

MicroNutrient

Your guide to customized optimal nutrition.



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What are Micronutrients?

Micronutrients, as opposed to macronutrients (protein, carbohydrates and fat), are comprised of vitamins, minerals, and co-factors which are required in small quantities to ensure normal metabolism, growth, and physical well-being.



Vitamins:



Vitamins are essential organic nutrients, most of which are not made in the body, or only in insufficient amounts, and usually must be obtained through food. When dietary intake of a vitamin is inadequate, deficiency disorders result. Although vitamins are only present and required in minute quantities, compared to the macronutrients, they are just as vital to health and need to be considered in the context of nutritional quality.

Minerals:



Minerals are inorganic nutrients that also play a key role in ensuring health and well-being. Minerals are divided into 2 categories: trace elements; copper, iodine, iron, manganese, selenium, and zinc, and macro elements; calcium, magnesium, potassium, and sodium. As with vitamins, minerals are found in small quantities within the body and are obtained from a wide variety of foods.

**No single food contains all of the vitamins and minerals we need and, therefore, a balanced and varied diet is necessary for an adequate intake of all micronutrients.*

Extracellular Micronutrients:

Micronutrients that are free floating in the blood and exist outside the cells, determined in plasma, are called extracellular micronutrients. These

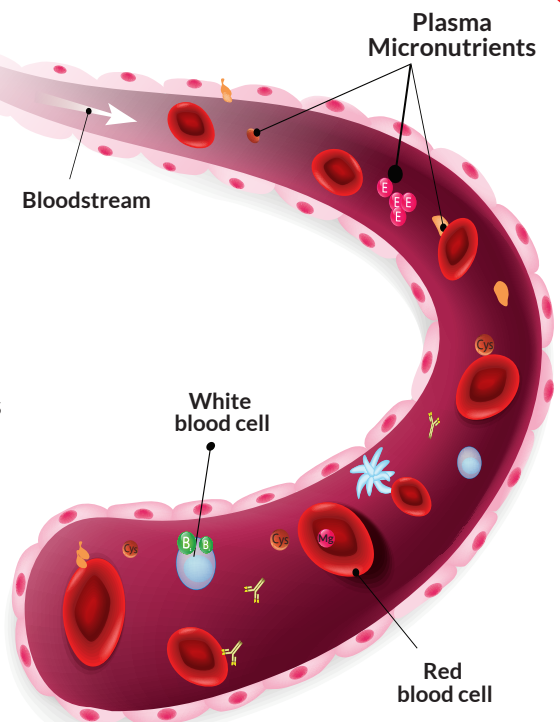
extracellular micronutrients are a static measure of what is in the blood at any given time. These are dependent on short term intake of supplements or diet and give a direct assessment of baseline micronutrient levels. Extracellular micronutrient tests reflect a person's diet over a relatively narrow time frame.

Intracellular Micronutrients:

Intracellular micronutrients are the micronutrients absorbed by your circulating white blood cells and red blood cells. Cellular micronutrient absorption is

an important step in maintaining and promoting optimal functioning of all cells. It is important to understand that, even though an adequate or healthy diet or supplements are being consumed, cellular intake levels of those nutrients may not be sufficient and may still provide risks for deficiencies and the disorders associated with them.

Genetics, aging, lifestyle, chronic illness, and medications all affect cellular nutrient absorption. The intracellular portion of Vibrant's micronutrient test takes all the above factors into consideration to identify cellular nutrient absorption status. This test can reveal a person's functional nutritional status over a much longer time (4-6 months) than extracellular testing.



This image represent plasma micronutrients and other micronutrients absorbed by the RBC and WBC.
*This image is not drawn to scale.

Role of Micronutrients:

Every physiological function in your body requires micronutrients to function optimally. Vitamins, minerals, and antioxidants play a key role in:

- | | |
|--|---|
| ✓ Producing and releasing energy | ✓ Maintaining insulin sensitivity |
| ✓ Strengthening the immune system | ✓ Slowing down cellular aging |
| ✓ Reducing systemic inflammation | ✓ Promoting the health of all tissues: skin, bone, brain, breast, gut, prostate, heart, etc. |
| ✓ Protecting against free radical damage | ✓ Maintaining a healthy hormonal balance (i.e. thyroid, sex hormones, adrenal hormones, neurotransmitters/brain hormones, etc.) |
| ✓ Protecting against the development, progression, and recurrence of cancer. | |

Why Test for Micronutrients?

Extracellular testing:

The benefits of extracellular testing include:

- Identifying baseline nutritional deficiencies
- Detecting higher than normal levels of vitamins and minerals in your blood
- Identifying excesses of nutrients caused by uncontrolled supplementation, to prevent the increased risk of certain chronic diseases or nutrient toxicity side effects
- Avoiding unnecessary spending on costly supplements
- Providing a short-term nutritional status of the last few days

Extracellular micronutrients have been well studied and deficiencies have correlated to multiple chronic diseases including cancer, Alzheimer's disease, diabetes, and cardiovascular diseases.^[1,2,3,4] Testing extracellular micronutrients also plays a role in patient management for such chronic diseases.

Intracellular testing:

The benefits of intracellular testing include:

- Identifying functional deficiencies in intracellular micronutrient levels (cellular nutrient absorption deficiency)
- Identifying essential micronutrient absorption deficiencies which cause or increase the risk of chronic diseases
- Providing a long-term nutritional status of the previous 4-6 months

Intracellular micronutrients have been studied scientifically and have long been considered a more sensitive tissue measure of micronutrient absorption. For example, vitamin C levels in lymphocytes have been found to be deficient in Type 2 diabetes patients as compared to plasma levels.^[5]

RBC folate and magnesium are clinically more significant than whole blood measures of these nutrients.^[6] RBC omega-3 and omega-6 fatty acid levels have been found to be markers of accelerated structural and cognitive aging.^[7]

Knowing both your extracellular and intracellular micronutrient levels are key to a thorough understanding of your nutritional requirements at a foundational level, which may contribute to your risk for disease, while simultaneously and positively impacting your overall health and well-being.

The Vibrant Micronutrient test

- Vibrant's Micronutrient test is the only test that provides a comprehensive extracellular and intracellular assessment of the levels of the most important vitamins, minerals, antioxidants, fatty acids, and amino acids.

Micronutrient Tests						
	Vitamins	Minerals	Amino Acids	Antioxidants	Metabolites	Intracellular (RBC)
	Vitamin A Vitamin B1 Vitamin B2 Vitamin B3 Vitamin B5 Vitamin B6 Vitamin B12 Vitamin C Vitamin D3 Vitamin E Vitamin K1 Vitamin K2	Calcium Manganese Zinc Copper Chromium Iron	Asparagine Glutamine Serine	Coenzyme Q10 Cysteine Glutathione Selenium	Choline Inositol Carnitine MMA (Methylmalonic acid)	RBC Folate RBC Magnesium RBC Omega fatty acids

■ How do you order Vibrant's Micronutrient test?

Vibrant's micronutrient test is only available to order through your provider. If your physician is not in our network, please contact us.

Who should run the Vibrant micronutrient test?

This testing would be most beneficial if you:



Are Experiencing

- Advanced aging
- Stress, feeling tired, or chronic fatigue
- Depression



Suffer from:

- Chronic diseases like diabetes, cardiovascular conditions, and/or arthritis
- Skin problems
- Numbness/tingling in your hands or feet
- Weakened Immune system
- Digestive Issues/disorders like celiac, wheat sensitivity, IBS, IBD, and SIBO



Have a history of:

- Long-term use of prescription medications
- Poor diet
- Obesity



Are Someone who is a:

- Athletic competitor/ exercise regularly
- Vegan or vegetarian

What happens in the lab?

01

Once an order is placed, your blood gets drawn and sent to the lab.

02

At the lab, the blood sample is spun down so that the plasma can be taken from the top and RBCs from the bottom.

03

The remaining sample is processed to isolate PBMCs (peripheral blood mononuclear cells) using an easyBLOOD system, which utilizes advanced CCD camera technology for high precision and accurate extraction.

04

All three subsets are processed separately to isolate appropriate micronutrients for injection into mass-spectrometry. All micronutrient levels are measured in an advanced state-of-the-art mass spectrometer that provides increased sensitivity for challenging compounds, enhanced detection system with six orders of linear dynamic range to ensure sensitivity is accessible, and a tool-free probe design that provides improved reproducibility between users.

05

Micronutrients measured in RBCs include: folate, omega-3 and omega-6 fatty acids, and magnesium.

06

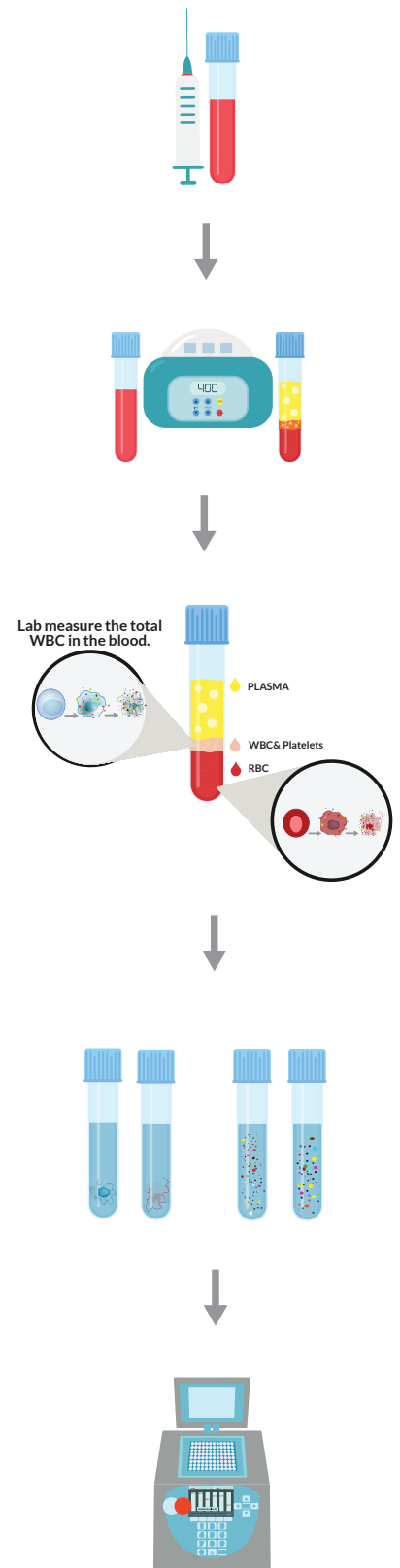
Plasma micronutrient measurements provide extracellular levels.

07

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. This normalization is a key step in ensuring minimal variability in results due to specimen differences. Because there are no external stimuli provided to stimulate the cells, all variabilities involved in such processes are removed, thereby providing the most accurate and quantitative method available for intracellular testing.

08

All reports are generated with reference ranges and an easy-to-interpret educational guide on each of the micronutrients.



Why not simply take additional micronutrient supplements?

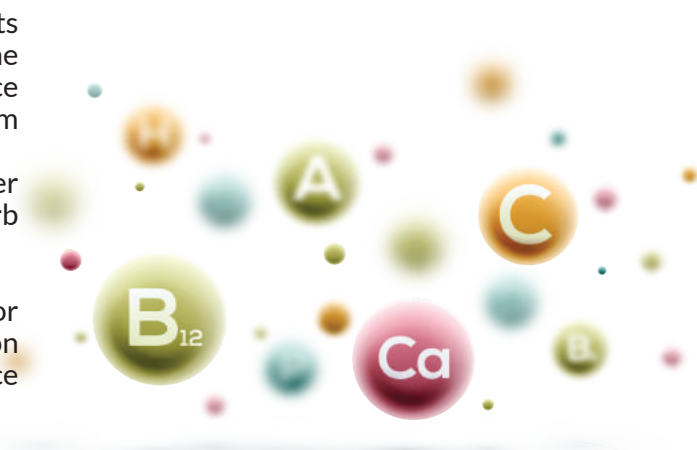
Though it would seem obvious to boost the body's nutrients with one of the many commercially available supplements, the human body is more complex than that. Plenty of evidence exists to show that micronutrient excess can also cause harm and long-term supplement intake can risk excessive levels. Certain nutrients perform best in the presence of other nutrients. For example, the body needs vitamin D to absorb calcium.

Certain nutrients may perform counteractive functions. For example, beta-carotene and vitamin C enhance iron absorption, while calcium and polyphenols appear to reduce the absorption of iron.^[8]

Also, numerous factors can affect proper nutrient absorption:

- **Potential genetic abnormalities**
- **Tobacco and alcohol use**
- **The type of foods you eat, as well as what they contain**
- **Medical conditions: certain medical conditions affect the way your body absorbs vitamins and can lead to nutrient deficiencies. Examples of these diseases include:**
 - Pernicious anemia (lack of intrinsic factor)
 - Irritable bowel syndrome
 - Inflammatory bowel disease (IBD) (Crohn's disease and ulcerative colitis)
 - Intestinal permeability
 - Human immunodeficiency virus (HIV)
 - Cystic fibrosis (a genetic disorder affecting the lungs and digestive system)
 - Celiac disease
 - Pancreatic, liver, and gallbladder diseases, as well as gallbladder removal
 - Radiation treatment that leads to intestinal inflammation
- **Intestine or stomach resection:** if you have had part of your stomach or intestines removed, as in the case of bariatric weight loss surgery, your body may not absorb some vitamins and minerals as efficiently as it did before surgery.
- **Parasite infections:** studies have shown that parasitic infections (such as tapeworm, hookworm, and giardia) can also cause nutrient malabsorption. This is because parasites in the human gastrointestinal tract feed on nutrients, taking them away from their human hosts.
- **Prescription medications:** taking certain medications can lower vitamin and mineral absorption by interfering with receptor sites or fat absorption (which affects fat soluble vitamins). Examples include proton-pump inhibitors, some antacids, weight loss medications, antibiotics, some anti-inflammatory medications, diabetes medications, and anti-seizure medications.^[9]
- **Intestinal bacteria imbalances:** sometimes the good and bad bacteria in your gut become imbalanced, which can alter vitamin absorption. Small intestinal bacterial overgrowth (SIBO) occurs when excessive bacteria build up in the small intestine and utilize nutrients there, which can lead to vitamin malabsorption -- especially vitamins B12, A, E, and D.

Thus, the "one-size-fits-all" philosophy can be dangerous when it comes to blind supplementation. Testing and understanding the roots of your deficiencies will help you personalize your diet and supplement intake.





FAQ

Should I discontinue my supplements when I take this test?

We recommend you stay off supplements for a week before you take this test.

Where is the testing performed?

All tests are performed at Vibrant America Clinical Labs in San Carlos, CA.

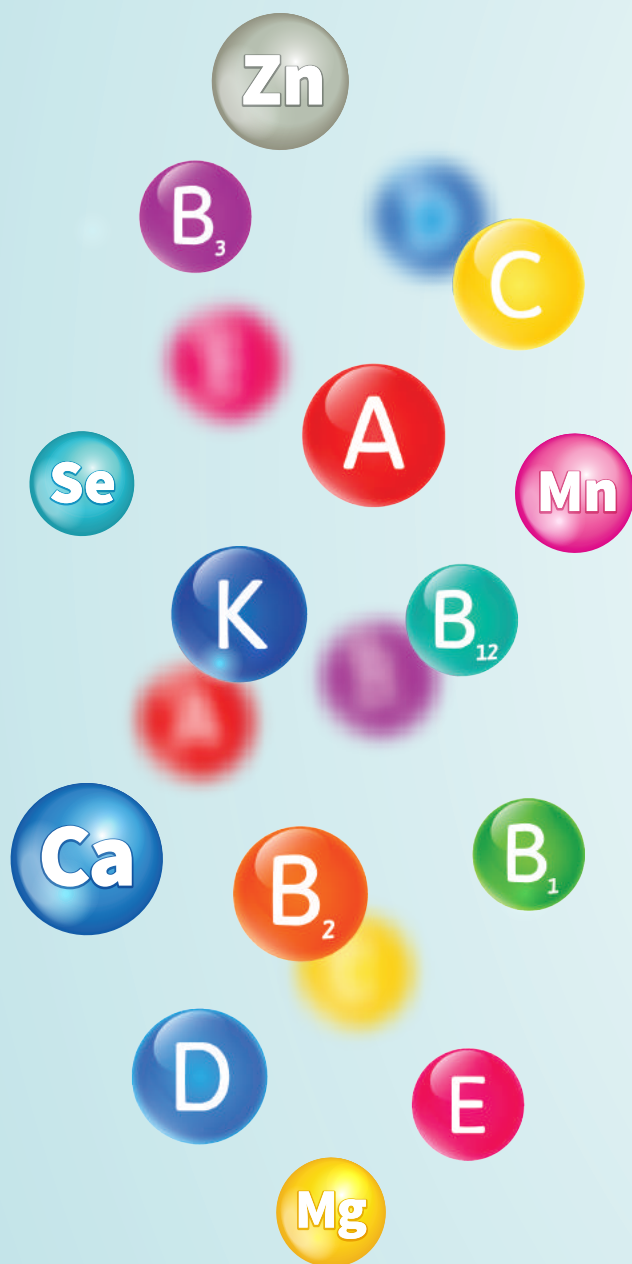
Should I fast before the blood is drawn?

While standard lab procedure does not require fasting before your blood draw for micronutrient tests, there is the possibility for fasting status to affect some micronutrient levels. Discuss with your provider what their preferences are regarding fasting for the Vibrant Micronutrient Test.

References:

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Why Vibrant?

- ✓ Vibrant's patented technology and reporting allows for high sensitivity quantitative detection of intracellular micronutrients.
- ✓ Vibrant provides both extracellular and intracellular testing for a thorough understanding of your short-term and long-term nutritional status and requirements.
- ✓ Vibrant utilizes highly accurate and precise testing, enabled by automation and advanced testing methodologies.
- ✓ Clinically relevant RBC folate, omega fatty acids, and magnesium are measured.
- ✓ WBC levels are normalized to total WBC count.
- ✓ Fast TAT of 10 business days.
- ✓ Vibrant's clinical support team of highly qualified expert dietitians are available to provide support on dietary plans and supplementation for patients.
- ✓ Vibrant's micronutrient test uses advanced reporting with easy-to-interpret results and repletion suggestions.
- ✓ Vibrant provides comprehensive back-up testing to identify potential sources of malabsorption.



Regulatory Statement:

These tests have been laboratory developed and their performance characteristics determined by Vibrant America, a CLIA-certified laboratory performing the test. This 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.

All information in this material is to be used solely for informational and educational purposes only and are not intended to constitute or to be a substitute for professional medical advice, diagnosis, or treatment. Patients should always seek the advice of a physician or other healthcare professional before making any changes to their lifestyle or medications.