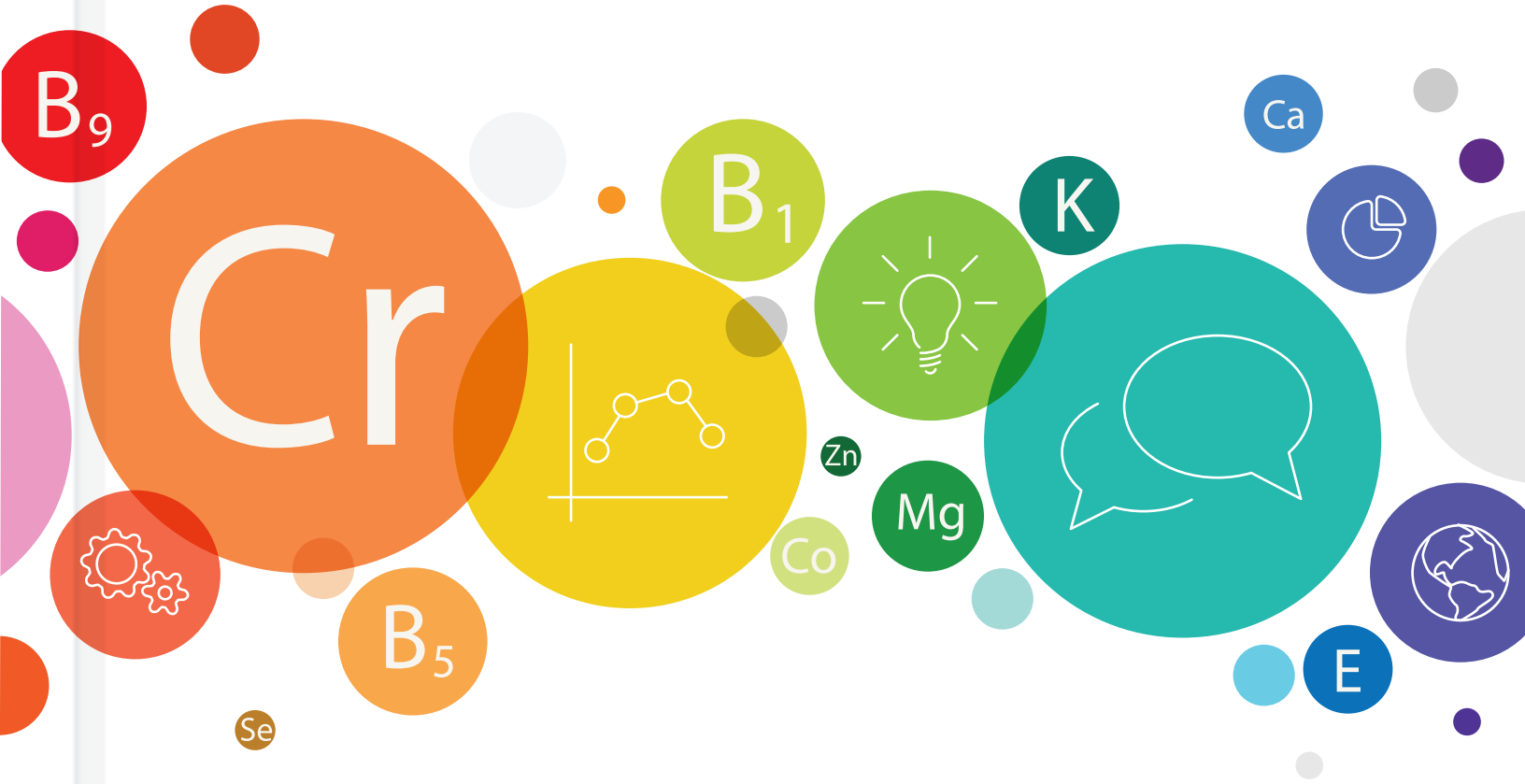

MICRONUTRIENT

Your guide to customized optimal nutrition.

VibrantAmerica

1 (866) 364-0963

support@vibrant-america.com

www.vibrant-america.com

1021 Howard Ave. Ste. B
San Carlos, CA 94070

FINAL REPORT DATE:	10-03-2017 13:44	SPECIMEN COLLECTED:	09-22-2017
ACCESSION ID:	1512010000	SPECIMEN RECEIVED:	09-23-2017 13:00

LAST NAME	FIRST NAME	MIDDLE NAME	DATE OF BIRTH	GENDER	PHYSICIAN ID:
TESTNAME	PATIENT		1980-10-10	Female	999994

PATIENT

Name: PATIENT TESTNAME
Date of Birth: 1980-10-10
Gender: Female
Age: 37

Medical Record Number:
Telephone #: 1-866-364-0963
Street Address: 1021 HOWARD AVENUE SUITE B
City: SAN CARLOS
State: CA
Zip #: 94070

Email: support@vibrant-america.com

PROVIDER

Practice Name: Demo Client, MD
Provider Name: Demo Client, MD (999994)
Street Address: 1021 HOWARD AVENUE
City: SAN CARLOS
State: CA
Zip #: 94070
Telephone #: 1-800-842-7268
Fax #:

For doctor's reference

Vibrant America is pleased to present to you micronutrient testing that provides a comprehensive extracellular and intracellular assessment of the levels of the most important vitamins, minerals, antioxidants, fatty acids, and amino acids to help you make healthy lifestyle choices in consultation with your physicians and dietitians.

Testing Methodology: The blood sample is spun down so that the plasma can be taken from the top and RBCs from the bottom. The remaining sample is processed to isolate PBMCs (Peripheral Blood Mononuclear cells). All three subsets are processed separately to isolate appropriate micronutrients for injection into mass-spectrometry. Micronutrients measured in RBCs include: folate, omega-3 and omega-6 fatty acids, and magnesium. Plasma micronutrient measurements provide extracellular levels. WBC measurements are done and total WBC counts are taken on an automated cell counter. Intracellular WBC levels are normalized to the total WBC count in a patient's sample.

Interpretation of Report: The test results of micronutrient levels are displayed in 3 columns – Plasma, RBC and WBC. Red↑ suggests higher than normal value compared to a reference population and Red↓ suggests lower than normal value compared to a reference population. Green suggests normal levels.

The statements in this report have not been evaluated by the Food and Drug Administration. Please consult your physician/dietitian for medication, treatment, or life style management. This product is not intended to diagnose, treat, or cure any disease.

This is only a Sample Report. The reference ranges and test results are not actual values and only a representation of an example Patient.

Please Note - It is important that you discuss any modifications to your diet, exercise, and nutritional supplementation with your physician before making any changes. To schedule an appointment with a Vibrant clinical dietitian please call: Toll-Free 866-364-0963

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LAST NAME	FIRST NAME	MIDDLE NAME	DATE OF BIRTH	ACCESSION ID
TESTNAME	PATIENT		1980-10-10	1512010000

SUMMARY

Plasma Micronutrient

Abnormal	Recommended Daily Intake	Suggested supplementation	Provider Recommendation
Vitamin B2 ↓	RDA: 1.7 mg/day.	25-50 mg/day.	
Vitamin E ↓	RDA: 15mg/day	250 IU/day	
Glutamine ↓	There is currently no established RDA, AI, or UL for glutamine	500 mg/day	

WBC Micronutrient

Abnormal	Recommended Daily Intake	Suggested supplementation	Provider Recommendation
Vitamin A ↓	700mcg RAE/day for women 900 mcg RAE/day for men	2000 IU/day	
Vitamin D3 ↓	RDA: 400 IU/day	2000 IU/day	
Vitamin E ↓	RDA: 15mg/day	250 IU/day	
Choline ↓	AI: 425 mg/day for women 550 mg/day for men	450 mg/day	
Glutamine ↓	There is currently no established RDA, AI, or UL for glutamine	500 mg/day	
Selenium ↓	RDA: 55 µg/day.	55 µg/day	

RBC Micronutrient

Abnormal	Recommended Daily Intake	Suggested supplementation	Provider Recommendation
EPA ↓	No recommended intake established	250 mg/day	

All supplement and dietary suggestions for specific micronutrients must be evaluated and approved by your provider. Suggested Supplementation is based off references provided at the end of this report. Please see detailed explanation for each micronutrient and follow your ordering providers' recommendation before using this as a therapeutic intake.

LAST NAME	FIRST NAME	MIDDLE NAME	DATE OF BIRTH	ACCESSION ID
TESTNAME	PATIENT		1980-10-10	1512010000

What Do I Do With The Information From This Test?

Your provider will discuss any nutrient deficiencies identified on the report.

Extracelluar	Intracelluar	Likely Interpretation
Normal	Normal	No action is required.
Deficient	Normal	The long term nutrient status is optimal, but short term needs improvement. Consider food sources and/or supplements recommended by your provider. Also consider if genetic SNPs or medications may have an affect on depletion.
Normal/Excess	Deficient	The short term status of micronutrients is optimal, but absorption may be a problem, as long as extracellular levels are not outside of normal levels. Recommend increasing dietary intake of the nutrient, or increasing supplementation dosage; consider a bioavailable version of the supplement if available. Consider additional follow up testing to identify your source of malabsorption.
Deficient	Deficient	Consider increasing dietary intake of food sources of the nutrient or increasing supplementation dosage; consider a bioavailable version of the supplement if available. Consider additional follow up testing to identify your source of malabsorption.

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LAST NAME	FIRST NAME	MIDDLE NAME	DATE OF BIRTH	ACCESSION ID
TESTNAME	PATIENT		1980-10-10	1512010000

	Micronutrient	Plasma			WBC			RBC		
		Current	Previous	Ref	Current	Previous	Ref	Current	Previous	Ref
Vitamins	Vitamin A	44.0 (mcg/dL)	48.0 (mcg/dL)	32.5~78.0	2.00 ↓ (pg/WBC)	6.80 (pg/WBC)	5.92~35.00			
	Vitamin B1	143.0 (nmol/L)	153.0 (nmol/L)	70.0~180.0	91.00 (pg/WBC)	19.00 (pg/WBC)	4.80~108.00			
	Vitamin B2	0.7 ↓ (mcg/L)	5.0 (mcg/L)	1.0~19.0	34.00 (pg/WBC)	10.80 (pg/WBC)	1.22~78.00			
	Vitamin B3	5.0 (mcg/mL)	7.0 (mcg/mL)	0.5~8.4	85.00 (pg/WBC)	22.00 (pg/WBC)	3.07~121.00			
	Vitamin B5	111.0 (mcg/L)	79.0 (mcg/L)	37.0~147.0	2.10 (pg/WBC)	2.40 (pg/WBC)	0.25~4.00			
	Vitamin B6	5.0 (ng/mL)	2.0 (ng/mL)	0.5~8.4	32.00 (pg/WBC)	20.20 (pg/WBC)	5.71~52.00			
	Vitamin B12	385.0 (ng/L)	480.0 (ng/L)	180.0~914.0						
	Vitamin C	2.0 (mg/dL)	0.2 ↓ (mg/dL)	0.4~2.0	30.00 (pg/WBC)	1.50 ↓ (pg/WBC)	6.13~85.00			
	Vitamin D3	72.0 (ng/mL)	50.4 (ng/mL)	30.1~120.0	2.60 ↓ (pg/WBC)	48.30 (pg/WBC)	3.63~115.00			
	Vitamin E	4.3 ↓ (mg/L)	12.0 (mg/L)	5.5~17.0	5.48 ↓ (pg/WBC)	62.00 (pg/WBC)	7.51~82.00			
	Vitamin K1	1.00 (ng/mL)	2.00 (ng/mL)	0.10~2.20	69.00 (pg/WBC)	70.00 (pg/WBC)	7.51~104.00			
	Vitamin K2	1.60 (ng/mL)	2.10 (ng/mL)	0.10~2.20	41.00 (pg/WBC)	1.00 ↓ (pg/WBC)	3.28~139.00			
	Folate							186 (ng/mL)	66 ↓ (ng/mL)	≥157

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TESTNAME	PATIENT		1980-10-10	1512010000

	Micronutrient	Plasma			WBC			RBC		
		Current	Previous	Ref	Current	Previous	Ref	Current	Previous	Ref
Minerals	Calcium	10.0 (mg/dL)	9.0 (mg/dL)	8.9~10.1	12.00 (pg/WBC)	4.69 ↓ (pg/WBC)	7.66~123.00			
	Manganese	2.0 (ng/mL)	2.1 (ng/mL)	1.1~2.4	18.00 (pg/WBC)	9.80 (pg/WBC)	7.99~84.00			
	Zinc	1.00 (mcg/mL)	0.71 (mcg/mL)	0.66~1.10	23.00 (pg/WBC)	53.20 (pg/WBC)	7.72~69.00			
	Copper	0.80 (mcg/mL)	1.10 (mcg/mL)	0.75~1.45	28.00 (pg/WBC)	21.00 (pg/WBC)	8.74~33.00			
	Chromium	0.2 (ng/mL)	0.1 (ng/mL)	≤0.3	9.00 (pg/WBC)	41.00 (pg/WBC)	0.14~76.00			
	Iron	117.0 (mcg/dL)	39.4 ↓ (mcg/dL)	50.0~145.0						
	Copper to Zinc Ratio	0.8	1.5 ↑	0.7~1.0						
	Magnesium							5.0 (mg/dL)	4.6 (mg/dL)	3.5~7.1
Metabolites	Choline	28.2 (nmol/mL)	26.1 (nmol/mL)	25.0~54.0	5.40 ↓ (pg/WBC)	10.30 (pg/WBC)	6.40~120.00			
	Inositol	29.6 (nmol/mL)	23.5 ↓ (nmol/mL)	25.0~54.0	10.00 (pg/WBC)	31.20 (pg/WBC)	5.75~49.00			
	Carnitine	36.0 (nmol/mL)	25.8 (nmol/mL)	25.0~54.0	53.00 (pg/WBC)	10.00 (pg/WBC)	3.49~122.00			
	MMA	0.2 (nmol/mL)	0.3 (nmol/mL)	≤0.4	34.00 (pg/WBC)	16.00 (pg/WBC)	2.20~40.00			
Amino Acids	Asparagine	154.0 (nmol/mL)	87.0 (nmol/mL)	63.0~187.0	33.00 (pg/WBC)	8.19 (pg/WBC)	4.73~68.00			
	Glutamine	56.4 ↓ (nmol/mL)	472.0 (nmol/mL)	371.0~957.0	4.10 ↓ (pg/WBC)	4.20 ↓ (pg/WBC)	7.74~10.00			
	Serine	93.0 (nmol/mL)	69.0 (nmol/mL)	63.0~187.0	12.00 (pg/WBC)	10.00 (pg/WBC)	9.85~64.00			

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LAST NAME	FIRST NAME	MIDDLE NAME	DATE OF BIRTH	ACCESSION ID
TESTNAME	PATIENT		1980-10-10	1512010000

	Micronutrient	Plasma			WBC			RBC		
		Current	Previous	Ref	Current	Previous	Ref	Current	Previous	Ref
Antioxidants	Coenzyme Q10	1.50 (mcg/mL)	1.40 (mcg/mL)	0.43~1.53	48.00 (pg/WBC)	8.30 (pg/WBC)	5.33~57.00			
	Cysteine	148.0 (nmol/mL)	69.0 (nmol/mL)	63.0~187.0	21.00 (pg/WBC)	39.00 (pg/WBC)	3.89~53.00			
	Glutathione	73.0 (nmol/mL)	78.0 (nmol/mL)	63.0~187.0						
	Selenium	124.0 (ng/mL)	76.0 (ng/mL)	70.0~150.0	2.86 ↓ (pg/WBC)	42.00 (pg/WBC)	6.57~118.00			
Omegas	EPA							0.07 ↓ (%)	1.00 (%)	0.10~2.50
	DPA							4.00 (%)	2.00 (%)	0.60~4.10
	DHA							7.8 (%)	6.4 (%)	0.2~8.4
	Total Omega 3							9.00 (%)	6.10 (%)	0.10~14.10
	LA							17.00 (%)	5.60 (%)	4.60~21.30
	AA							15.00 (%)	11.30 (%)	10.50~23.30
	Total Omega 6							33.00 (%)	32.60 (%)	28.60~44.50
	Omega 3 Index							11.00 (%)	12.20 (%)	≥8.01

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VITAMINS

Physiological Function

Two very important coenzymes involved in energy metabolism are derived from riboflavin to participate in oxidation/reduction reactions.

Riboflavin is also essential for NOS enzyme (nitric oxide synthase) and glutathione reductase which regenerates glutathione, and which is very important for antioxidation/detoxification.

How it gets depleted

Riboflavin is commonly depleted by excessive or chronic alcohol consumption. Need for riboflavin is increased in the elderly.

Clinical Manifestations of Depletion

Frank deficiency of riboflavin is rare, however, marginal deficiency is common.

Deficiency of riboflavin is associated with fatigue/weakness.

Food Sources

Food sources high in riboflavin include: organ meats, dairy foods, eggs, leafy greens (spinach), broccoli, and liver.

*Enriched grains include riboflavin

Supplement Options

- The RDA for riboflavin is 1.7 mg/day.
- Common levels of therapeutic intake of riboflavin are 25-50 mg/day.
- No UL for riboflavin has been set.

Physiological Function

Vitamin E is an important antioxidant that reduces the formation of reactive oxygen species (ROS) that result from fat oxidation. Vitamin E also regulates cell signaling, influences immune function, and inhibits coagulation.

How it gets depleted

Vitamin E may become depleted or deficient due to intestinal malabsorption. Smoking also depletes the body's vitamin E stores.

Clinical Manifestations of Depletion

Vitamin E deficiency may result in peripheral neuropathy, ataxia, muscle weakness, skeletal myopathy, retinopathy, and increased risk of CVD, red blood cell destruction, prostate cancer, and cataracts.

Food Sources

Dietary sources of vitamin E include: plant seeds (such as sunflower seeds), walnuts, hazelnuts, olive oil, canola oil, wheat germ oil, sunflower oil, safflower oil, tomato, avocado, spinach, and Swiss chard.

Supplement Options

- The RDA for vitamin E is 15mg/day.
- The UL for vitamin E is set at 1000 mg/day in order to prevent interference in vitamin K clotting pathways.
- The only supplementary form of vitamin E that reverses deficiency symptoms is α-tocopherol.
- In addition, α-Lipoic acid is an important co-factor that can aid in restoring vitamin E levels when depleted.

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LAST NAME	FIRST NAME	MIDDLE NAME	DATE OF BIRTH	ACCESSION ID
TESTNAME	PATIENT		1980-10-10	1512010000

Physiological Function

- Vitamin A is a group of fat-soluble vitamins which includes retinol, retinal, retinoic acid, and several provitamin A carotenoids, among which beta-carotene is the most important.
- Vitamin A has multiple functions including: growth and development in infants, children and adolescents, maintenance of the immune system, and healthy vision.
- Vitamin A is needed by the retina of the eye for both low-light and color vision.
- Vitamin A also functions as retinoic acid, an important hormone-like growth factor for epithelial and other cells.

How it gets depleted

Vitamin A deficiency may occur with chronic alcoholism, zinc deficiency, hypothyroidism, and use of laxatives.

Clinical Manifestations of Depletion

Vitamin A deficiency may result in night blindness, impaired immunity, impaired healing, increased risk of infection, thyroid disorders, leukoplakia or keratosis.

Assess zinc status to assess if zinc deficiency has led to secondary functional deficiency of vitamin A release from liver stores.

Food Sources

Food sources of vitamin A include: cod liver oil, liver (turkey, beef, pork, fish and chicken), dandelion greens, fortified cereals and milk, butter, eggs, sweet potato, pumpkin, carrot, cantaloupe, mango, spinach, broccoli leaf (broccoli florets have much less), kale, and butternut squash.

Supplement Options

The RDA for vitamin A is 700mcg RAE/day for women and 900 mcg RAE/day for men. This is the amount needed to prevent chronic deficiency, but more may be needed for optimal health.

These measurements are the equivalent of 2500 IU/day for women and 3000 IU/day for men of pre-formed vitamin A sources (animal sources).

The upper intake level (UL) for vitamin A in adults is set at 3,000 µg RAE/day.

Vitamin A toxicity can occur from taking pre-formed vitamin A from sources other than plant sources.

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TESTNAME	PATIENT		1980-10-10	1512010000

Physiological Function

Vitamin D regulates the function of hundreds of genes, supports the immune system, supports production and function of endocrine hormones, is important for normal growth and development of bones and teeth, tightly regulates the levels of calcium and phosphorus being absorbed intestinally as well as released from bone, regulates cell differentiation and growth, and may play an important role in regulating mood.

How it gets depleted

Vitamin D deficiency is very common in the U.S.

The most common reasons for vitamin D deficiency include: lack of sun exposure and regular use of sunscreen. Individuals with darker pigmented skin are at greater risk for vitamin D deficiency.

Chronic liver disease and kidney failure are risk factors for vitamin D deficiency.

Some medications can deplete vitamin D: anti-inflammatory medications, antibiotics, anticonvulsant medications, cholesterol lowering medications, laxatives and anti-ulcer medications.

Clinical Manifestations of Depletion

Conditions that have been associated with low vitamin D status include: Alzheimer's disease, asthma, autism, cancer, cavities, colds and flus, cystic fibrosis, dementia, depression, diabetes 1 and 2, eczema and psoriasis, hearing loss, heart disease, hypertension, infertility, inflammatory bowel disease, insomnia, macular degeneration, migraines, multiple sclerosis, Crohn's disease, muscle pain, obesity, osteomalacia, osteoporosis, periodontal disease, preeclampsia, rheumatoid arthritis, schizophrenia, seizures, septicemia, and tuberculosis.

Food Sources

Food sources of vitamin D include: dairy products, such as fortified milk and yogurt, fortified orange juice, egg yolks, liver, fatty fish, such as salmon, tuna, mackerel, sardines, shrimp, mushrooms grown in adequate sunlight, baker's yeast.

Naturally occurring sources will contain vitamin D3, whereas fortified sources (baker's yeast) will contain D2.

Supplement Options

- The previously established RDA of 400IU/day has been found to be insufficient for therapeutic needs. Common doses are used between 1000 and 10,000 IU/day.
- Vitamin D comes in two forms: D2 (ergocalciferol) and D3 (cholecalciferol); both forms can be converted to active vitamin D in the body (25-hydroxyvitamin D).
- Vitamin D is produced when skin is exposed to ultraviolet light from the sun.
- Supplementation with Vitamin D is almost always necessary, as it is extremely difficult to meet needs though diet and sun exposure alone. Consult with your practitioner for supplement recommendations and target goal for serum levels.
- Because vitamin D can be stored or trapped in adipose tissue (fat cells) obese individuals and pregnant women have higher vitamin D requirements.
  Obtaining too much vitamin D from sun exposure is not possible, but it is possible to obtain too much from supplementation.
- Vitamin D toxicity has been observed in individuals taking greater than 50,000 IU/day, but intake levels less than 10,000 IU/day are unlikely to cause toxicity.

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METABOLITES

Physiological Function

Choline is metabolized within cellular mitochondria resulting in production of trimethylglycine; TMG plays a role in supporting methyl donation processes either directly (methylating homocysteine) or indirectly through supporting production of S-adenosyl methionine (SAMe). Choline is converted into acetylcholine (ACh).

How it gets depleted

Depletion of choline is typically not a concern, and limited information exists on how depletion would happen primarily, however, lower intake of choline may lead to inefficient methylation.

Clinical Manifestations of Depletion

- Deficiency in dietary choline is known to increase hepatic triglyceride accumulation. This results in lower blood triglycerides, but increased accumulation of triglycerides in the liver.
- Subjects with a mutation in the MTHFR enzyme seem to place more burden on choline in methylation cycles. Depletion of choline can also lead to muscle damage.

Food Sources

Eggs, liver, and peanuts are the best sources of choline. Poultry, fish, and cruciferous veggies are good sources of choline.

*Dietary choline sources, including lecithin (phosphatidylcholine), may increase serum TMAO in humans, although the evidence is mixed.

Supplement Options

- The AI for choline is 425 mg/day for women and 550 mg/day for men.
- The UL is 3,500 mg/day.
- Choline bitartrate is the most common supplemental form of choline for most general purposes, such as liver health.
- CDP-Choline and Alpha-GPC are commonly used for nootropic purposes.
- Supplemental choline can enhance systemic methylation. Excessive consumption of choline ≥7,500 mg has been associated with low blood pressure, excessive sweating, fishy body odor, and gastrointestinal side effects.

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TESTNAME	PATIENT		1980-10-10	1512010000

AMINO ACIDS

Physiological Function

- Glutamine is a conditionally essential amino acid (conditional mainly during times of disease or muscle wasting, such HIV/AIDS, cancer, or severe infections).
- In the intestinal lining, glutamine is the preferred source of fuel for intestinal epithelial cells and the main energy source for leukocytes (immune cells).
- Other important functions of glutamine include: transporting nitrogen between cells, acting as a precursor to glutathione production, acting as a precursor to nucleotides (for DNA and RNA synthesis), participating in gluconeogenesis in the absence of adequate carbohydrate intake, blunting the rise of blood glucose after consuming carbohydrate-rich meals, and regulating intestinal tight junctions.

How it gets depleted

Glutamine is known to be depleted in certain types of physiological stress such as burns, major trauma, and cancers that consume available intra-cellular glutamine stores more rapidly than skeletal muscle can generate it, leading to increased muscle wasting.

During physical activity, serum glutamine is consumed for longer endurance events (2+ hours); some evidence exists that chronic endurance exercise reduced glutamine levels to affect immune cell function and proliferation.

Clinical Manifestations of Depletion

Glutamine depletion or deficiency is rare, as glutamine can be made endogenously and is ubiquitous in the food supply from both plant and animal sources.

Some studies suggest an increase in intestinal permeability when intestinal epithelial cells lack sufficient glutamine, as well as insufficient availability for leukocyte function.

Food Sources

Very good sources of glutamine include: whey, casein, milk, white rice, corn, and tofu.

Good sources of glutamine include: meat and eggs.

Supplement Options

- There is currently no established RDA, AI, or UL for glutamine.
- Glutamine is typically sold as l-glutamine and doses have been studied in humans ranging from 500 mg/day – 50g/day. Higher doses (>10 g/day) are commonly used in the treatment of intestinal barrier permeability.
- Supplementation of glutamine has not been shown to enhance muscle growth in healthy individuals; typically an increase in serum insulin results after consumption of glutamine due to increased conversion to glucose. This may impact individuals with insulin resistance.
- Glutamine supplementation is also potentially beneficial to improve mental focus and concentration, as well as curbing cravings for sugar and alcohol.
- In some individuals, glutamine is converted more efficiently to glutamate, which can lead to a neuro-excitatory state, increased anxiety, tension headaches/migraines, and even tachycardia. If any of these symptoms occur after consuming glutamine, discontinue supplementation and discuss with your provider.

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ANTIOXIDANTS

Physiological Function

Selenium is an essential trace element required for immune function and for the synthesis of thyroid hormones, through its actions in selenoproteins such as iodothyronine deiodinase, and the direct conversion of thyroxine (T4) to triiodothyronine (T3).

Additionally, this mineral assists enzymes in protecting cell membranes from damage and selenium is a critical component of antioxidant reactions, by supporting the production of selenoproteins, such as glutathione peroxidase.

Selenium helps to regenerate vitamin C and vitamin E from their oxidized forms, supporting antioxidant action of these vitamins.

How it gets depleted

Individuals at risk for low levels of selenium or selenium depletion are patients who have had bariatric surgery, celiac patients, and Crohn's disease patients.

Clinical Manifestations of Depletion

- Selenium deficiency is very rare in developed countries. Low selenium intake may decrease an individual's ability to fight viral infections. Some research also links low intakes to some cancers. Toxicity causes brittle hair and nails and is most likely to occur with supplements.
- Selenium deficiency may not always produce overt symptoms of disease, but may manifest as increased oxidative stress in deficient individuals, due to decreased action of glutathione peroxidase, decreased antioxidant regeneration, decreased conversion of thyroid hormones, and reduced methionine metabolism.
- Severe selenium deficiency can result in Keshan disease, in which the heart becomes enlarged alongside cardiac insufficiency. Selenium supplementation prevents further progression of the condition, but does not reverse damage that has already occurred.

Food Sources

Food sources of selenium include: Brazil nuts, tuna, cod, turkey, chicken breast, beef roast, sunflower seeds, and ground beef. Organ meats, seafood, other meats, and whole grains are additional sources.

Depending upon the soil in which they are grown, Brazil nuts are one of the richest sources of selenium.

Supplement Options

- The RDA for selenium is 55 µg/day.
- The UL for selenium is 400 µg/day, including food sources.
- Protein-based food sources of selenium appear to be the most effective at increasing circulating levels of glutathione peroxidase.
- Selenium supplementation in individuals with autoimmune thyroiditis has been shown to reduce circulating autoantibody levels.
- Selenium supplementation has been found to reduce viral load progression in individuals with HIV.
- Selenium supplementation in persons with sepsis and septic shock has been shown to reduce mortality.
- Selenium comes in the following supplemental forms: sodium, selenite, sodium selenate, selenomethionine.
- Selenomethionine has been shown to increase blood levels of selenium more effectively than the inorganic forms of selenium (selenite and selenate). Sodium selenate is absorbed to a lesser extent than sodium selenite, but sodium selenate is retained in greater amounts.
- Selenium supplements are not recommended for individuals with or at risk for diabetes mellitus.

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TESTNAME	PATIENT		1980-10-10	1512010000

OMEGAS

Physiological Function

- Eicosapentanoic acid (EPA) is an omega-3 fatty acid that participates in the health of cellular membranes, mediates lipid actions, and reduces inflammatory responses in the body.
- EPA and DHA influence the types of inflammatory response mediators made in favor of anti-inflammatory eicosanoids such as leukotrienes, prostaglandins, and thromboxanes. EPA and DHA are also noted for moderate to strong anti-depressant effects.
- Specific to EPA, it has been shown to suppress signaling of TNF-α in adipocytes.
- EPA also increases cerebral oxygenation.
- EPA appears to have some beneficial influence on regulating levels of leptin and increasing adiponectin.
- EPA may enhance adaptive immunity by stimulating B cell responsiveness.

How it gets depleted

Lower dietary intake of omega-3 fatty acids is the primary reason for deficiency of EPA, or low levels of EPA.

Certain genetic polymorphisms such as reduced activity of the FADS1 and FADS2 genes may lead to reduced conversion of ALA into EPA and DHA.

Clinical Manifestations of Depletion

EPA can be manufactured in the body from ALA, as well as retroconverted from DHA. However, relying solely on intake of ALA to provide adequate levels of EPA is not recommended due to poor or inefficient conversion from ALA to EPA.

Lower levels of EPA or deficient intake of EPA have been linked to increased risk for cardiovascular disease, arrhythmia, blood clots, heart attacks, stroke, elevated triglyceride levels, increased growth of atherosclerotic plaque, reduced vascular endothelial function, skin cancer, and increased inflammation.

Lower levels of EPA are also associated with lower brain mass in older adults.

Food Sources

Good sources of EPA include: fatty fish such as Pacific herring, salmon, oysters, tuna, and omega-3 enriched eggs.

Food sources of ALA, the essential fatty acid EPA precursor include: flaxseeds and flaxseed oil, chia seeds, walnuts, and canola oil.

Supplement Options

- Currently, no official dietary intake recommendations have been established.
- Several official health organizations have proposed a minimum dietary intake level of 500 mg/day of EPA+DHA.
- Because the efficiency of conversion of ALA to EPA is so low, supplementing EPA is generally recommended to meet therapeutic doses.
- High dose supplementation of omega-3 fatty acids (including EPA) has been shown to reduce the need for non-steroidal anti-inflammatory drugs (NSAIDS).
- Persons suffering from ulcerative colitis have been shown to need fewer corticosteroids when supplementing with high dose omega-3 fatty acids.
- Adverse side effects observed with high dose omega-3 fatty acids from supplement form include gastrointestinal upset and loose stools.
- Omega-3 supplements including EPA and DHA should be used with caution in persons with clotting disorders or on anti-clotting medication.

Key Terms/Glossary

AI
Adequate Intake. A nutrient measure used when RDA cannot be determined due to insufficient data. AIs are approximations of nutrient needs and based on average intake in a healthy population.

Antioxidant
A chemical compound that serves to quench free radicals and other reactive species produced by the process of oxidation, thereby reducing cellular protein damage, as well as inflammation.

Cofactor
A substance that is required for the activity of an enzyme or another protein in a biochemical reaction.

Conditionally Essential
Nutrients that become essential only in certain situations: stress, drug interactions, illness, aging, etc.

Enriched
Refers to refined cereal grains that have had nutrients added back after processing removes the bran and the germ layers. In the United States, enriched grains have the B vitamins (thiamin, riboflavin, niacin, folic acid) and iron added in. Fiber is not added back to enriched grains.

Essential
Refers to a nutrient that is required for life and body function that the body cannot synthesize (produce) on its own. For dietary vitamins, minerals, fatty acids, and amino acids, many, but not all, are essential.

RDA
Recommended Daily Allowance. The estimated amount of a nutrient or calories per day set by the Food and Nutrition Board of the National Research Council. RDA intake level for a particular nutrient that will meet the needs for healthy individuals. RDAs are usually determined for different groups (male, female, children, elderly, pregnant, lactating, etc.) RDAs were originally developed during World War II for soliders' meal ratio's with the intention to prevent frank nutrient deficiencies. They do not take into consideration interactions/depletions from medications or lifestyle factors.

Citations/Sources

[1] ConsumerLab.com, 2017, https://www.consumerlab.com/RDAs/. Accessed 27 Sept. 2017.
[2] Liska, Dan, David Jones, Robert Lerman, Jeffrey Bland, and Linda Costra. Clinical Nutrition A Functional Approach. 2nd ed., Gig Harbor, Washington, The Institute of Functional medicine, 2006.
[3] Orgen State University, 2017, lpi.oregonstate.edu/mic. Accessed 27 Sept. 2017.
[4] Houston, Mark C., and Stephen T. Sinatra. Clinical Nutrition A Functional Approach. CRC Press, 2015.

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RISK AND LIMITATIONS

This test has been laboratory developed and its performance characteristics determined by Vibrant America LLC, a CLIA and CAP certified laboratory performing the test. The test has not been cleared or approved by the U.S. Food and Drug Administration (FDA). Although FDA does not currently clear or approve laboratory-developed tests in the U.S., certification of the laboratory is required under CLIA to ensure the quality and validity of the tests.

However, laboratory error can occur, which might lead to incorrect results. Some of them may include sample mislabeling or contamination, operational error, or failure to obtain data for certain micronutrients. Vibrant's laboratory may need a second sample to complete the testing. Vibrant America has effective procedures in place to protect against technical and operational problems; however, such problems may still occur. Examples include failure to obtain the result for a specific micronutrient due to circumstances beyond Vibrant's control. Vibrant may re-test a sample in order to obtain these results but upon re-testing the results may still not be obtained. As with all medical laboratory testing, there is a small chance that the laboratory could report incorrect results. A tested individual may wish to pursue further testing to verify any results.

All supplement and dietary suggestions for specific micronutrients must be evaluated and approved by your provider. Suggested Supplementation is based off references provided at the end of this report. Please see detailed explanation for each micronutrient and follow your ordering providers' recommendation before using this as a therapeutic intake.

A limitation of this testing is that most scientific studies have been performed in Caucasian populations only. The interpretations and recommendations are done in the context of Caucasian studies, but the results may or may not be relevant to tested individuals of different or mixed ethnicities. Please note that pediatric ranges have not been established for these tests. Interference studies have not been established for individuals on immunosuppressive drugs. Based on test results and other medical knowledge of the tested individual, health care providers might consider additional independent testing, or consult another health care provider.