

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



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Message from our founder and CEO

Background of the Cellular Nutrient Assays

My interest in food as medicine goes back almost 50 years. I spent a great deal of time outdoors in my youth and was enchanted by what I saw as the perfection and beauty of the natural world, which gave me the conviction that good quality food could create health and happiness; and conversely, poor quality food could slowly kill.

That conviction eventually drew me to undertake the project of perfecting the method of the ALCAT Test, to identify which foods are good for any particular person and which are not. Food quality is essential; but, every bit as critical is the compatibility of the food for each and every individual.

That project began in 1986 and I have continued it to this day. For those of you who may not know, the ALCAT Test is an automated way to determine how an individual's peripheral immune cells (i.e., live, white blood cells in the blood) react or do not react when confronted with a food, chemical, medicinal herb, drug; or, other substance. Testing is conveniently performed outside the body, that is, "ex vivo".

This method was already confirmed in the 1930's and 40's through clinical studies conducted by allergists such as Theron Randolph, Herbert Rinkle, and others. Randolph, particularly, took lengthy and extensive histories on each of the patients that came to his Chicago practice during the 1930's and concluded:

"Usually, neither the patients nor their physicians have suspected food allergy as the root of their problem because most food allergy, by its very nature, is masked and hidden. It is hidden from the patient, hidden from his or her family, and hidden from the medical profession in general.[...] In the case of food allergy, the source of the problem is literally in front of you, in the form of some commonly eaten substance that is bringing on and perpetuating chronic symptoms."*

*Please note that what Dr. Randolph referred to as, "food allergies" we now call food sensitivities, or, intolerances.

So, the concept and crude methodology for evaluation of leukocyte reactions to foods, ex vivo, already existed when I entered the field.

What we did was automate the process, making it more reliable and build a structure to deliver it economically. I'm happy with the outcomes. Many hundreds of thousands of people from around the world have been profoundly helped by this technology. I cannot think of a better answer to our health care crisis than the implementation of this technology on a broader scale.

Along the way I heard about a lab that was doing something similar. They were looking at a sub set of white blood cells (the lymphocytes) to see if the specific memory cells would undergo a favorable proliferative response, when stimulated to do so, in the presence of different alterations of the micronutrient content (basically, vitamins, minerals, amino and essential fatty acids) in the culture medium, also ex vivo.

It should be mentioned that there are basically two broad types of immune system cells: innate immune cells, which are the first line of defense; and cells of the specific or "adaptive" branch of the immune system.

The ALCAT Test for Food and Chemical Sensitivities looks at both categories; but, it is mainly the innate immune system cells that underlie food and chemical **sensitivities**. They are by far the more numerous, respond more quickly, and live for a shorter period of time. The specific immune cells, which are the lymphocytes, only become activated when the innate immune cells need an extra boost, be that through antibody production or the ability to directly kill infected cells.

The specific immune cells are pathogen specific, meaning, they recognize only one pathogen, hence the name; and, are capable of dividing into exact replicas of themselves in order to buttress the attack. However, once the threat has passed, they go back to their resting state and reduce in number.

Their ability to divide or “proliferate” determines how quickly we quell the pathogen next time it comes around. And that ability to do so is dependent upon its intracellular nutrient stores.

Hence, measurement of cell proliferation, when stimulated to do so (by a mitogen, i.e., “mitosis generator”) can provide a functional measurement of not only the lymphocytes’ respective individual micronutrient stores but also reflect the nutritional status of all somatic cells.

I found this approach fascinating and I learned that the inventor of this test, **Dr. William Shive**, worked at Experimental Sciences, University of Texas in Austin.

Since I lived in Austin I reached out to see if he would entertain a visit. We met shortly thereafter and had numerous follow up meetings to discuss how our methods of cellular measurement might improve his assay; and, toward that end, we began collaboration. This continued until Dr. Shive’s untimely death. We have since continued our efforts over the past 20 years and have finally succeeded in bringing about a test that is broader, less time consuming, more accurate, and more economical.

We hope you find it beneficial.

For this I honor the important pioneering work performed by Dr. Shive and his collaborators and am grateful for the extraordinary achievements of my research and nutrition teams, and thank them for their untiring work.

Roger Deutsch, CEO
Cell Science Systems, Corp.



N.B.

I still strongly believe in meeting our nutritional requirements through consumption of wholesome, fresh, organically produced food; however, in today’s world one may greatly benefit by taking appropriate supplements; and, this test can offer valuable guidance as to which supplements to take.

The ALCAT test for food and chemical sensitivities and the ALCAT method for assessment of micronutrient deficiencies, go hand in hand. They both measure a different functional response of the immune system; one test telling you what not to eat; and, the other, telling you what you should eat.

However, some gastrointestinal disorders can impair absorption of nutrients, even if adequately consumed. For this reason we have created a test panel to assess genetic risk for Crohn’s and celiac disease, along with markers to assess current disease states. It’s called the CICA (Celiac, IBS, and Crohn’s Array) and can be ordered along with an ALCAT test at a reduced cost.

**"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 Cellular Nutrition 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)



CNA CELLULAR
NUTRITION
ASSAYS

The next generation of functional cellular nutrition testing

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 nutrient insufficiencies, overall antioxidant function, and antioxidants that may be particularly beneficial:

CNA CELLULAR MICRONUTRIENT ASSAY (CMA)

→ 46 nutrients tested

CNA REDOX ASSAY

CNA ANTIOXIDANT PROTECTION ASSAY (APA)

→ 40 antioxidant/anti-inflammatory substances tested

+ Plus 11 proprietary formulations (optional)

Who will benefit?

Are your cells getting the nourishment they need? Many individuals are exceeding energy (caloric) needs but not meeting micronutrient (essential vitamin and mineral) requirements.

- ▶ Nutritional and 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



Personalized assessment of nutrient needs

Most conventional laboratory tests' target values are set using population averages. Therefore, the established ranges tend to be broad and do not take into consideration various individual factors.

However, nutrient requirements are unique to each individual. Stress, genetics, high energy output in sports, pregnancy, recent infection, toxic burden, sleep patterns, age, gender, etc. all play a role.

The Cellular Nutrition Assays by Cell Science Systems are exactly calibrated according to the individual's need and how the patient's immune cells respond to the addition of each test items.

- Our tests use a patient specific "control" for each nutrient tested.

Mimicking *biological* processes using the *patient's own serum*

That patient serves as their own control. That is, **the individual's baseline is the measurement of their own level of cellular metabolism, while the cells are cultured in autologous serum.**

- Use of **autologous serum** provides for the most in vivo like conditions. **Measurement of metabolic activity reflects cellular activation and proliferation rate, when stimulated with a mitogen.**

Single nutrients are added - one at a time - to the culture: and, the changes in metabolic activity are

compared to the patient's baseline level. Thus the isolated variable is the single nutrient being tested.

- An **increase in metabolic activity** of the cells following a nutrient addition in vitro, can be reasonably assumed to reflect a functional insufficiency of that nutrient.
- Currently 46 micronutrient, 40 antioxidants, and 11 propriety formulas are validated for testing.

References and links

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1 Cellular Micronutrient Assay (CMA)

Micronutrient insufficiencies

The CMA (Cellular 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).

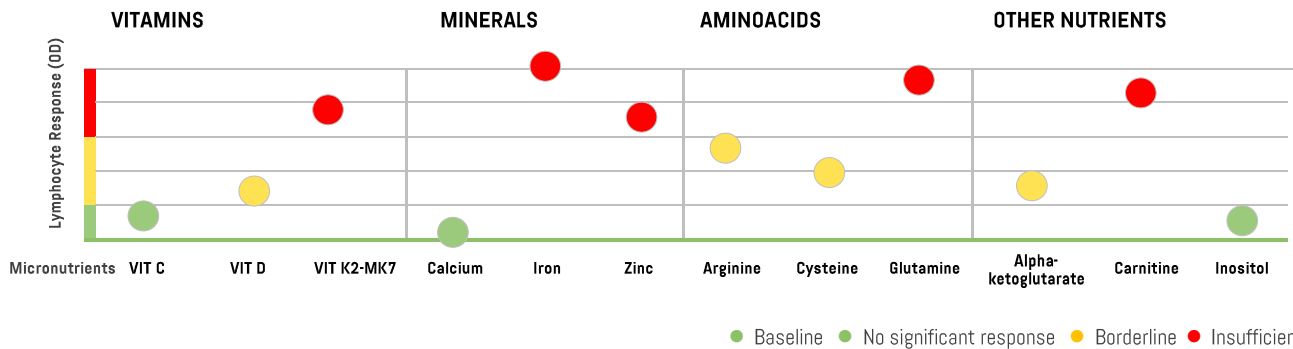
When the body has an infection, it increases production of the T and B lymphocytes (memory cells) that “recognize” and combat that specific invader. The faster these cells reproduce the faster infection is overcome.

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 vitamins, minerals, and amino acids, fall within “normal” ranges.

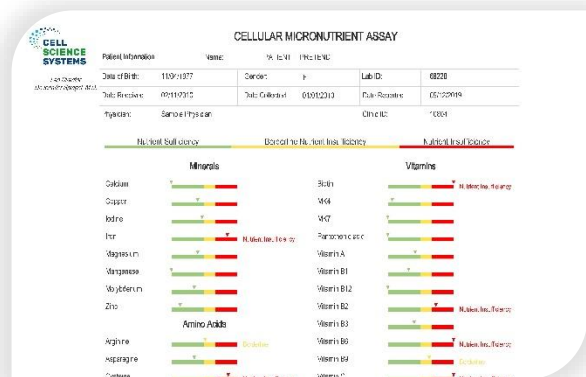
Metabolism happens WITHIN the cells. Serum nutrient measurement is only a “SNAPSHOT” of nutrient status. Cellular activity gives insight into LONG TERM nutrient status.



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.

- 1) The lymphocytes' growth rate stimulated by the mitogen, without the addition of micronutrients, is defined as the patient's baseline.
- 2) Micronutrients are added one at the time to the lymphocytes.
- 3) The enhancement of the mitogen induced proliferation rate occurs with the addition of the nutrients the patient needs (insufficiency).
- 4) 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 “insufficient.”

2 Redox Assay

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.

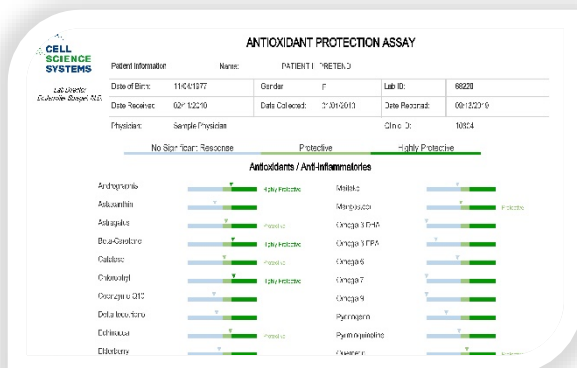


The ability of the patient's immune cells to resist effects of oxidative stress is compared to the average normal ranges of the population.

3 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 may be particularly protective in resisting oxidative stress and restoring efficient antioxidant function.



● Baseline ● No significant response ● Protective ● Highly Protective

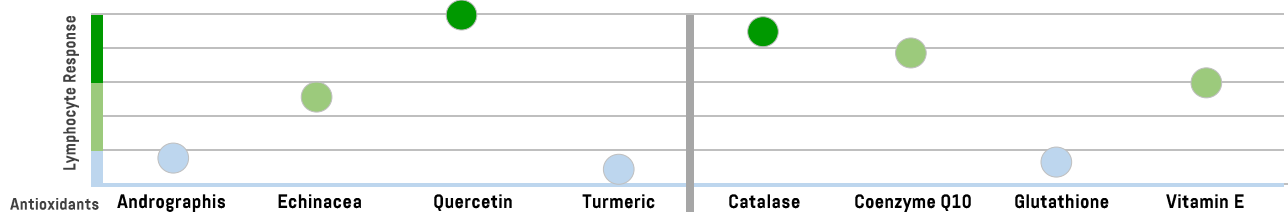
Antioxidants are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged. Although there are several enzyme systems within the body that scavenge free radicals, certain micronutrient antioxidants are required for proper function of the 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. This process is repeated for each individual antioxidant.

BOTANICALS, PLANT EXTRACTS, PIGMENTS, PHYTONUTRIENTS

ANTIOXIDANT AND ANTIINFLAMMATORY NUTRIENTS, FATTY ACIDS, AND ENZYMES





CNA Panel contents / 98 items (including formulas)

Micronutrient insufficiencies / Cellular Micronutritional Assay (CMA) - 47 items

VITAMINS

- Thiamine (vitamin B1)
- Riboflavin (vitamin B2)
- Biotin
- Cobalamin (vitamin B12)
- Folate (vitamin B9)
- Gamma Delta-tocotrienol
- Mixed tocopherols
- Nicotinamide (Niacin, vitamin B3)
- Pantothenic Acid
- Pyridoxine (vitamin B6)
- Vitamin C
- Vitamin A
- Vitamin D
- Vitamin K1

- Vitamin K2-MK7
- Vitamin K2-MK4

MINERALS

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

AMINO ACIDS

- Arginine
- Asparagine
- Cysteine
- Glutamine
- Histidine
- Isoleucine
- Leucine
- Lysine
- Serine
- Methionine
- Phenylalanine
- Taurine
- Threonine

- Tyrosine
- Valine

OTHER NUTRIENTS

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

Individually beneficial antioxidants / Antioxidant Protection Assay (APA) - 40 items

BOTANICALS, PLANT EXTRACTS, PIGMENTS, PHYTONUTRIENTS

- Andrographis
- Astaxanthin
- Astragalus
- Chlorophyll
- Echinacea
- Elderberry
- Frankincense
- Grape Seed
- Green Tea Extract
- Lavender

- Lycopene
- Maitake mushroom
- Mangosteen
- Milk Thistle
- Pycnogenol
- Quercetin
- Resveratrol
- Rhodiola Root
- Shiitake mushroom
- Turmeric
- Wild Cherry Bark
- Zeaxanthin

ANTIOXIDANT AND ANTI-INFLAMMATORY NUTRIENTS FATTY ACIDS, AND ENZYMES

- Beta-carotene
- Catalase
- Coenzyme Q10
- Docosahexaenoic acid (DHA)
- Eicosapentaenoic acid (EPA)
- Gamma Delta tocotrienol
- Geranylgeraniol
- Glutathione

- Linoleic Acid
- Lipoic Acid
- Lutein
- Mixed tocopherols
- Oleic Acid (omega-9)
- Palmitoleic acid (omega-7)
- Pyrroloquinoline
- Selenium
- Super Oxide Dismutase (SOD)
- Vitamin C

Plus 11 proprietary formulations (optional):

- Amino Acid Synergy*
- BCAA Powder with L-Glutamine*
- Immunitone Plus*
- ImmunoBerry™ Liquid *
- Metabolic Synergy*
- Mito PQQ*
- Mitochondrial NRG*
- Omega Avail Synergy *

- Organic PurePea Protein *
- PurePaleo Protein*
- WheyCool Protein*

**All products were supplied by Designs for Health*



"North American Food Intolerance
Testing Company of the Year"
(Frost & Sullivan)

**Functional Laboratory Testing aimed at personalized
nutrition and prevention of chronic inflammation and
autoimmune disease.**

Cell Science Systems Corp. (CSS) is a specialty clinical laboratory that develops and performs testing in immunology, serology, cell biology, and other specialties supporting the personalized treatment and prevention of chronic disease.

CSS operates a CLIA-certified laboratory and is an FDA inspected and registered, cGMP medical device manufacturer meeting ISO EN13485:2012 standards.

- CLIA-ID#10D0283906
- State of Florida Lab ID: 800001500
- State of California Lab ID: 00800633
- TUV compliant, product and facility safety monitored
- Reagents and instruments are CE marked for the international market
- Supported by the EU and the State of Brandenburg

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