SPECTRACELL LABORATORIES

PATIENT
DUPLICATE

LABORATORY REPORT

Account Number: 186506

John Doe, M.D.
1234 Any Street
Suite 244
Anytown, TX 77581-1234

Name: **Sample E Patient**
Gender: Female DOB: 07/14/1968

Accession Number: H25902
Requisition Number: 761503

Date of Collection: 07/29/2008
Date Received: 08/30/2008
Date Reported: 08/18/2008

Summary of Deficient Test Results

FIA Comprehensive 5000 has determined the following functional deficiencies:

Vitamin B12 Pantothenate Selenium 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 (H2O2) 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 B12 (Cobalamin)	300 mcg daily (methylcobalamin or adenosylcobalamin)
2. Pantothenate	500 mg b.i.d. (1000 mg daily)
3. Total Antioxidant Function	Based on Spectrox and individual Antioxidant tests:
	* Glutathione: 600 mg daily of N-Acetylcysteine (NAC)
	* 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 Deficient: 200 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.

FIA ™ Test Description	Patient Results (% Control)	Functional Abnormals	Reference Range (greater than)
B Complex Vitamins			
Vitamin B1 (Thiamin)	102		>78%
Vitamin B2 (Riboflavin)	67		>53%
Vitamin B3 (Niacinamide)	100		>80%
Vitamin B6 (Pyridoxine)	68		>54%
Vitamin B12 (Cobalamin)	13	Deficient	>14%
Folate	39		>32%
Pantothenate	7	Deficient	>7%
Biotin	46		>34%
Amino Acids			
Serine	38		>30%
Glutamine	39		>37%
Asparagine	57		>39%
Metabolites			
Choline	31		>20%
Inositol	77		>58%
Carnitine	48		>46%
Fatty Acids			
Oleic Acid	74		>65%
Other Vitamins			
Vitamin D (Ergocalciferol)	86		>83%
Vitamin A (Retinol)	82		>70%
Minerals			
Calcium	52		>38%
Zinc	50		>37%
Copper	51		>42%
Magnesium	57		>37%
Carbohydrate Metabolism			
Glucose-Insulin Interaction	55		>38%
Fructose Sensitivity	41		>34%
Chromium	52		>40%
Antioxidants			
Glutathione	52		>42%
Cysteine	54		>41%
Coenzyme Q-10	94		>86%
Selenium	68	Deficient	>74%
Vitamin E (A-tocopherol)	89		>84%
Alpha Lipoic Acid	93		>81%
Vitamin C	48		>40%
SPECTROX™			
Total Antioxidant Function	53.0	Deficient	>65%

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

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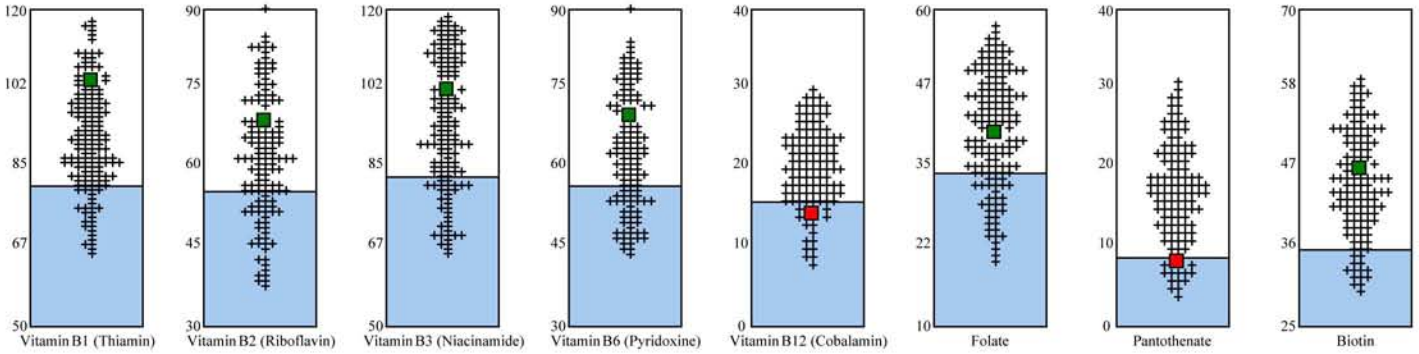
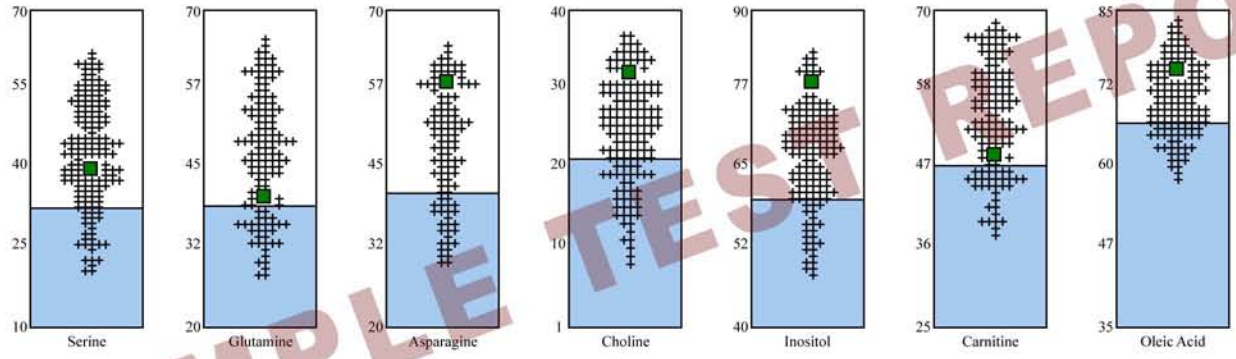
Sample E Patient

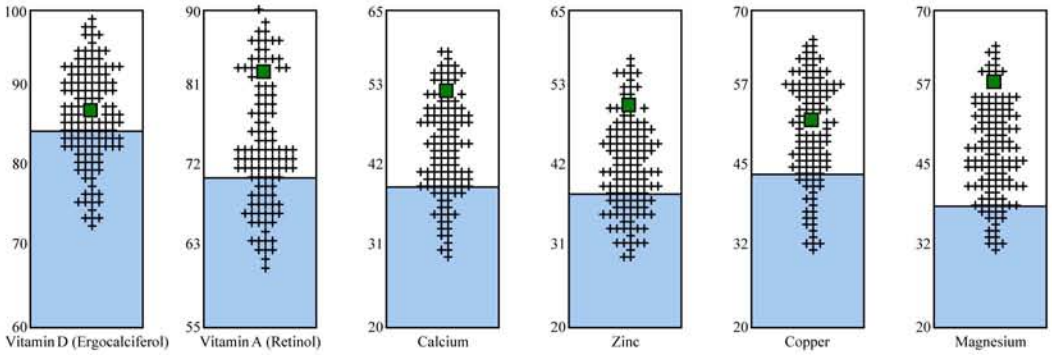
B Complex Vitamins



Amino Acids & Metabolites



Other Vitamins & Minerals



Adequate

Deficient

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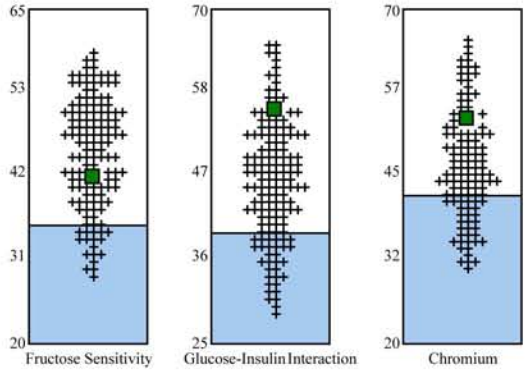
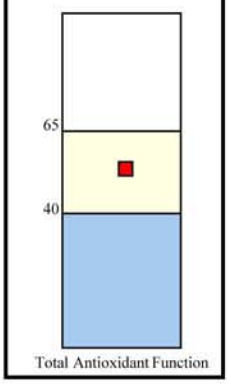
Carbohydrate Metabolism



Spectrox

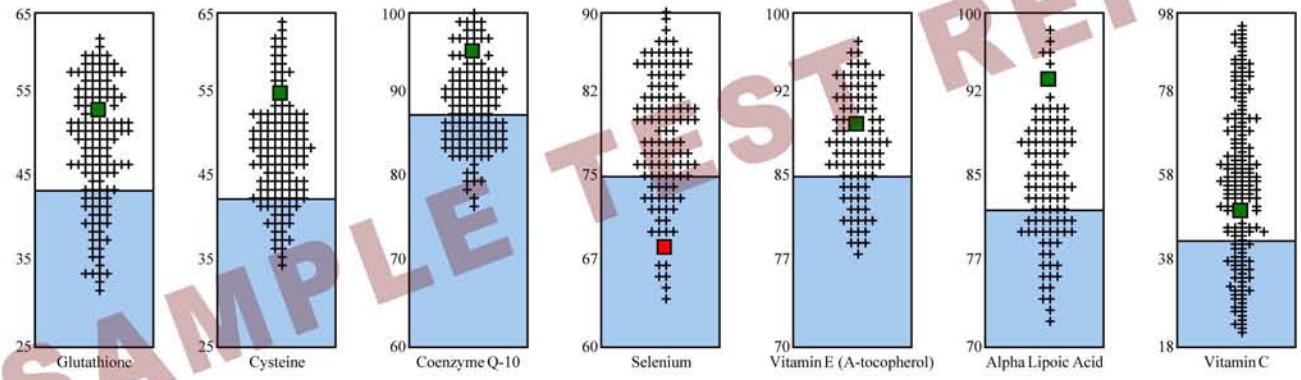


A Spectrox value above 65%-
indicates a desirable status for apparently healthy individuals. Since antioxidants are protective nutrients, the most desired status would be the greatest ability to resist oxidative stress.

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



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SUPPLEMENTAL INFORMATION

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Vitamin B12 (Cobalamin)

Status:

The patient's lymphocytes have shown a deficient status for vitamin B12 (Cobalamins).

Function:

Vitamin B12 is required to form blood and immune cells, and support a healthy nervous system. A series of closely-related compounds known collectively as cobalamins or vitamin B12 are converted into active forms methylcobalamin or 5-deoxyadenosylcobalamin. Methylcobalamin interacts with folate metabolism, preventing folate derivatives from being trapped in unusable states. Adenosylcobalamin is involved in the metabolism of odd-chain fatty acids and branched-chain amino acids.

Deficiency Symptoms:

Deficiency symptoms of vitamin B12 are both hematological (pernicious anemia) and neurological. A megaloblastic anemia may occur because the effects of the vitamin B12 deficiency on folate metabolism. Shortness of breath, fatigue, weakness, irritability, sore tongue, decrease in blood cell counts (red, white and platelets) are all clinical signs of a vitamin B12 deficiency. Neurological symptoms are manifested as a progressive neuropathy, with loss of position sense and ataxia. If vitamin B12 repletion is not initiated, permanent neurological damage, including degeneration of nerves and spinal cord can result. Recent evidence suggests that mental symptoms of depression and fatigue are detectable before anemia develops. Vitamin B12 is necessary to prevent accumulation of homocysteine, a toxic metabolic byproduct linked to cardiovascular disease and connective tissue abnormalities. Hypochlorhydria and gastrointestinal disturbances are frequently associated with vitamin B12 deficiency.

Repletion information:

Dietary sources for cobalamins are strictly from animal foodstuffs. Vitamin B12 is not found in plant foodstuffs. Dietary supplements can also contain vitamin B12

The 1989 RDA for vitamin B12 is 2.0 μg for adults. No toxic effects of oral vitamin B12 intake have been demonstrated, even in doses over 1000 μg daily.

Since the absorption and intracellular activation of oral vitamin B12 are frequently difficult, consideration should be given to injectable forms of vitamin B12. Some patients may require more frequent or larger doses than usual before repletion occurs.

Pantothenate

Status:

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

Function:

Pantothenic acid plays vital roles in energy production from foodstuffs. Pantothenate is a component of coenzyme A, which is indispensable for two-carbon unit metabolism (acetyl groups). Acetyl groups are involved in the release of energy from carbohydrates, fats, proteins, and other compounds, as well as synthesis of fats, cholesterol, steroid hormones, porphyrin and phospholipids.

Deficiency Symptoms:

Pantothenate deficiency symptoms are thought to be uncommon because of widespread distribution in all foodstuffs. However, human deficiency symptoms may include fatigue, depression, burning feet, dermatitis, burning or pain of arms and legs, anorexia, nausea, indigestion, irritability, mental depression, fainting, hair loss, increased heart rate, and susceptibility to infection.

Repletion Information:

Dietary sources richest in Pantothenate (per serving) include:

Nutritional Supplements	Nutritional Yeasts
Meats	Legumes
Whole Grain Products	Wheat Germ
Vegetables	Nuts
Seeds	

The estimated safe and adequate daily dietary intake for pantothenate is 4-7 mg for adults. Oral administration of pantothenate has shown no toxicity in doses up to 10 gms daily. Higher doses may cause diarrhea.

Selenium

Status:

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

Function:

The trace mineral selenium functions primarily as a component of the antioxidant enzyme, glutathione peroxidase. Glutathione peroxidase activity, which requires selenium for activity, facilitates the recycling of vitamins C and E, in optimizing the performance of the antioxidant system. Low levels of selenium have been linked to a higher risk for cancer, cardiovascular disease, inflammatory diseases, and other conditions associated with free radical damage, including aging and cataract formation. Selenium is also essential for healthy cell-mediated immune function, stimulating immune properties of lymphocytes. Selenium is also needed for the activation of thyroid hormones.

Deficiency Symptoms:

Chronic low selenium intake is associated with an increased risk for heart disease, cancer and depressed immune function. Selenium appears to provide protection against heart disease and stroke. Selenium supplementation (100 mcg/day) increases the ratio of HDL to LDL and inhibits platelet aggregation.

Selenium and glutathione peroxidase activity are low in patients with rheumatoid arthritis, eczema, psoriasis and most inflammatory conditions. This is related to the increased synthesis of proinflammatory prostaglandins and leukotrienes. Immune system function is enhanced by selenium, by contributing to higher natural killer cell (NKC) activity. Natural killer cells have the ability to destroy cancer cells and bacterial and viral agents. Heavy metal toxicity symptoms may be alleviated by selenium, acting as an antagonist. Selenium deficiency may also contribute to male infertility.

Repletion Information:

Selenium is safe at the level generally used for supplementation (100-200 mcg/day). However, taking more than 750 mcg of selenium per day may cause toxicity Reactions such as loss of fingernails, skin rash, and neurological aberrations. In the presence of iodine deficiency goiter, selenium supplementation has been reported to exacerbate low thyroid function.

Selenium is available in several different forms. Studies indicate that inorganic salts like sodium selenite are less effectively absorbed and not as biologically active as organic forms of selenium, such as selenomethionine or high-selenium content yeast. Richest sources of dietary selenium are found in:

Wheat Germ	Bran
Brazil Nuts	Red Swiss Chard
Whole Wheat Bread	Oats
Brown Rice	Turnips

The adult RDA for selenium is 50 mcg/day.

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.