ Phytonutrient	Description	Potential Beneficial Properties	May be useful for prevention/treatment of	Sources
<b>Lavender</b>	Lavender is a perennial evergreen plant that is native to countries in the Mediterranean region. The applicable parts of lavender are the flowers, leaves, and oil.	<ul style="list-style-type: none"> <li>• Analgesic</li> <li>• Antibacterial</li> <li>• Anticancer</li> <li>• Lipid reduction</li> <li>• Antifungal</li> <li>• Anti-inflammatory</li> <li>• Hair growth</li> <li>• Neurologic/CNS effects- relaxation, sedation</li> <li>• Wound healing</li> </ul>	anxiety, depression, stress, psychological well-being, dysmenorrhea, pain, intestinal problems, and high cholesterol	capsules, via aromatherapy, and topically
<b>Lycopene</b>	Lycopene is a reddish carotenoid found in some fruits and vegetables.	<ul style="list-style-type: none"> <li>• Antioxidant</li> <li>• Antiplatelet</li> <li>• Lipid lowering</li> <li>• Free radical scavenger</li> </ul>	asthma, prostate cancer, atherosclerosis, hypertension, CHF, antiplatelet, hyperlipidemia, sunburn, oral leukoplakia, and infertility	tomato products, watermelon, pink grapefruit, papaya, guava, and apricots
<b>Maitake Mushroom</b>	This edible and medicinal mushroom, is a perennial fungus that grows in clusters at the base of trees. The active constituents of maitake include beta-glucans, agarico glycerides, and fiber.	<ul style="list-style-type: none"> <li>• Tumor inhibition</li> <li>• Immune system support</li> <li>• Anti-inflammatory</li> <li>• Antiviral</li> <li>• Blood glucose regulation</li> <li>• Cardiovascular support</li> <li>• Hormonal support</li> <li>• Blood lipid reduction</li> </ul>	diabetes, PCOS, certain types of cancer, hypertension, and hepatitis B	Maitake is available fresh and in powders, capsules, and extracts
<b>Mangosteen</b>	Mangosteen is a tropical fruit cultivated in Southeast Asia. The fruit, fruit juice, rind, twig, and bark are used as medicine.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-allergy</li> <li>• Antibacterial</li> <li>• Anti-inflammatory</li> <li>• Antiviral</li> <li>• Immune support</li> <li>• Astringent</li> <li>• Free radical scavenger</li> </ul>	diarrhea, UTIs, gonorrhea, thrush, tuberculosis, cardiovascular issues, menstrual disorders, cancer, osteoarthritis, dysentery, and skin issues	mangosteen fruit, supplemental form
<b>Milk Thistle</b>	Milk thistle, also known as Silymarin (the main active ingredient), is a plant native to Europe and brought to North America by early colonists. It is now found throughout the US. Milk thistle gets its name from the milky sap that is released from the leaves. The applicable parts of milk thistle are the seeds and above ground parts.	<ul style="list-style-type: none"> <li>• Antioxidant</li> <li>• Anticancer</li> <li>• Insulin sensitivity support</li> <li>• Anti-inflammatory</li> <li>• Antilipemic</li> <li>• Antiviral</li> <li>• Hepatoprotective</li> <li>• Renal protective</li> </ul>	Liver disorders, skin damage caused by radiation, diabetes, indigestion	In foods, milk thistle leaves and flowers are eaten as a vegetable and seeds are roasted for use as a coffee substitute. May be consumed as tea and in supplemental form as well.
<b>Noni Berry</b>	Noni Berry is a tropical fruit of the evergreen tree in the Pacific Islands, Southeast Asia, Australia, and India. It has been used as an herbal remedy. Scientific name Morinda citrifolia. Common names: noni, morinda, Indian mulberry, hog apple, canarywood. It contains high amounts of potassium.	<ul style="list-style-type: none"> <li>• Antioxidant</li> <li>• Anti-inflammatory</li> <li>• Anti-allergy</li> <li>• Analgesic</li> <li>• Antibacterial</li> <li>• Antifungal</li> <li>• Antihypertensive</li> <li>• Gastrointestinal function</li> <li>• Anti-viral</li> <li>• Anti-lipemic</li> <li>• Anti-cancer</li> <li>• Immune support</li> <li>• Neuroprotective</li> </ul>	Pain, fatigue, cervical spondylosis, hypertension, hyperlipidemia, digestive issues, inflammatory skin conditions.	Noni juice, juice concentrate, powder supplement, dried fruit powder, teas. It's often found in combination with grape juice.



# Botanicals & Phytonutrients Tested in the APA

Botanical/ Phytonutrient	Description	Potential Beneficial Properties	May be useful for prevention/treatment of	Sources
<b>Piperine</b>	Piperine is the major bio-active component of black pepper.	<ul style="list-style-type: none"> <li>• Antibacterial</li> <li>• Blood glucose support</li> <li>• Antifungal</li> <li>• Antioxidation</li> <li>• Antiparasitic</li> <li>• Anticancer</li> <li>• Diuretic</li> <li>• Cognitive Support</li> <li>• GI Support/Antiflatulent</li> <li>• Hepatoprotective</li> <li>• Insecticidal</li> <li>• Metabolic Support</li> </ul>	<ul style="list-style-type: none"> <li>• Diabetes</li> <li>• Vitiligo</li> <li>• Cognitive decline</li> <li>• Overweight/Obesity</li> <li>• Parasitic infection</li> <li>• Nutrient bioavailability enhancement</li> </ul>	supplemental from-capsules, tablets. Essential oils.
<b>Pomegranate</b>	Pomegranate is a small tree cultivated around the world. It has been used for thousands of years in many cultures as a folk medicine. Pomegranate holds a variety of phytonutrients with potential antioxidant effects. All applicable parts of the pomegranate linked to health benefits include the fruit, fruit juice, seeds, seed oil, bark, ring, root, stem, leaf, and flower	<ul style="list-style-type: none"> <li>• Analgesic</li> <li>• Antiallergic</li> <li>• Antiatherogenic</li> <li>• Anticoagulant</li> <li>• Antidiarrheal</li> <li>• Antimicrobial, antibacterial, antifungal, antiviral</li> <li>• Anti-inflammatory</li> <li>• Anti-cancer</li> <li>• Antioxidant</li> <li>• Anti-obesity</li> <li>• Athletic performance</li> <li>• Bone and skin health</li> <li>• Hypotensive</li> <li>• Hypoglycemic</li> <li>• Immune support</li> <li>• Neuroprotective</li> <li>• Wound healing</li> </ul>	Atherosclerosis, CHD, athletic performance, Alzheimer's disease, candidiasis, dental plaque, periodontitis, diabetes, metabolic syndrome, ESRD, erectile dysfunction, hyperlipidemia, hypertension, menopausal symptoms, PCOS, prostate cancer, RA	pomegranate is available fresh, in juice, as an extract, powder, tea, or in supplement capsule forms.
<b>Pycnogenol</b>	Pycnogenol is an extract from the bark of a pine tree that grows along the coast of southwest France.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-inflammatory</li> <li>• Anti-allergic</li> <li>• Anti-arthritic</li> <li>• Anti-asthmatic</li> <li>• Anti-cancer</li> <li>• Glucose regulation</li> <li>• Antimicrobial</li> <li>• Antiviral</li> <li>• Sun protection</li> <li>• Liver protection</li> <li>• Immune support</li> <li>• Energy Metabolism</li> </ul>	allergic rhinitis, antiplatelet, asthma, chronic venous insufficiency, cognitive function, retinopathy, ADHD, cognitive decline, common cold, coronary artery disease, neuropathy, edema, erectile dysfunction, hyperlipidemia, Meniere's disease, menopausal symptoms, metabolic syndrome, obesity, psoriasis, SLE, and varicose veins	supplemental form or consumed as a "brew"
<b>Quercetin</b>	Quercetin is an antioxidant that belongs to a class of water-soluble plant substances called flavonoids, which are present in certain fruits and vegetables.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Inhibition of histamine release, anti-allergy</li> <li>• Enhancement of capillary and tissue integrity</li> <li>• Certain cancer risk reduction</li> <li>• Anti-inflammatory</li> <li>• Antiviral</li> <li>• Immune support</li> <li>• Glucose regulation</li> <li>• Inhibition of AGE formation</li> </ul>	obesity, CVD, allergic rhinitis, Meniere's disease, diabetes, interstitial cystitis, prostatitis	capers, onions, elderberries, kale, okra, radicchio, watercress, carob fiber, dill weed, radish leaves, apple peel, asparagus, goji berries

# Botanicals & Phytonutrients Tested in the APA

Botanical/ Phytonutrient	Description	Potential Beneficial Properties	May be useful for prevention/treatment of	Sources
<b>Resveratrol</b>	Resveratrol is a naturally occurring polyphenol produced by plants to protect from threats to plants' survival- fungus, drought, inflammation, UV irradiation.	<ul style="list-style-type: none"> <li>• Antioxidation</li> <li>• Anti-aging</li> <li>• Anti-cancer</li> <li>• Anti-inflammatory</li> <li>• Anti-coagulant</li> <li>• Antiviral</li> <li>• Cardioprotective</li> <li>• Liver protection</li> <li>• Immune support</li> <li>• Neuroprotective</li> <li>• Pulmonary protection</li> <li>• Fat metabolism</li> </ul>	Alzheimer's, cardiovascular disease, metabolic syndrome/obesity, diabetes, insulin resistance, cognitive decline, allergic rhinitis, certain types of cancer, and ulcerative colitis	red wine, red grape skins, purple grape juice, mulberries, peanuts, mulberries, blueberries and bilberries, eucalyptus, Japanese knotweed, and spruce
<b>Rhodiola Root</b>	Rhodiola is a flowering herb that grows in cold, high-altitude regions of Europe and Asia. Other names for it include Arctic Root, Golden Root, King's Crown, and Rose Root. It is considered an adaptogen. It's applicable part is the root.	<ul style="list-style-type: none"> <li>• Adaptogenic- protection from stressors</li> <li>• Antiaging- reduction in oxidative stress</li> <li>• Antiarrhythmic</li> <li>• Antibacterial</li> <li>• Anticancer</li> <li>• Antidepressant, anti-anxiety, mood support</li> <li>• Blood glucose regulation</li> <li>• Blood pressure support, cardio protective support</li> <li>• Anti-inflammatory</li> <li>• Antioxidant</li> <li>• Antiviral</li> <li>• Cognitive support</li> <li>• Immune support</li> </ul>	depression, anxiety, adrenal issues, fatigue, mental performance, difficulty concentrating, and bladder cancer	supplemental form- capsules/tablets
<b>Shiitake Mushroom</b>	Shiitake mushrooms are edible mushrooms native to East Asia. Research on the compounds in shiitake mushrooms, shows that this fungus provides many health benefits.	<ul style="list-style-type: none"> <li>• Anti-inflammatory</li> <li>• Antioxidant</li> <li>• Cardiovascular support</li> <li>• Lipid lowering</li> <li>• Immune system support</li> <li>• Blood glucose regulation</li> <li>• Tumor inhibition</li> </ul>	Type 2 diabetes, cardiovascular disease, certain types of cancers, immune issues, and hypertension	You can find it fresh, dried or in various dietary supplements.
<b>Sulforaphane</b>	Sulforaphane is a chemical (isothiocyanate) made during the chewing of cruciferous vegetables, especially broccoli and broccoli sprouts. Sulforaphane is produced when glucoraphanin, a constituent of cruciferous vegetables, interacts with myrosinase, an enzyme that occurs naturally in these plants and in human gut microbiota.	<ul style="list-style-type: none"> <li>• Anti-cancer</li> <li>• Antimicrobial (antibiotic)</li> <li>• Anti -allergic</li> <li>• Neurological support</li> <li>• Respiratory support</li> <li>• Cardioprotective</li> <li>• Antioxidant</li> <li>• Anti-inflammatory</li> <li>• Detoxification support- phase 2</li> </ul>	Cancer- particularly prostate, liver, and leukemia, H-pylori, cardiovascular disease	cruciferous veggies (cauliflower, kale, cabbage, collards, brussel sprouts, radish, mustard) especially broccoli and broccoli sprouts

# Botanicals & Phytonutrients Tested in the APA

Botanical/ Phytonutrient	Description	Potential Beneficial Properties	May be useful for prevention/treatment of	Sources
<b>Turmeric</b>	Turmeric, a plant related to ginger, has been used in Ayurvedic medicine for many conditions including breathing problems, pain, and fatigue. It is a common spice and a major ingredient in curry powder.	<ul style="list-style-type: none"> <li>• Anti-inflammatory</li> <li>• Antioxidation</li> <li>• Antibacterial</li> <li>• Antiseptic</li> <li>• Interference with cancer cell signaling</li> <li>• Blood glucose regulation</li> <li>• Fat metabolism</li> <li>• Wound healing</li> </ul>	arthritis, joint pain, diabetes, digestive conditions- IBS, IBD, obesity, age-related cognitive decline, depression, high triglyceride blood levels, rheumatoid arthritis, and certain types of cancer	Turmeric is a common spice and a major ingredient in curry powder. Turmeric's underground stems are dried and made into capsules, tablets, teas, powders, and extracts. Turmeric powder can also be made into a paste for skin issues.
<b>Wild Cherry Bark</b>	Wild cherry is a tree native to North and South America. The bark and the fruit is used to make medicine.	<ul style="list-style-type: none"> <li>• Antioxidant</li> <li>• Reduction in blood pressure</li> <li>• Sedative effect</li> <li>• Anti-inflammatory</li> <li>• Respiratory support, cough suppressant</li> </ul>	Although commonly used for bronchitis, colds, cough, and diarrhea, there is insufficient information available about the effectiveness of wild cherry	Most commonly found in syrup formulas. Also in teas/extracts.
<b>Zeaxanthin</b>	Zeaxanthin is one of two major carotenoids (and lutein) found as a color pigment in the human eye. It accumulates in the macular region of the retina where it exerts a protective effect by filtering the phototoxic blue-light portion of the sun's rays. It is the pigment that gives corn, saffron, and many other plants their characteristic color.	<ul style="list-style-type: none"> <li>• Antioxidant</li> <li>• Antibacterial</li> </ul>	AMD, degenerative eye disease, retinitis pigmentosa, and visual impairment	spinach, kale, dark green leafy vegetables, egg yolks, corn, grapes, oranges, squash, and zucchini

**IMPORTANT:** Identified adverse food reactions- allergies, sensitivities, and intolerances- should be avoided even if these cellular tests have shown those food sources of micronutrients/botanicals to be "beneficial". The CMA and APA test the responses of B and T lymphocytes, not antibodies (IgE-mediated allergies) or cells of the innate immune system (Alcat Test). Patients and practitioners are encouraged to carefully read all product/supplement labels and avoid all ingredients that are contraindicated for any reason.





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