SPECTRACELL LABORATORIES

LABORATORY REPORT

Account Number: 123456	Name: Jane Doe
	Gender: Female DOB: 11/13/1947
Dr. John Smith	
123 Main St	Accession Number: J71101
Anytown, USA	Requisition Number: 781864
	Date of Collection: 05/19/2010
	Date Received: 05/20/2010
	Date Reported: 06/01/2010

Summary of Deficient Test Results

Micronutrient analysis (WBC) determined the following deficiencies:

Vitamin D3	Calcium	Zinc	Glutathione
Spectrox			

John F. Crawford, Ph.D.
Laboratory Director

CLIA# 45D0710715

OVERVIEW OF TEST PROCEDURE

1. A mixture of lymphocytes is isolated from the blood.
2. These cells are grown in a defined culture medium containing optimal levels of all essential. nutrients necessary to sustain their growth in cell culture.
3. The T-lymphocytes are stimulated to grow with a mitogen (phytohemagglutinin) and growth is measured by the incorporation of tritiated (radioactive) thymidine into the DNA of the cells.

The growth response under optimal conditions is defined as 100%, and all other growth rates are compared to this 100% level of growth.

For example – we remove vitamin B6 from the medium and stimulate the cells to grow by mitogen stimulation. Growth is measured by DNA synthesis and the rate of growth is dependent only upon the functional level of vitamin B6 available within the cells to support growth. For Vitamin B6 a growth rate of at least 55% of the growth rate observed in the optimal (100%) media is considered normal. Results less than 55% are considered to indicate a functional deficiency for Vitamin B6. Each nutrient has a different reference range that was established by assaying thousands of apparently healthy individuals.

BREAKING DOWN THE REPORT

1. TEST RESULT (% CONTROL)

This column represents the patient's growth response in the test media measured by DNA synthesis as compared to the optimal growth observed in the 100% media.

2. FUNCTIONAL ABNORMALS

An interpretation is provided for those nutrients found to be deficient.

3. REFERENCE RANGE

This column represents how this patient's result compares to thousands of patients previously tested. A patient's result is considered deficient when it is less than the reference range.

4. GRAPHS

The abnormal range of results is noted in the blue area. Abnormal results are indicated in red. The gray cross hatch area is a representation of the range of test results found in a random selection of subjects.

SPECTROX® – TOTAL ANTIOXIDANT FUNCTION

SPECTROX® is a measurement of overall antioxidant function. The patient's cells are grown in the optimal media, stimulated to grow, and then increasing amounts of a free radical generating system (H_2O_2) are added. The cell's ability to resist oxidative damage is determined. The increasing levels of peroxide will result in diminished growth rates in those patients with poor antioxidant function capacity.

INDIVIDUAL ANTIOXIDANT LEVELS

In the tests for individual antioxidants, it is determined which specific antioxidants may be deficient and thus affecting the SPECTROX® antioxidant function result. For these tests, the patient's cells are preincubated with one of the nutrient antioxidants, i.e. selenium, and then the Spectrox® test is repeated to determine if the addition of selenium improves the patient's antioxidant function. This process is repeated for each individual antioxidant.

Antioxidants tested with this process:
Glutathione, Cysteine, Coenzyme-Q10, Selenium, Vitamin E, and Alpha Lipoic Acid

Repletion Suggestions

1. Vitamin D3 (Cholecalciferol)	1000 IU b.i.d.(2000 IU daily) of Cholecalciferol (Vitamin D3-1-alpha 25-dihydroxyvitamin D)
2. Calcium	500 mg b.i.d. (1000 mg daily) as citrate, malate, ascorbateor glycinate
3. Zinc	25 mg daily
4. Total Antioxidant Function	Based on Spectrox and individual Antioxidant tests: * Glutathione Deficient: 600 mg t.i.d. (1800 mg daily) of N-Acetylcysteine (NAC) Take each dose with a meal * Cysteine: The daily dose of N-Acetylcysteine (NAC) listed for Glutathione is usually sufficient for Glutathione and/or Cysteine repletion. * Vitamin E: 200 IU daily of mixed tocopherols * Selenium: 50 mcg daily * Coenzyme Q10: 30 mg daily of CoQ10 Take each dose with a meal * Lipoic Acid: 50 mg daily * Vitamin C: 250 mg daily

Please note: Supplementation is usually required for four to six months to effect the repletion of a functional deficiency in lymphocytes

Suggestions for supplementation with specific micronutrients must be evaluated and approved by the attending physician. This decision should be based upon the clinical condition of the patient and the evaluation of the effects of supplementation on current treatment and medication of the patient.

Micronutrients	Patient Results (% Control)	Functional Abnormals	Reference Range (greater than)
B Complex Vitamins			
Vitamin B1 (Thiamin)	83		>78%
Vitamin B2 (Riboflavin)	56		>53%
Vitamin B3 (Niacinamide)	84		>80%
Vitamin B6 (Pyridoxine)	55		>54%
Vitamin B12 (Cobalamin)	19		>14%
Folate	35		>32%
Pantothenate	18		>7%
Biotin	40		>34%
Amino Acids			
Serine	38		>30%
Glutamine	43		>37%
Asparagine	56		>39%
Metabolites			
Choline	23		>20%
Inositol	60		>58%
Carnitine	50		>46%
Fatty Acids			
Oleic Acid	70		>65%
Other Vitamins			
Vitamin D3 (Cholecalciferol)	41	Deficient	>50%
Vitamin A (Retinol)	76		>70%
Vitamin K2	54		>30%
Minerals			
Calcium	34	Deficient	>38%
Zinc	35	Deficient	>37%
Copper	48		>42%
Magnesium	56		>37%
Carbohydrate Metabolism			
Glucose-Insulin Interaction	52		>38%
Fructose Sensitivity	49		>34%
Chromium	52		>40%
Antioxidants			
Glutathione	40	Deficient	>42%
Cysteine	50		>41%
Coenzyme Q-10	96		>86%
Selenium	78		>74%
Vitamin E (A-tocopherol)	90		>84%
Alpha Lipoic Acid	83		>81%
Vitamin C	46		>40%
SPECTROX™			
Total Antioxidant Function	48.0	Deficient	>65%
Proliferation Index			
LPI	66		>40%

The reference ranges listed in the above table are valid for male and female patients 12 years of age or older.

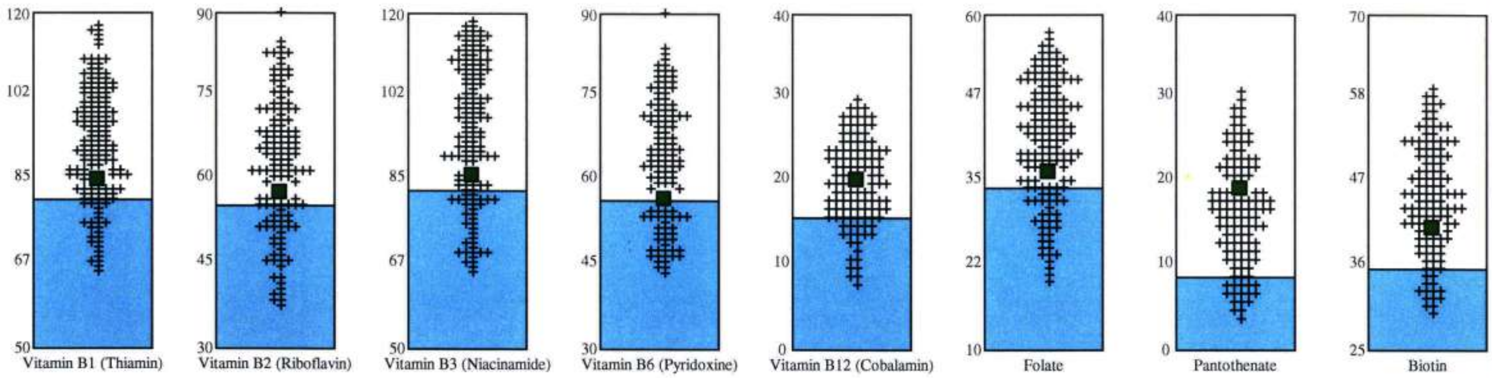
Adequate

Deficient

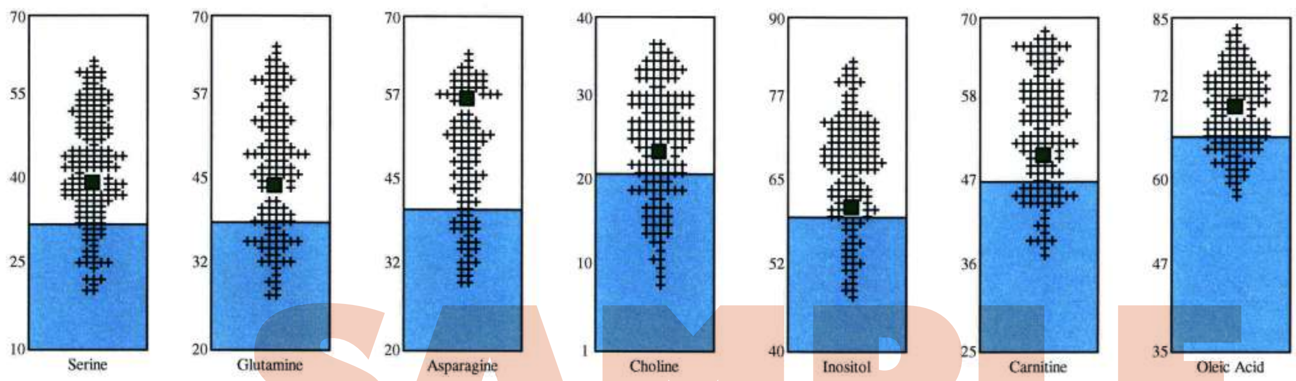
Values in this area represent a deficiency and patient may require nutrient repletion or dietary changes

Accession Number: J71101
Jane Doe

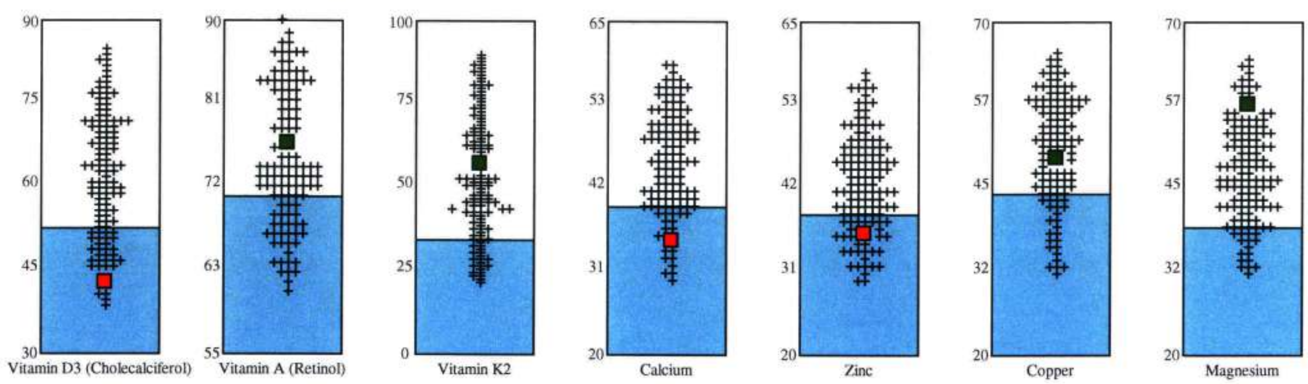
B Complex Vitamins



Amino Acids & Metabolites



Other Vitamins & Minerals



Adequate

Deficient

Values in this area represent a deficiency and patient may require nutrient repletion or dietary changes

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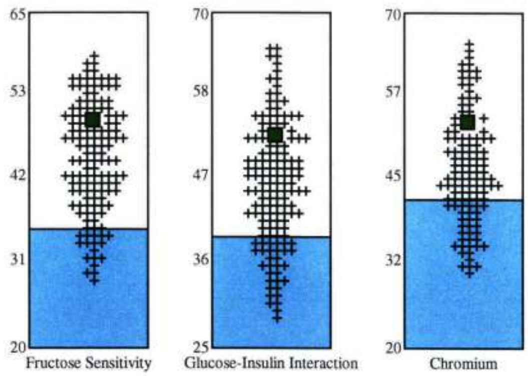
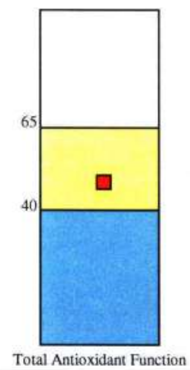
Carbohydrate Metabolism



Spectrox

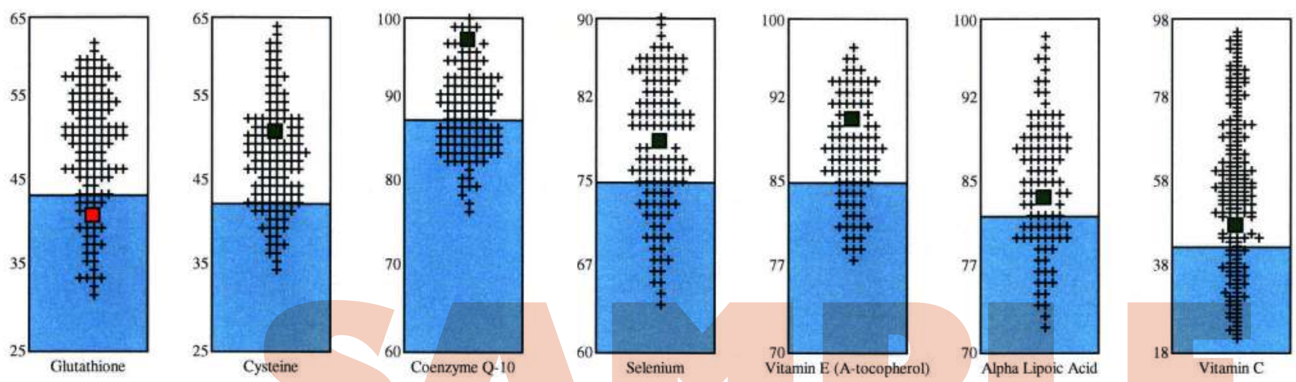


A Spectrox value above 65%-
indicates a desirable status for apparently healthy individuals. Since antioxidants are protective nutrients, the most desired status would be the greatest ability to resist oxidative stress.

A Spectrox value between 40% and 65%-
indicates an average antioxidant function for apparently healthy individuals. An average status means the ability to resist oxidative stress similar to the majority of persons. However, average status is not ideal, nor is it clearly deficient.

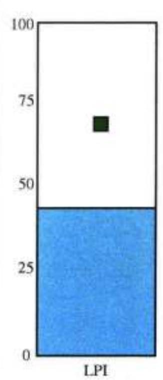
A Spectrox value below 40%-
indicates a deficient antioxidant function resulting in a decreased ability to resist oxidative stress or an increased antioxidant load.

Individual Antioxidants



SAMPLE

LPI



The Lymphocyte Proliferation Index is an indication of the patient's lymphoproliferative response relative to a control population. A result greater than the 65th percentile is desirable, a value between the 40th and 65th percentiles indicates average proliferation, and a value below the 40th percentile indicates diminished proliferative response.
Basic to immunological function of lymphocytes is their ability to proliferate in response to specific signals. When isolated lymphoctytes are exposed to certain plant compounds (mitogens), this proliferative ability can be readily quantified by measuring the incorporation of marker molecules into the DNA of the dividing cells. The assessment of lymphoctye proliferation has found wide applications in clinical immmunology to help describe abnormalities associated with diverse congenital immunodeficiencies as well as those considered to be secondary to infectious diseases, cancer, aging, malnutrition, substance abuse, stress, surgery, shock and autoimmune disease. Variables that may influence proliferative response include age, nutritional status, protein calories malnutrition, smoking, alcohol and drug abuse, medications, and psychosocial stressors (e.g. bereavement, anxiety, etc.).

SPECTRACELL LABORATORIES

SUPPLEMENTAL INFORMATION

Name: Jane Doe
Gender: Female DOB: 11/13/1947
Accession Number: J71101

Date Received: 05/20/2010
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Account Number 123456
Dr. John Smith
123 Main St
Anytown, USA

Vitamin D3 (1, 25 dihydroxy cholecalciferol) (Calcitriol)

Status:

The patient's lymphocytes have shown a deficient status for vitamin D3.

Function:

Vitamin D3 is the principle regulator of calcium homeostasis in the body. It is essential for skeletal development and bone mineralization. Vitamin D is a prohormone with no hormone activity. It is converted to a molecule that has biological activity. The active form of the vitamin is 1,25-dihydroxyvitamin D, usually referred to as vitamin D3. It is synthesized in the skin from 7-dehydrocholesterol via photochemical reactions requiring UV light (sunlight). Inadequate exposure to sunlight contributes to vitamin D deficiency. Vitamin D deficiency in adults can lead to osteoporosis. This results from a compensatory increase in the production of parathyroid hormone resulting in bone resorption. Increasing evidence is accumulating that vitamin D may also contribute to antioxidant function by inhibiting lipid peroxidation. The mechanism of the antioxidant effect is unknown. Vitamin D is also needed for adequate blood levels of insulin. Vitamin D receptors have been identified in the pancreas.

Deficiency Symptoms:

Osteoporosis results from an imbalance between bone resorption and bone formation. Decreased vitamin D levels result in decreased production of the active vitamin form, vitamin D3. Vitamin D enhances the efficiency of calcium absorption. Chronic vitamin D deficiency results in decreased calcium absorption and secondary hyperparathyroidism.

Vitamin D3 has been found to have anticarcinogenic activity, inducing apoptosis in many types of cancer cells including breast, colon and prostate cancers. It has also been useful in the treatment of psoriasis when applied topically. Vitamin D appears to demonstrate both immune-enhancing and immunosuppressive effects.

Repletion Information:

Supplemental vitamin D is available as vitamin D2 (ergocalciferol) or vitamin D3 (cholecalciferol). The supplementation with vitamin D3 is considered the more biologically active form of the vitamin and at this time is the form most commonly used for repletion.

Our repletion recommendation is 1000 IU daily (25 micrograms) if a moderate functional deficiency is identified, twice daily if indicated. These recommendations are higher than in the past due to recent research linking mild vitamin D deficiency with a wide variety of health problems.

Dosages over 5000 IU per day should be recommended and monitored by the ordering physician. The prolonged ingestion of excessive vitamin D and the accompanying hypercalcemia can result in metastatic calcification of soft tissues, including kidney, blood vessels, heart and lungs.

Calcium

Status:

The patient's lymphocytes have shown a deficient status for Calcium.

Function:

Calcium is the most abundant mineral in the body, with 99% residing in bones and teeth. As a component of hard tissues, Calcium fulfills a structural role to maintain body size and act as attachments for musculoskeletal tissues. The remaining 1% of calcium is present in blood and soft tissues. Functions of non-skeletal Calcium include: enzyme activation, second messenger roles (transmitting hormonal information), blood clotting, cell and cell organelle membrane function (stabilization and transport), nerve impulse transmission, and muscular contraction, tone, and irritability. Calcium levels in the blood are maintained within very strict limits by dietary intake, hormonal regulation, and a rapidly exchangeable pool in bone tissue.

Deficiency Symptoms:

Calcium deficiencies are both acute and chronic. Acute Calcium deficiency relates to lack of ionized Calcium, causing increased muscular and nervous irritability, muscle spasms, muscle cramps, and tetany. Chronic calcium deficiency manifests as bone loss disorders (osteoporosis, osteomalacia in adults, rickets in children), tooth decay, periodontal disease, depression, and possibly hypertension.

Those at risk for Calcium deficiency include: malnourished, malabsorption, and bone loss disorders. Conditions which are known to decrease Calcium uptake or distribution are: decreased gastric acidity, Vitamin D deficiency, high fat diets, high oxalate intake from rhubarb, spinach, chard, and beet greens, high phytic acid intake from whole grains, high fiber intake, immobilization, faster gastrointestinal motility, psychological stress, thiazide diuretic therapy, aluminum compounds (aluminum-containing antacids, drugs, some parenteral feeding solutions).

Repletion Information:

Dietary Sources richest in Calcium (per serving) are:

Calcium Supplements	Multiple Vitamin/Mineral Supplements with Calcium
Tofu	Milk and Dairy Products (milk, yogurt, cheeses)
Bone Meal	Canned Salmon & Sardines (with bones)

The 1989 RDA for calcium is 1000-1200 mg for adults (1300 mg for ages 9-18, 800 mg other ages). In general, daily calcium intakes of 2.0 grams or less are safe. Certain individuals with tendency to form kidney stones should consult a physician before increasing calcium intake. Milk-alkali syndrome is possible after consumption of 2 or more quarts of milk daily along with large amounts of carbonate antacids (calcium deposition in soft tissues and kidney stones). Calcium intakes greater than 2-4 grams daily may depress uptake of magnesium, zinc, iron, manganese, and other minerals, and are associated with depressed reflexes, muscle weakness, ataxia, and anorexia.

Zinc

Status:

The patient's lymphocytes have shown a deficient status for Zinc.

Function:

The primary role of zinc is to activate almost 200 enzymes with vital roles in cell regulation, immune function, acid/base balance, DNA, RNA, and protein synthesis, lipid metabolism, eicosanoid production, and digestion. Zinc also is a component of insulin (energy metabolism), thymic hormones (immune function) and gustin (taste acuity).

Deficiency Symptoms:

Symptoms of zinc deficiency include fatigue, dermatitis, acne, loss of taste, poor wound healing, anorexia, decreased immunity, delayed growth, hypogonadism and delayed sexual maturation, diarrhea, skeletal abnormalities, alopecia, behavioral disturbances, white spots on fingernails, infertility and night blindness.

Those at risk for zinc deficiency include alcoholics, malnourished, malabsorption (Crohn's Disease, celiac disease), long-term parenteral nutrition, chronic renal disease, anorexics, dieters, pregnant women, elderly, and sickle-cell disease.

Repletion Information:

Dietary sources rich in Zinc (per serving) are:

Nutritional Supplements	Oysters
Red Meats	Wheat Germ
Seeds	Nuts
Soybean Products	Legumes
Potatoes	Zinc-Fortified Cereal Products

Compounds found in meats enhance absorption of zinc from plant sources.

The 1989 RDA for zinc is 12-15 mg. In general, daily doses up to 50mg of elemental zinc appear safe. Acute toxicity (nausea, vomiting, diarrhea, fever, muscle pain) may occur after intake of 1-2 grams of zinc. Chronic intakes of 150 mg of zinc for several months may impair certain immune responses, decrease high-density lipoprotein levels, or impair copper status (possibly leading to normocytic anemia). Significant differences in tolerability between inorganic zinc salts and organic zinc chelates exist with organic chelates recommended for supplementation.

Glutathione

Status:

The patient's lymphocytes have shown a deficient status for Glutathione.

Function:

Glutathione is implicated in many cellular functions including antioxidant protection and detoxification. It is also essential for the maintenance of cell membrane integrity in red blood cells. Intracellular glutathione concentrations are principally derived by intracellular synthesis, as few cells directly uptake glutathione from the surrounding extracellular fluid. The high concentration of glutathione in virtually all cells clearly indicates its importance in metabolic and oxidative detoxification processes. Glutathione may be considered the preeminent antioxidant.

Deficiency Symptoms:

A wide range of human conditions such as aging, cancer, atherosclerosis, arthritis, viral infections, AIDS, cardiovascular, neurodegenerative diseases and pulmonary diseases may be produced, or made worse, by "free radicals". Their treatment or prevention often includes antioxidants such as vitamin C, vitamin E, carotenoids and selenium. Glutathione is an essential component of the antioxidant defense system: producing a "sparing effect" for both tocopherol and ascorbate by reducing the oxidized forms, and by eliminating hydrogen peroxide by reacting with glutathione peroxidase. Cellular glutathione functions to decrease the formation of oxidized LDL, implicated in the development of atherosclerosis. T-lymphocytes become deficient in glutathione in the progression of AIDS which impairs immune function. Glutathione is also required for the synthesis of some prostaglandins from n-3 and n-6 polyunsaturated fatty acids which are important in the inflammatory response. Patients with adult respiratory distress syndrome are favorably affected by treatments that increase cellular glutathione.

Repletion Information:

Glutathione is poorly absorbed from the gastrointestinal tract and foods rich in glutathione do not appear to contribute to increases in intracellular glutathione levels. Cysteine appears to be the limiting amino acid in the intracellular synthesis of glutathione and supplementation with up to 2000 mg daily of N-Acetyl-L-Cysteine appears safe. Supplementation with cysteine is not recommended as it may be poorly tolerated by many patients. In addition, it may be rapidly oxidized to L-cystine, a less usable form for the synthesis of glutathione. Foods rich in cysteine are generally high protein foods such as meats, yogurt, wheat germ and eggs.

SPECTROX™ (Total Antioxidant Function)

Function:

The function of antioxidants is to protect biomolecules from oxidative damage. SPECTROX measures the net ability of antioxidant and repair mechanisms of each individual's own cells, giving a total assessment of antioxidant function.

Oxidative Stress:

Each person's cells and tissues are constantly subjected to highly reactive and unstable molecules termed *free radicals*, causing oxidative stress. These hostile molecules are a normal byproduct of life and are produced by the metabolism of oxygen, immune system cells, numerous enzyme reactions essential for metabolism, and environmental sources (smoke, ionizing radiation, air pollution, chemicals, toxic heavy metals and oxidized (rancid) fats. Some of the more common free radicals are superoxide, hydroxyl, singlet oxygen, and peroxides. By their chemical nature, free radicals, although short-lived, promote a chain reaction of radical formation, followed by a wake of chemically altered damaged biological molecules. Research is continuing to find that much biological damage and diseases are induced and/or mediated by injury from free radicals.

Cellular Antioxidants:

Protection of deleterious effects from free radicals is found in a diverse range of molecules termed *antioxidants*. Free radicals and their chain reaction byproducts can be neutralized and converted to less harmful products (quenched) by antioxidants. Antioxidants are enzymes (superoxide dismutase, catalase, glutathione peroxidase), essential nutrients (carotenoids, vitamin C, vitamin E, cysteine, selenium) or a wide variety of endogenous compounds (glutathione, sulfhydryl groups, thioredoxin, lipoic acid, coenzyme Q_{10} , urate, bilirubin) or dietary compounds (mannitol, bioflavonoids, phenolic acid derivatives, proanthocyanidins). Antioxidants interact in a complex manner with recharging and overlapping, redundant functions. Cells also possess extensive mechanisms to repair damaged biomolecules, which appear protective in a total antioxidant function test.

The clinical correlation of antioxidant status to health remains under investigation. Research evidence in humans has indicated that deficient intakes or levels of nutrient antioxidant are associated with higher risks of arthritis, cancer, cardiovascular disease, cataracts and many other degenerative diseases. Also, higher intakes of nutrient antioxidants are associated with a lower incidence of chronic degenerative diseases. Encouraging studies have also shown that intervention with antioxidant nutrient supplements have therapeutic benefits in humans. Thus, strong scientific evidence illustrates that antioxidants help to prevent chronic degenerative diseases and may help to restore health.