**Patient Information:** PATIENT II, PRETEND

| | | | | | |
|---|---|---|---|---|---|
| DOB: | 11/04/1977 | Gender: | F | **Lab ID:** | **68220** |
| Received: | 07/02/2022 | Collected: | 07/01/2022 | Reported: | 07/12/2022 |
| Clinic ID: | 10804 | HCP: | Sample Physician | | |

CELL SCIENCE SYSTEMS

CLIA#10D0283906
Lab Director
Harold Alvarez, M.D.

CELLULAR NUTRITION ASSAYS

# CELLULAR MICRONUTRIENT ASSAY (CMA)

## VITAMINS

| | | | |
|---|---|---|---|
| Biotin | 131% Insufficient | Vitamin B2 | |
| Delta tocotrienol | | Vitamin B3 | |
| MK4 | 130% Insufficient | Vitamin B6 | |
| MK7 | | Vitamin B9 | 115% Borderline |
| Pantothenic acid | | Vitamin C | |
| Vitamin A | | Vitamin D | |
| Vitamin B1 | | Vitamin K1 | |
| Vitamin B12 | 118% Borderline | | |

## MINERALS

| | | | |
|---|---|---|---|
| Boron | | Magnesium | |
| Calcium | | Manganese | |
| Chromium | | Molybdenum | |
| Copper | 124% Insufficient | Selenium | |
| Iodine | | Strontium | |
| Iron | | Vanadium | |
| Lithium | 113% Borderline | Zinc | |

## AMINO ACIDS

| | | | |
|---|---|---|---|
| Arginine | | L-Tyrosine | |
| Asparagine | | Lysine | >140%Insufficient |
| Cysteine | >140%Insufficient | Methionine | 111% Borderline |
| Glycine | >140%Insufficient | Phenylalanine | |
| Histidine | 116% Borderline | Taurine | |
| Isoleucine | | Threonine | |
| Leucine | | Tryptophan | |
| L-Glutamine | | Valine | |
| L-Serine | | | |

## OTHER NUTRIENTS

| | | | |
|---|---|---|---|
| Carnitine | >140%Insufficient | Lipoic Acid | |
| Choline | | Omega 3 DHA | |
| Coenzyme Q10 | | Omega 3 EPA | |
| Glutathione | >140%Insufficient | Omega 9 | |
| Inositol | 124% Insufficient | | |

| | |
|---|---|
| 100% - 109% | Nutrient Sufficiency |
| 110% - 119% | Borderline Insufficiency |
| ≥ 120% | Insufficiency* |

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## MICRONUTRIENTS TO ADDRESS

**Glutathione**

Glutathione is produced in the liver from the amino acids, glycine, cysteine, and glutamic acid. It is considered the body's "master antioxidant". **Important for:** • DNA synthesis and repair • Metabolism of toxins and carcinogens • Immune support • Prevention of oxidative cell damage • Protein and prostaglandin synthesis • Transport of amino acids • Antioxidation,-fights free radicals • Antiviral • Anti-inflammation **May be useful for the prevention/treatment of:** 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 **Good food sources:** 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.

**Lysine**

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. **Important for:** • Building muscle protein • Increasing collagen production and tissue repair • Supporting the production of enzymes, antibodies, and hormones • Promoting calcium absorption • Immune support **May be useful for the prevention/treatment of:** recurring herpes simplex infections/cold sores, diabetes, high triglycerides, and stress **Good food sources:** 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.

**Cysteine**

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 **Important for:** • Protein synthesis • Support of the synthesis of glutathione, the body's "master antioxidant" • Immune support • Lipid metabolism • Digestive support • Vascular support • Antioxidation • Anti-inflammation • Nerve protection • Detoxification **May be useful for the prevention/treatment of:** Alzheimer's disease, Parkinson's disease, arthritis, poor intestinal health, dementia, multiple sclerosis, male infertility, and osteoporosis **Good food sources:** beef, pork, chicken, sunflower seeds, walnuts, and soy

**Carnitine**

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. **Important for:** • Mitochondrial function and energy production • Immune, brain, liver, and cardiac function • Elimination of toxic compounds • Blood lipid levels- reduction of triglycerides, increase in HDL **May be useful for the prevention/treatment of:** · certain cardiovascular issues and common diagnoses such as asthma, celiac disease, cirrhosis, IBD, diabetes, erectile dysfunction, NAFLD, fatigue, PCOS, COPD, and more. **Good food sources:** animal foods such as meat, fish, poultry, and dairy products (mostly in whey).

**Glycine**

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. **Important for:** • Collagen formation • Heme synthesis • Detoxification • Glutathione synthesis • Energy source/synthesis of glucose • Brain neurotransmitter effect/CNS function • Anti-cancer • Antioxidation **May be useful for the prevention/treatment of:** • Schizophrenia • Stroke • Seizures • Memory and cognitive performance in psychosis risk syndrome • Cystic fibrosis • Gout • Insomnia • Venous leg ulcers • Certain types of cancer **Good food sources:** gelatin, protein rich foods including meat, fish, dairy, and legumes

**Biotin**

Biotin is an essential B vitamin also known as vitamin B7. **Important for:** • The conversion of carbohydrates, proteins and fats into energy. • Health of skin, nails, eyes, liver, and nervous system. **May be useful for the prevention/treatment of:** diabetes, brittle nails, seborrheic dermatitis of infancy, MS, and uremic neuropathy **Good food sources:** meat, fish, egg yolks, liver, poultry, dairy products, seeds, nuts, sweet potatoes, spinach, and broccoli

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## MICRONUTRIENTS TO ADDRESS

**MK4**

Vitamin K is a general name of a family of compounds with a common chemical structure-Vitamin K1 (phylloquinone 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 (phylloquinone). **Important for:** • Regulation of bone demineralization Directs calcium deposits to bones instead of soft tissue • Anti-inflammation • Anticoagulation • Antioxidation • Supports bone growth and development • Supports cardiovascular health • insulin sensitivity, energy utilization **May be useful for the prevention/treatment of:** 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 **Good food sources:** 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

**Inositol**

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. **Important for:** • Cell membrane components, cell signaling • Lipoprotein components • Proper function of hormones • Possibly enhancing insulin sensitivity **May be useful for the prevention/treatment of:** Alzheimer's disease, bronchopulmonary dysplasia (BPD), depression, diabetes (d-chiro inositol)/gestational diabetes, NAFLD, OCD, panic attacks, and PCOS **Good food sources:** whole grains, buckwheat, peanuts, legumes, nuts, seeds, grapefruit, other citrus fruits, and cantaloupe

**Copper**

Copper is an essential trace mineral found in all body tissues. **Important for:** • Red blood cell formation (along with iron), anemia prevention • Myocardial contractility • Maintenance of the health of blood vessels, nerves • Immune support, wound healing • Generation of energy from carbohydrate • Antioxidation (cofactor for SOD- superoxide dismutase) • Anti-inflammation support • Bone and tissue integrity • Cholesterol and glucose regulation **May be useful for the prevention/treatment of:** aortic aneurysm, burns, osteoporosis, peptic ulcer, RA, and disorders of taste **Good food sources:** 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.

**Vitamin B12**

Vitamin B12 is a group of compounds called cobalamins. **Important for:** • DNA (genetic material) synthesis • Red blood cell formation • Nervous system and immune system function • Metabolism of homocysteine **May be useful for the prevention/treatment of:** issues of the skin, ears/nose/throat, issues associated with aging, and certain conditions/disorders of the cardiovascular, gastrointestinal, musculoskeletal, immune, and nervous systems **Good food sources:** 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.

**Histidine**

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. **Important for:** • Protection of nerve cells • Metabolism of the neurotransmitter, histamine • Immune, gastric, and sexual function • Manufacturing of red and white blood cells • Protection of tissues against radiation and heavy metals **May be useful for the prevention/treatment of:** rheumatoid arthritis, allergic diseases, ulcers, and anemia caused by kidney failure or kidney dialysis **Good food sources:** beef, lamb, pork, poultry, fish, cheese, nuts, seeds, eggs, legumes, soybeans, quinoa, and whole grains.

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## MICRONUTRIENTS TO ADDRESS

**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. **Important for:** • Growth and development • Homocysteine and vitamin B12 metabolism • Brain and CNS function • Immune system function • Cardiovascular support • Red blood cell production • Reproductive health **May be useful for the prevention/treatment of:** 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 **Good food sources:** Spinach and other leafy greens, green vegetables, beets, banana, melon, legumes, yeast, mushrooms, oranges and tomato juice.

**Lithium**

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. **Important for:** • Modulation of the nervous system function • Modulation of neurotransmitter activity- GABA, serotonin, melatonin • Modulation of circadian rhythms • May be required for normal metabolism and neural communication **May be useful for the prevention/treatment of:** Bipolar disorder, depression, schizophrenia, impulsive aggressive behavor associated with ADHD. **Good food sources:** 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.

**Methionine**

Methionine is an essential amino acid that is involved in the synthesis of important protein molecules and other amino acids. **Important for:** • The support of detoxification of toxins and heavy metals • Antioxidant function • Digestive support • The availability of folate • The support of healthy liver function • Reduction of histamine in blood • Exercise recovery, connective tissue production, and cardiovascular health • Hair and nail strength **May be useful for the prevention/treatment of:** pancreatitis, Parkinson's disease, urinary tract infections, and diaper rash **Good food sources:** Brazil nuts, meat, poultry, fish, yogurt, cheese, eggs, legumes, soybeans, sesame seeds, and grains

**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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