



ALCAT³
FUNCTIONAL
CELLULAR
Assays

The next generation of
personalized **Functional Nutrition
Testing** is here.

Personalized testing is the key
to feeling your best!



"That which can be treated by diet should be treated by diet." Maimonides

But, which diet?

It is impossible to say what the best diet is by only looking at the characteristics of the food; one must foremost consider the characteristics of the person eating the foods.

"I believe that no two individuals are exactly alike chemically any more than structurally."

Archibald Garrod, "The Father of Chemical Genetics"

Personalized diet – Scientific Assessment

By using the Alcat Test for food and chemical sensitivities, along with the Alcat Micronutrient and Antioxidant Protection Assays, it is now possible to scientifically determine what any particular individual should and should not eat and which specific micronutrients are particularly beneficial.

"...improvement of immune functions by foods can normalize the physical state of allergic patients or cancer patients, and may reduce the risk of diseases in healthy individuals. Therefore, it is valuable to assess the immune-modulating abilities of foods..."

Dr. Shuichi Kaminogawa, Dr. Masanobu Nanno (Modulation of Immune Functions by Foods, Annals of Oncology, Vol. 1 #3)

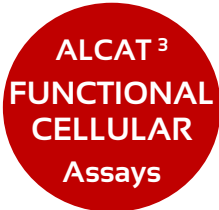


The next generation of functional cellular nutrition testing has arrived.

In order to address **patients' nutritional needs at the functional cellular level** we have developed three assays that can provide patients with comprehensive information regarding their

- 1 Nutrient deficiencies (AMA / Alcat Micronutrient Assay)**
- 2 Specific antioxidants that may be particularly beneficial (APA / Antioxidant Protection Assay)**
- 3 Overall antioxidant function (ARA / Alcat Redox Assay)**

Are your immune cells being nourished properly?



Who will benefit?

Many individuals are exceeding energy (caloric) needs but not meeting micronutrient (essential vitamin and mineral) requirements.

The test can benefit:

- ▶ **Nutritional & health status optimization with a tailored food and supplement plan**
- ▶ **Women's health; fertility, pregnancy, lactation, perimenopause, menopause and others**
- ▶ **High performance and/or severe stress**
- ▶ **Sports nutrition**
- ▶ **Pre and post surgery**
- ▶ **Weight management, obesity**
- ▶ **Burnout, fatigue, depression, mood swings, low vitality**
- ▶ **Chronic conditions, and/or metabolic syndrome (increased blood pressure and blood sugar, excess body fat, abnormal cholesterol)**

"[...] the majority of Americans do not follow a healthy eating pattern.

Together with physical inactivity, eating an energy-rich, nutrient-poor diet predisposes one to many chronic diseases, including type 2 diabetes mellitus, cardiovascular disease, cancer, osteoporosis, and especially obesity.

Decades of public health messages to eat a balanced diet have not resulted in behavior change. [...]"

Linus Pauling Science Center
Oregon State University



1 Alcat Micronutrient Assay (AMA)

Nutrient deficiencies

The AMA (Alcat Micronutrient Assay) directly measures the effect of specific micronutrients on the ability of T and B lymphocytes to reproduce when stimulated with a mitogen (i.e., mitosis generator).

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 individual and are impacted by many factors. Stress, genetics, and other conditions, for example; high energy output in sports, pregnancy, recent infection, toxic burden, sleep patterns, etc., all play a role.

Measurement of the effect of nutrients on your immune function can be more revealing than just knowing if your blood serum levels of a vitamin, mineral or amino acid, fall within "normal" ranges.

What is normal for one may not be normal for others.

How does the test work?

Serum and a mixture of lymphocytes are isolated from the whole blood of patients. This mixture is diluted with minimal media to the targeted concentration and grown in the presence of different micronutrients.



The lymphocytes' growth rate stimulated by the mitogen, without the addition of micronutrients, is defined as the patient's baseline. Micronutrients are added to the lymphocytes. The enhancement of the mitogen induced proliferation rate occurs with the addition of the nutrients the patient needs (deficiency/insufficiency). Each individual essential micronutrient is assessed and compared against the patient's baseline.

The nutrients that restored the cellular functional response to the mitogenic stimuli is reported as "deficient".

② Antioxidant Protection Assay (APA)

Specific antioxidants that may be particularly beneficial

Cell Science Systems has developed the cellular test that determines patient- specific nutrients that are particularly beneficial in resisting oxidative stress and restoring efficient antioxidant function.

Antioxidants are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged. Although there are several enzyme systems within the body that scavenge free radicals, certain micronutrient antioxidants are required for proper function of the body's antioxidant enzyme systems. The body cannot manufacture these micronutrients so they must be supplied in the diet.

In the tests for individual antioxidants, it is determined which specific antioxidants may be **beneficial and thus supporting patient's immune cells to resist oxidative stress**. For these tests, single antioxidants are added to the patients' cells and their serum in the presence of oxidative stress molecules.

Specific antioxidants that significantly improve patients' antioxidant function to recover and resist the effect of the oxidative stress are reported to the patient. This process is repeated for each individual antioxidant.



③ Alcat Redox Assay (ARA)

Overall antioxidant function

Redox is a measurement of overall antioxidant function of patient's immune system.



The cells stimulated to grow in the minimal media contain only the patient's serum, without any external nutrients added. Then increasing amounts of a free radical generating system (H₂O₂) are added to the cells. The cells' ability to resist oxidative damage is determined. The increasing levels of peroxide will diminish cells' growth rates depending on antioxidant function capacity of the tested cells.

The ability of the patient's immune cells to resist effects of oxidative stress is compared to the average normal ranges of the population.



Test items

What can be tested?

Alcat Micronutritional Assay (AMA) – 45 item

VITAMINS

- Thiamine (vitamin B1)
- Riboflavin (vitamin B2)
- Biotin
- Cobalamin (vitamin B12)
- Folate (vitamin B9)
- Nicotinamide (Niacin, vitamin B3)
- Pantothenic Acid
- Pyridoxine (vitamin B6)
- Vitamin C
- Vitamin A
- Vitamin D
- Vitamin E (D-alpha tocopherol acetate)
- Vitamin E (Delta-tocotrienol)
- Vitamin K1
- Vitamin K2- MK7
- Vitamin K2-MK4

MINERALS

- Calcium
- Iron
- Molybdenum
- Zinc
- Magnesium
- Manganese
- Copper
- Iodine

AMINO ACIDS

- Arginine
- Asparagine
- Cysteine
- Histidine
- Leucine
- Lysine
- Methionine

- Phenylalanine
- Taurine
- Threonine
- Valine
- Tyrosine
- Glutamine
- Serine
- Isoleucine

OTHER NUTRIENTS

- Carnitine
- Inositol
- Geranylgeraniol
- Choline
- Alpha-ketoglutarate
- Beta- 1, 3-glucan

Antioxidant Protection Assay (APA) – 38 items

BOTANICALS, PLANT EXTRACTS, PIGMENTS, PHYTONUTRIENTS

- Echinacea
- Green Tea Extract
- Astragalus Extract
- Andrographis
- Elderberry
- Lycopene
- Rhodiola Root
- Shiitake mushroom
- Maitake mushroom
- Wild Cherry Bark
- Turmeric
- Quercetin

- Resveratrol
- Lavender
- Frankincense
- Chlorophyll
- Grape Seed
- Pycnogenol
- Mangosteen
- Astaxanthin
- Zeaxanthin

ANTIOXIDANT AND ANTI-INFLAMMATORY NUTRIENTS, FATTY ACIDS, AND ENZYMES

- Pyrroloquinoline
- Glutathione

- Lutein
- Vitamin C
- Selenium
- Beta-carotene
- Coenzyme Q10
- Lipoic Acid
- Super Oxide Dismutase (SOD)
- Catalase
- Geranylgeraniol
- Vitamin E (Delta tocotrienol)
- Eicosapentaenoic acid (EPA)
- Docosahexaenoic acid (DHA)
- Linoleic Acid
- Palmitoleic acid (omega-7)
- Oleic Acid (omega-9)

Special Product Testing – 11 items

- PurePaleo Protein*
- WheyCool Protein*
- BCAA Powder with L- Glutamine
- Organic PurePea Protein *

- Metabolic Synergy*
- Amino Acid Synergy*
- Immunitone Plus*
- Mitochondrial NRG*
- Mito PQQ*

- ImmunoBerry™ Liquid *
- Ultra Gamma E Complex*

** Designs For Health product/ all ingredients were supplied by Designs For Health*

Cellular functional assay vs. serum assay

Our lymphocyte based functional cellular assays differ from standard serum assays: Serum assays determine the level of a specific micronutrient in the serum and compare that to a normal range. However, what's "normal" for one person may not be "normal" for someone else.



Our testing assumes that each individual is unique and therefore we look at the response of the lymphocytes to certain substances (individual micronutrients) when stimulated with a mitogen.

Serum levels are prone to daily fluctuations. Intracellular nutrient stores are much more stable and reflect long-term nutritional status.

① The AMA: Lymphocytes are separated from whole blood, patient serum is added back, cells are stimulated with a mitogen, baseline proliferation rates are determined, and then compared to proliferation rates when nutrient substances are added to each culture - one at a time. Hence the single independent variable is the presence of a specific micronutrient and in this way we can determine if that specific micronutrient enhances proliferation; and, the degree to which it does so.

If a specific micronutrient enhances cell proliferation it suggests a functional deficiency regardless of serum concentration.

② If the patient's cells are seen to be prone to such damage under those conditions we carry out the APA wherein we add specific antioxidant micronutrients (a different one in each culture) repeat the challenge, and see which ones confer protection.

③ In the Redox Assay we prepare the cultures in the same manner and then add a stressor that induces free radical damage.

Note of caution: "Are there any risks in taking supplements? - Yes. Many supplements contain active ingredients that have strong biological effects in the body. This could make them unsafe in some situations and hurt or complicate your health. [...] Combining supplements; Using supplements with medicines (whether prescription or over-the-counter); Substituting supplements for prescription medicines; Taking too much of some supplements, such as vitamin A, vitamin D, or iron [...]." <https://www.fda.gov/food/resourcesforyou/consumers/ucm109760.htm>

► **The test results are to be used as part of a full nutritional assessment with individualized guidance from a qualified practitioner.**

References and links:

1. Maimonides; medieval philosopher, scholar, and physician
2. Archibald Garrod, "The Father of Chemical Genetics" in a 1909 lecture at St. Bartholomew's Hosp. (London) - Author, "Inborn factors of disease" (1931)
3. Dr. Shuichi Kaminogawa, Dr. Masanobu Nanno (Modulation of Immune Functions by Foods, *Annals of Oncology*, Vol. 1 #3)
4. <https://lpi.oregonstate.edu/mic/micronutrient-inadequacies/overview>
5. <https://www.fda.gov/food/resourcesforyou/consumers/ucm109760.htm>
6. US Department of Health and Human Services and US Department of Agriculture. 2015-2020 Dietary Guidelines for Americans December 2015. Available at: <https://health.gov/dietaryguidelines/2015/>. Accessed 4/23/18.
7. National Institute of Diabetes and Digestive and Kidney Diseases. Overweight & Obesity Statistics. Available at: <https://www.niddk.nih.gov/health-information/health-statistics/overweight-obesity>. Accessed 8/31/17.
8. US Preventive Services Task Force, Grossman DC, Bibbins-Domingo K, et al. Screening for obesity in children and adolescents: US Preventive Services Task Force Recommendation Statement. *JAMA*. 2017;317(23):2417-2426. (PubMed)
9. Kant AK. Consumption of energy-dense, nutrient-poor foods by adult Americans: nutritional and health implications. The Third National Health and Nutrition Examination Survey, 1988-1994. *Am J Clin Nutr*. 2000;72(4):929-936. (PubMed)
10. Huskisson E, Maggini S, Ruf M. The role of vitamins and minerals in energy metabolism and well-being. *J Int Med Res*. 2007;35(3):277-289. (PubMed)
11. Angelo G, Drake VJ, Frei B. Efficacy of multivitamin/mineral supplementation to reduce chronic disease risk: a critical review of the evidence from observational studies and randomized controlled trials. *Crit Rev Food Sci Nutr*. 2015;55(14):1968-1991. (PubMed)
12. Miller EM. Iron status and reproduction in US women: National Health and Nutrition Examination Survey, 1999-2006. *PLoS One*. 2014;9(11):e112216. (PubMed)
13. Hoy MK, Goldman JD. Potassium intake of the US population: What we eat in America, NHANES 2009-2010. Food Surveys Research Group. Dietary Data Brief No. 10. Sept. 2012
14. Schleicher RL, Carroll MD, Ford ES, Lacher DA. Serum vitamin C and the prevalence of vitamin C deficiency in the United States: 2003-2004 National Health and Nutrition Examination Survey (NHANES). *Am J Clin Nutr*. 2009;90(5):1252-1263. (PubMed)
15. Holick MF, Binkley NC, Bischoff-Ferrari HA, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2011;96(7):1911-1930. (PubMed)
16. Ross AC. Vitamin A. In: Ross AC, Caballero B, Cousins RJ, Tucker KL, Ziegler TR, eds. *Modern Nutrition in Health and Disease*. 11th ed. Philadelphia: Lippincott Williams & Wilkins; 2014:260-277.