



METAMETRICS
LABORATORY

IMMUNO NUTRIENT TEST

Obtain clinically actionable information to boost the immune system.

Why You Need Immuno Nutrient Testing

The Immune Response to Health Threats

Our body relies on essential nutrients to generate energy, produce metabolic precursors, and tune our immune response to infectious agents that cause allergies and illness.¹ Any disruptions to our body's nutritional balance can leave a substantial impact on our immune competence, which can result in increased susceptibility to infection during deficiency, or chronic inflammation associated with over-nutrition.²

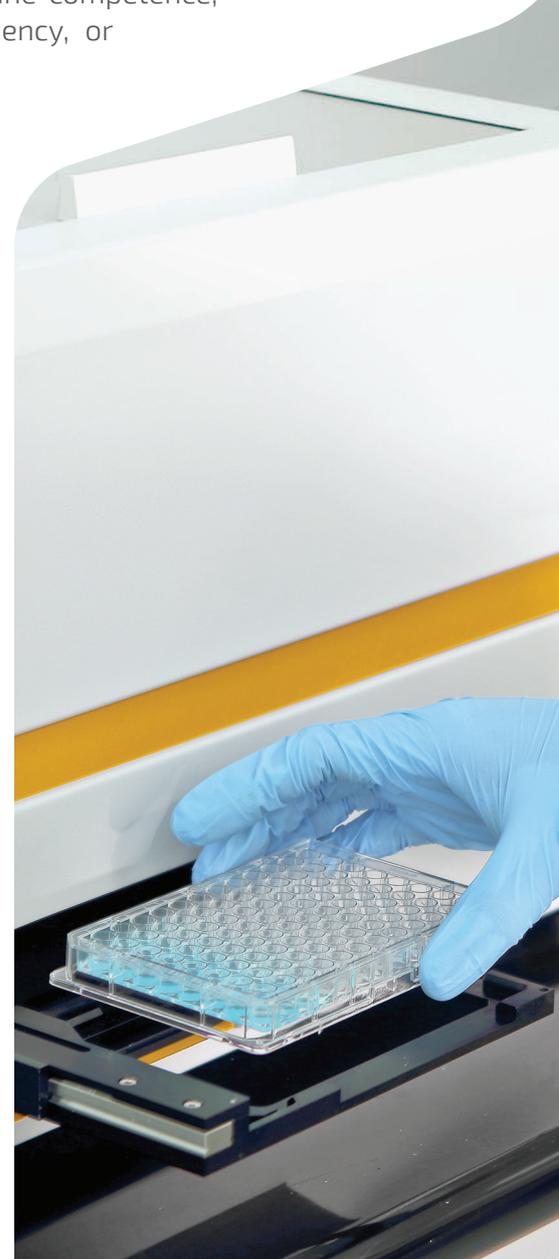
The Impact of Immuno Nutrient Testing

The Immuno Nutrient Test reveals accurate micronutrient imbalances that may weaken the body's response to allergies and illness, especially for individuals with declining or impaired immune function, like the elderly and work-stressed.

This test provides the healthcare practitioner with specific information to practice personalized supplementation that can optimize nutrient levels while minimizing risks associated with supplementation.

- ✓ Measures the level of 16 vitamins, minerals, and antioxidants essential to healthy host defense and disease prevention
- ✓ Examines imbalances in all fat-soluble vitamins (A, D, E, K) that are essential for optimal immune response to eliminate the guesswork in supplementation
- ✓ Evaluates intracellular mineral levels (instead of just serum measurement) like magnesium, calcium, selenium, zinc, manganese, and chromium
- ✓ Provides clinically actionable information that enables clinicians to develop personalized dietary and supplementation protocol for patients with immunity problem

Micronutrient imbalance can affect immune function. Managing deficiencies and toxicities can have significant benefits, such as stronger immunity and reduced incidence of infections and illnesses.³



IMMUNO NUTRIENT TEST

Micronutrients Tested:

Vitamin C is a water-soluble vitamin and the most often used vitamin to boost immunity. It strengthens immune cells against oxidative damage by neutralizing free radicals. It further supports immunity through production and improved function of white blood and other immune system cells.⁴

Vitamin E is a fat-soluble antioxidant. This vitamin helps neutralize free radicals in cell membranes, and improves the activity and reproduction of some immune cells.⁵ Vitamin E also helps in the production of red blood cells, as well as helping the body use vitamin K. Studies have found low levels of this vitamin in people with cancer.⁶

Vitamin A helps control cellular processes in the immune system and contributes to the growth and development of immune cells.⁷ Toxic levels of vitamin A (or hypervitaminosis) can accumulate in the liver, which can lead to increased intracranial pressure, nausea, headaches, skin irritation, and even death. Since tissue levels take long to fall after intake is discontinued, the resultant liver damage may be permanent.⁸

Vitamin D is an essential fat-soluble vitamin that aids in bone and immune system health. Vitamin D receptors are located in almost all immune system cells, where the micronutrient regulates and enhances immune cell function.⁹ A deficiency in this vitamin is common. Low levels of vitamin D can result in reduced intestinal calcium absorption (mediated by this vitamin) and loss of bone density.¹⁰

Vitamin B9 is involved in the formation of red blood cells and in ensuring immune system function. A B9 deficiency in central nervous tissue may lead to depression, insomnia, fatigue, and anxiety—all of which can reduce the immune response.¹¹

Cobalamin (vitamin B12) is essential for addressing adrenal fatigue, multiple metabolic functions, and maintaining healthy nervous and cardiovascular systems. Deficiency is associated with tiredness, weakness, depression, constipation, loss of appetite, weight loss, megaloblastic anemia, and nerve problems.¹²

Selenium protects cells against oxidative damage while boosting natural and acquired immunity. Dietary selenium—as it is involved in the regulation of redox, oxidative stress, and other important cellular processes in virtually all cell types and tissues—strongly affects immune responses and risk of inflammation, especially as studies have shown its effects against aging and certain pathogens.¹³

Zinc is crucial for normal development and function of immune cells, including protection from oxidative damage and other basic cellular functions, such as DNA replication, RNA transcription, cell division, and cell activation. Deficiency can affect multiple aspects of the immune system, from the barrier of the skin to gene regulation within lymphocytes, and can increase susceptibility to a variety of pathogens and infections.¹⁴

This nutrient panel also tests for **vitamin K, calcium, magnesium, manganese, chromium, ferritin, sodium, and potassium.**

1 How to boost your immune system. 31 October 2017.

<https://www.health.harvard.edu/staying-healthy/how-to-boost-your-immune-system>

2 Romagnani S. Th1 / Th2 cells. *Inflamm Bowel Dis.* 1999 Nov;5(4):285-94.

<https://www.ncbi.nlm.nih.gov/pubmed/10579123>

3 Davidson H, Hamer, et al. Micronutrient Deficiencies Are Associated with Impaired Immune Response and Higher

Burden of Respiratory Infections in Elderly Ecuadorians. *J Nutr.* 2009 Jan; 139(1): 113–119.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC264621/>

4 Wintergerst ES, Maggini S, Hornig DH. Immune-enhancing role of vitamin C and zinc and effect on clinical conditions.

Ann Nutr Metab 2006;50(2):85-94.

5 Vitamin E is a unique essential nutrient that is one of the only fat-soluble antioxidants. Fats are present in all cell

membranes and are susceptible to damage by free radicals. This vitamin helps neutralize these free radicals. It

improves the activity and reproduction of some immune cells.

6 <https://www.umm.edu/health/medical/altmed/supplement/vitamin-e>

7 Green HN, Mellanby E. Vitamin A as an anti-infective agent. *Br Med J.* 1928;2(3537):691-696. Ross CA; Vitamin A. In:

Coates PM, Betz JM, Blackman MR, et al., eds. *Encyclopedia of Dietary Supplements*. 2nd ed. London and New York: Informa Healthcare; 2010:778-91

8 <https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/>

9 Edfeldt K, Liu PT, Chun R, et al. T-cell cytokines differentially control human monocyte antimicrobial responses by regulating vitamin D metabolism. *Proc Natl Acad Sci U S A.* 2010;107(52):22593-22598

10 Vitamin D Deficiency in Adults: When to Test and How to Treat. Kurt A, Kennel, et al. *Mayo Clin Proc.* 2010 Aug; 85(8): 752–758. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2912737/>

11 Kunisawa, J & Kiyono H. Vitamin-Mediated Regulation of Intestinal Immunity *Front Immunol.* 2013; 4: 189

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3708512/>

12 <https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/>

13 Muscaritoli M, Molino A, Laviano A, Rasio D, Rossi Fanelli F (2012) Parenteral nutrition in advanced cancer patients.

Crit Rev Oncol Hematol; Brozmanová J (2011)

14 <https://ods.od.nih.gov/factsheets/Zinc-HealthProfessional/>

TEST INFORMATION

Specimen : 20 ml. whole blood
Result TAT : 7 working days
Method : HPLC, LC-MS/MS, ICP-MS, Microassay

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