MICRO.NUTRIENT

Driven *by Science*. Inspired *by You*.

Patient: **Doe, Jon**

Accession ID: 0000000000

Provider: Sample Provider, MD

10401 Town Park Drive, Houston, TX 77072
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SpectraCell Laboratories
Science + Health + Solutions

PATIENT	
NAME **Doe, Jon**	AGE **48**
DOB **6/7/1970**	Gender **Male**
Patient ID **00-000-00000**	

SPECIMEN	
ACCESSION ID **0000000000**	DATE COLLECTED **02/28/2019**
ORDER ID **0000-00000000000-000000**	DATE RECEIVED **03/01/2019**
	DATE REPORTED **03/18/2019**

PROVIDER	
Account ID **00000000**	CLIENT NAME **Sample Provider, MD**
Address **123 S. Any Street** **ANYWHERE, TX 77000**	

*Welcome to your Micronutrient Profile, **Jon**!*

Your body is unique and your story is too. Virtually all metabolic and developmental processes that take place in the body require micronutrients and strong evidence suggests that subtle vitamin, mineral, and antioxidant deficiencies can contribute to degenerative processes. These cellular deficiencies may suggest the underlying cause of a myriad of unwanted symptoms and, if corrected, can optimize physical and mental health performance.

The SpectraCell Advantage

Superior insights, earlier interventions, customized treament plans.

Functional

We measure the functional level and capability of nutrients present within your white blood cells, where metabolism takes place and where micronutrients do their job.

Long-term

This test measures intracellular micronutrient function over a period of 4-6 months, extending beyond static serum measurements.

Proprietary

Only SpectraCell offers the patented Spectrox® (reflects antioxidant capacity) and Immunidex (an overall measure of immune function).

What we measure:

We have measured the functional levels of 31 micronutrients, from vitamins and minerals to fatty acids and metabolites, as well as an overall measurement of antioxidant capacity and immune function to provide you with a powerful tool for optimal health, performance, and insight into any health condition. We provide your unique nutrient status in the following areas:

VITAMINS & MINERALS
Discover your body's unique vitamin and mineral requirements and the disparities that exist within your makeup.

AMINO ACIDS
Learn how well your amino acids, the building block of protein, are functioning within your cells.

ENERGY, FAT AND METABOLISM
Know how well your body is metabolizing micronutrients for energy production.

ANTIOXIDANT STATUS & IMMUNE FUNCTION
Understand your body's ability to manage oxidative stress and your immune response to infections and disease.

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Results At-A-Glance

Functional Deficiencies

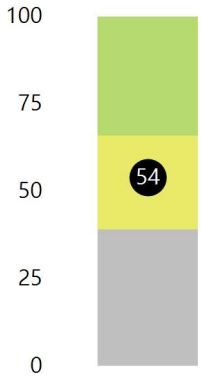
Abnormal	Suggested Supplementation *	Provider Comments
Choline	1000 mg b.i.d. (2000 mg daily) of Choline from Choline Bitartrate, Citrate or Chloride salts	
Oleic Acid	2-3 tbsp olive oil daily for repletion of Oleic Acid. Deficiency of Oleic Acid suggests impaired synthesis of unsaturated	
Vitamin A	10,000 IU of Vitamin A and 25,000 IU beta-carotene for 6 months and then retest.	
Vitamin B12	1000 mcg daily (methylcobalamin or adenosylcobalamin) (consider injectable forms)	

* The RDA (Recommended Daily Allowance) was first published in 1968 primarily for use in nutritional labeling of packaged foods. The DRI (Dietary Reference Intake), published in 1997, serves as replacements for the former RDA, although the actual values are generally within an order of magnitude, and are also primarily for use in nutritional labeling and fortification of packaged foods. In most cases, neither the RDA nor the DRI will be adequate to replete a nutrient in people who demonstrate a functional cellular deficiency of said nutrient. An evidence based approach was used to develop clinically relevant repletion recommendations, consisting of data from published studies and clinician expertise. However, the information presented is not intended nor implied to be a substitute for professional medical advice, diagnosis or treatment.

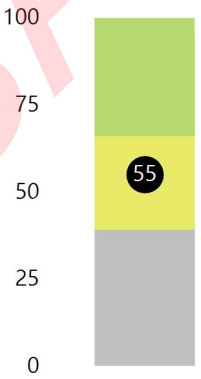
Borderline Deficiencies

Borderline	Provider Comments
Asparagine	
Calcium	
Folate	
Fructose	
Glutathione	
Immunidex	
Inositol	
Pantothenate	
Serine	
Spectrox	
Vitamin B2	
Zinc	

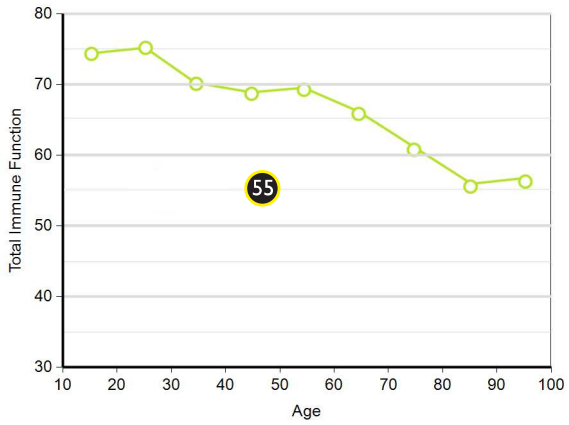
Spectrox®
Total Antioxidant Function



Immunidex
Total Immune Function



Total Immune Function vs Age



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

Borderline
Values in this area represent a borderline deficiency and may indicate a need for nutrient repletion or dietary changes

Normal
Values in this area represent a normal result

Spectrox®

Total Antioxidant Function is a measurement of overall antioxidant function. The patient's cells are oxidatively challenged and the cell's ability to resist damage is determined.

Immunidex

Total Immune Function is an indication of the patient's T-Lymphocyte's response to mitogen stimulation relative to the response of a control population. An average or poor growth response may improve with correction of the nutritional deficiencies determined by the micronutrient testing.

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Micronutrients	Patient Results	Reference Range	Patient Result	Interpretation
B-VITAMINS				
Vitamin B1		>78%	86	
Vitamin B2		>53%	55	Borderline
Vitamin B3		>80%	87	
Vitamin B6		>54%	60	
Vitamin B12		>14%	13	Deficient
Folate		>32%	33	Borderline
Pantothenate		>7%	11	Borderline
Biotin		>34%	42	
AMINO ACIDS AND METABOLITES				
Serine		>30%	34	Borderline
Glutamine		>37%	43	
Asparagine		>39%	42	Borderline
Choline		>20%	19	Deficient
Inositol		>58%	62	Borderline
Carnitine		>46%	59	
Oleic Acid		>65%	65	Deficient
OTHER VITAMINS & MINERALS				
Vitamin D3		>50%	68	
Vitamin A		>70%	70	Deficient
Vitamin K2		>30%	56	
Manganese		>50%	72	
Calcium		>38%	41	Borderline
Zinc		>37%	42	Borderline
Copper		>42%	54	
Magnesium		>37%	43	
CARBOHYDRATE METABOLISM				
Fructose		>34%	39	Borderline
Glucose-Insulin Interaction		>39	53	
Chromium		>40%	47	
ANTIOXIDANTS				
Glutathione		>42%	46	Borderline
Cysteine		>41%	48	
Coenzyme Q10		>86%	92	
Selenium		>74%	82	
Vitamin E		>84%	91	
Lipoic Acid		>81%	92	
Vitamin C		>40%	60	

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

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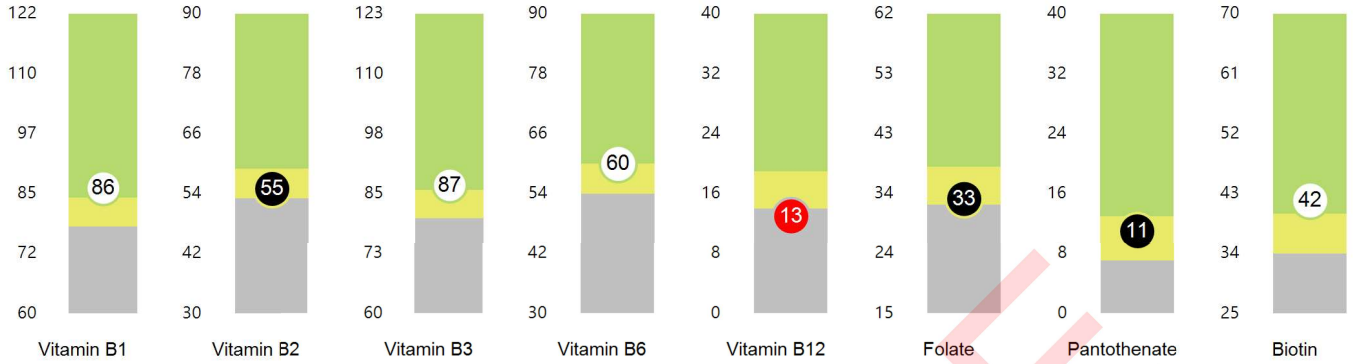
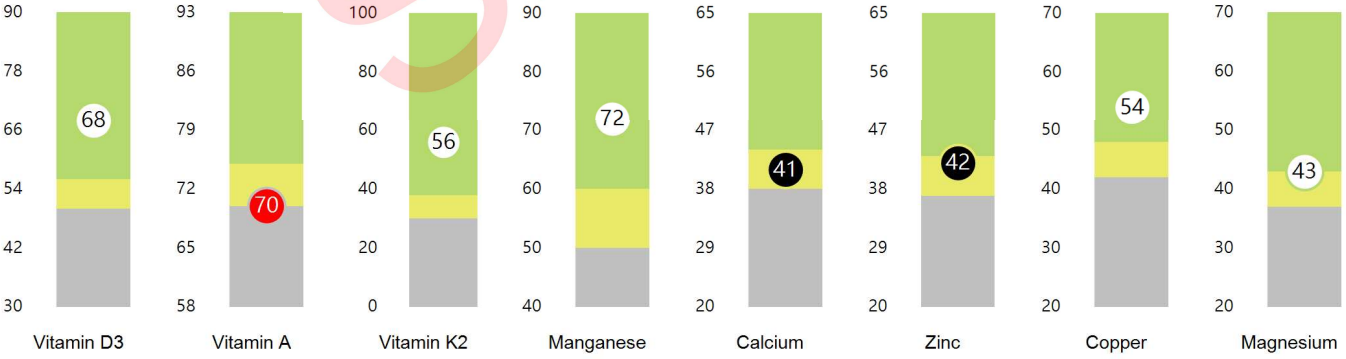
B-Complex Vitamins



Amino Acids & Metabolites

Other Vitamins & Minerals



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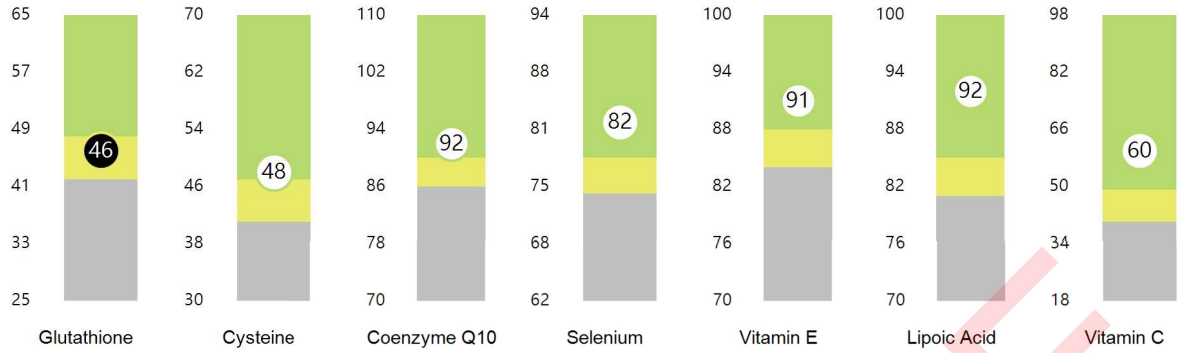
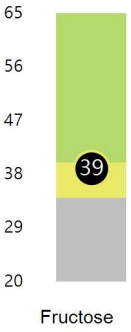
Individual Antioxidants

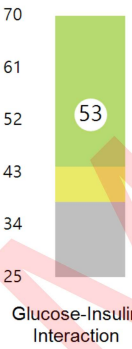


Carbohydrate Metabolism



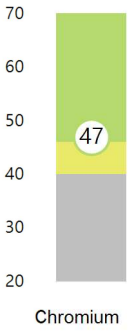
Fructose Sensitivity

This assay measures changes in the patient's lymphocyte growth response to a fructose challenge. Significant reduction in cell growth capacity is indicative of poor ability to metabolize fructose. This can be due to nutritional deficiencies of necessary cofactors in the fructose metabolizing pathway (e.g. copper, zinc) or may be due to genetic factors.



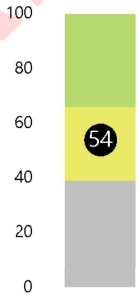
Glucose-Insulin Interaction

The patient's cells are challenged with glucose and their ability to grow in the presence or absence of insulin is determined. A significant decrease of cell growth is indicative of reduced ability to metabolize glucose.



Spectrox® - Total Antioxidant Function

Total Antioxidant Function is a measurement of overall antioxidant function. The patient's cells are oxidatively challenged and the cell's ability to resist damage is determined.



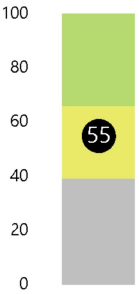
Total Antioxidant Function value above 65%
indicates a desirable status. Since antioxidants are protective nutrients, the most desired status would be the greatest ability to resist oxidative stress.

Total Antioxidant Function value between 40%-65%
indicates an average ability to resist oxidative stress.

Total Antioxidant Function value below 40%
indicates poor antioxidant function resulting in reduced ability to resist oxidative stress.

Immunidex - Total Immune Function

Total Immune Function is an indication of the patient's T-Lymphocyte's response to mitogen stimulation relative to the response of a control population. An average or poor growth response may improve with correction of the nutritional deficiencies determined by the micronutrient testing.



Total Immune Function value above 65%
indicates a strong response, a measurement of cell mediated immune function

Total Immune Function value between 40% and 65%
indicates an average response.

Total Immune Function value below 40%
may indicate a weakened cell mediated immune response

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Overview of Test Methodology

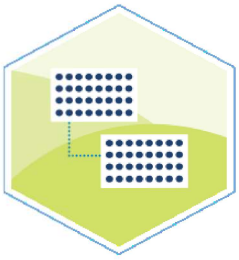
Cellular Function = Performance, Not Just Potential

Lymphocyte Proliferation Assay

1 ISOLATION
Lymphocytes are purified, washed, counted, and plated.

INCUBATION
Cells are incubated for 5 days in a defined culture medium containing optimal levels of all essential nutrients necessary to sustain their growth.

2



3 LABELING
The mitogen stimulated cells' growth are measured by the incorporation of radioactive thymidine.

HARVEST & COUNTING
Cells are harvested onto filter paper and counted.

4

5 DATA PROCESSING
Data is reviewed, approved, and released to reporting.

Routine turnaround time for the Micronutrient assay is 10-14 business days.

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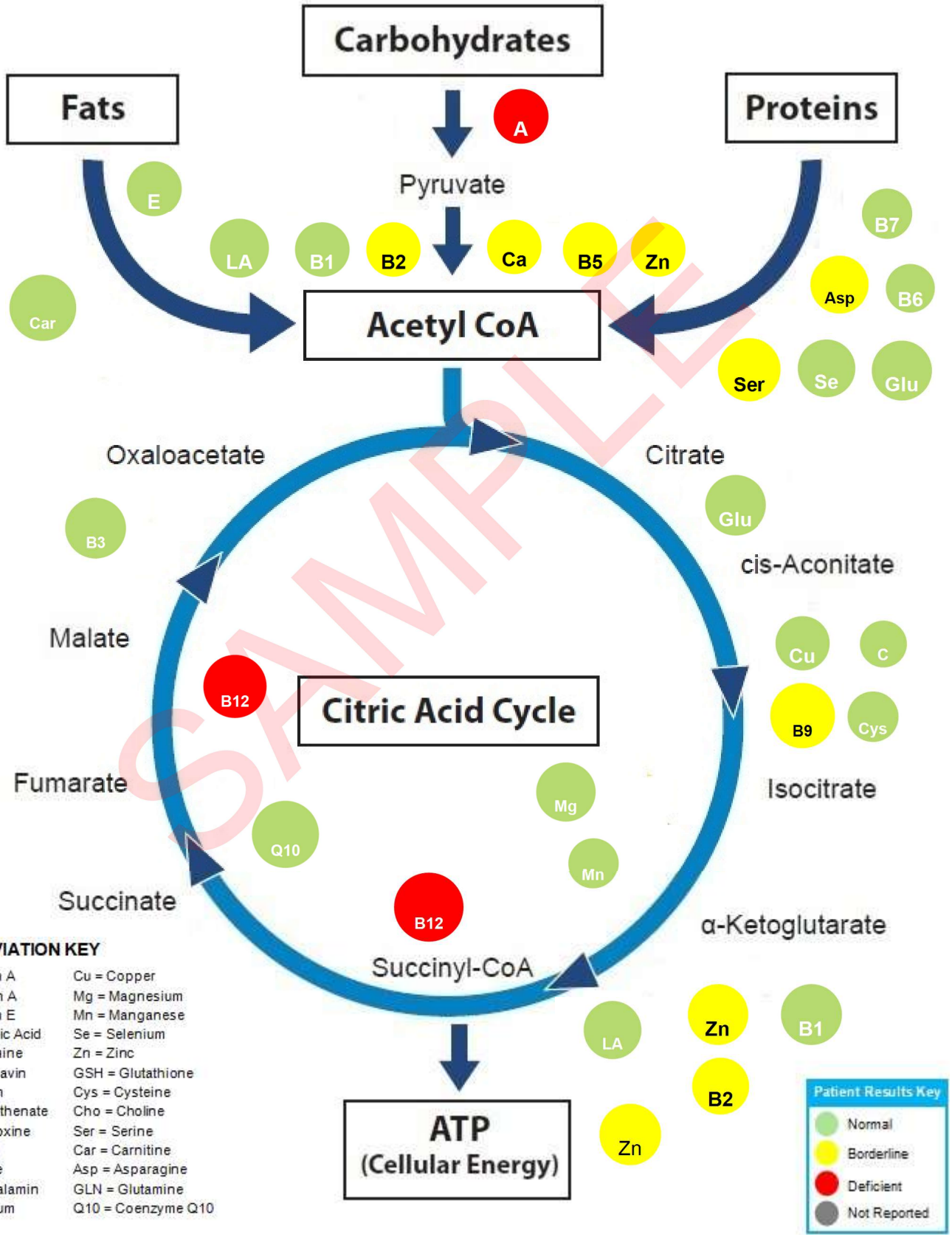
Krebs Cycle

Energy Production



ABBREVIATION KEY

A = Vitamin A	Cu = Copper
C = Vitamin A	Mg = Magnesium
E = Vitamin E	Mn = Manganese
ALA = Lipoic Acid	Se = Selenium
B1 = Thiamine	Zn = Zinc
B2 = Riboflavin	GSH = Glutathione
B3 = Niacin	Cys = Cysteine
B5 = Pantothenate	Cho = Choline
B6 = Pyridoxine	Ser = Serine
B7 = Biotin	Car = Carnitine
B9 = Folate	Asp = Asparagine
B12 = Cobalamin	GLN = Glutamine
Ca = Calcium	Q10 = Coenzyme Q10

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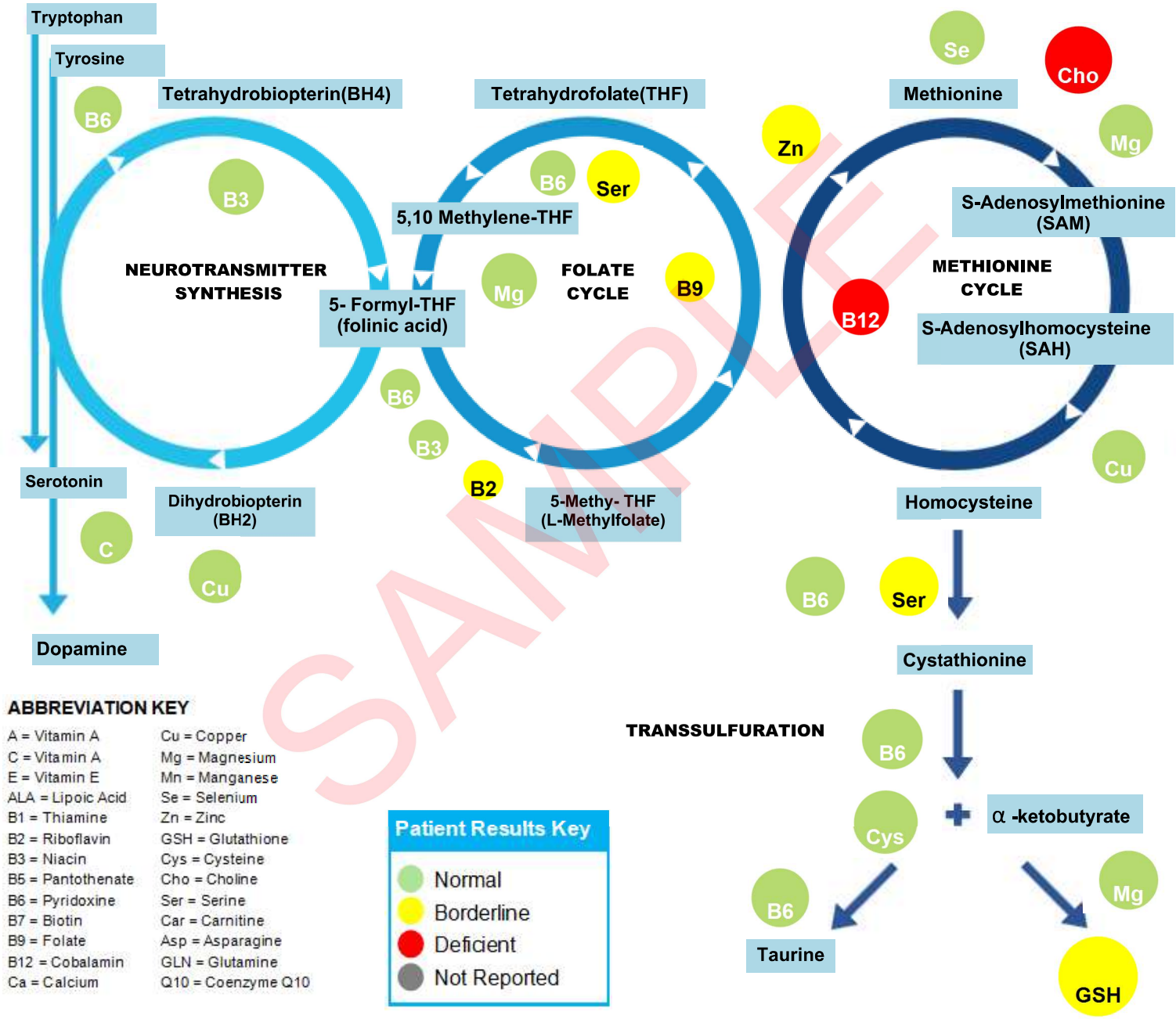
Methylation Cycle

Detoxification, Cellular Adaptability, Gene Regulation



ABBREVIATION KEY

A = Vitamin A	Cu = Copper
C = Vitamin A	Mg = Magnesium
E = Vitamin E	Mn = Manganese
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B1 = Thiamine	Zn = Zinc
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B3 = Niacin	Cys = Cysteine
B5 = Pantothenate	Cho = Choline
B6 = Pyridoxine	Ser = Serine
B7 = Biotin	Car = Carnitine
B9 = Folate	Asp = Asparagine
B12 = Cobalamin	GLN = Glutamine
Ca = Calcium	Q10 = Coenzyme Q10

Patient Results Key

- Normal
- Borderline
- Deficient
- Not Reported

Supplemental Information

Cellular Function = Performance, Not Just Potential

PHYSIOLOGICAL FUNCTION

Choline is an essential nutrient that is part of cell membranes and is used by nerves to send impulses. Choline is known to be essential for mammals, and is essential for human cell growth. A dietary requirement for choline in humans has not been proven, although recent data on infants and dietaty choline depletion in adults suggests that choline is an essential nutrient. Choline has several distinct functions. First, choline serves as a source of one-carbon units (methyl groups) for biosynthesis of other compounds. Interactions with methionine, Vitamin B12, folate, ethanolamine, and betaine allow choline to partially replace, or be replaced by other constituents in one-carbon metabolism. Second, choline is a component of phosphatidyl choline, the major component of cell membranes. Lecithin is a commercial name for phospholipids containing 10- 35% phosphatidyl choline. Phosphatidyl choline has interactions with cholesterol and lipoprotein metabolism.

DEFICIENCY SYMPTOMS

Symptoms of Choline deficiency in humans primarily include: liver dysfunction and decreased serum cholesterol. Abnormal liver function resembling Choline deficiency symptoms in animals has been noticed long-term intravenous feeding (containing no Choline), and during malnutrition. Symptoms of inadequate cholinergic transmission may indicate an increased need for Choline.

FOOD SOURCES

Food	Serving	(mg)
Beef liver	3 oz.	350
Wheat germ	1 cup	200
Egg	1 large	147
Beef	3 oz.	70-110
Scallops	3 oz.	94
Cod	3 oz.	71

Food	Serving	(mg)
Potato	1 large	57
Kidney beans	1/2 cup	45
Milk	1 cup	38
Brussels sprouts	1/2 cup	32
Broccoli	1/2 cup	31
Peanuts	1/4 cup	24

REPLETION INFORMATION

Choline intake can be accomplished by two types of choline forms: choline salts and phospholipids. Choline salts include choline chloride, choline bitartrate, and choline citrate. No apparent adverse effects after daily intakes of up to 10 grams of choline as choline salts have been reported. However, doses of 20 grams daily or more have been associated with symptoms of excess cholinergic stimulation (increased salivation, sweating, nausea, dizziness, depression, and ECG changes). Choline supplementation in the form oflecithin or phosphatidyl choline in daily doses of up to 100 grams appears to have no toxicity. However, occasional changes in bowel habits or upset stomachs appear, and the caloric content of additional lipids needs to be considered.

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PHYSIOLOGICAL FUNCTION

Oleic acid is the most common monounsaturated fatty acid in human cells. Oleic acid is incorporated into cell membrane phospholipids, where it is important for important for proper membrane fluidity. Hormone responsiveness, infectivity of pathogens, mineral transport, and immune competence are affected by membrane fluidity.

Oleic acid is a major energy source for cells. Oleic acid is catabolized to acetyl groups used for energy (ATP) production and biosynthesis of many essential metabolites.

Oleic acid is obtained by cells from endogenous biosynthesis or from serum triglycerides. Biosynthesis of fatty acids (like oleic acid) utilizes the same enzymes responsible for elongation of other fatty acids which are precursors for eicosanoids (prostaglandins). Thus, deficient oleic acid status may also indicate deficient eicosanoid production, signifying a need for essential fatty acids.

DEFICIENCY SYMPTOMS

No deficiency symptoms are clearly defined for oleic acid since a dietary intake is not absolutely essential. Monounsaturated fat intake may be beneficial for reducing high blood cholesterol levels. A need for oleic acid may possibly reflect a need for essential fatty acids (linoleic acid, linolenic acid), or omega-3 fatty acids (alpha linolenic acid, EPA, and DHA).

FOOD SOURCES*

Source	**Oleic acid composition
High oleic safflower oil	84%
Peanut oil	71%
Avocado oil	70%
Almond oil	67%

Source	Oleic acid composition
Olive oil	66%
Canola oil	63%
Rice bran oil	43%
Sesame oil	42%

*The corresponding foods to the oils listed above (e.g. olives, avocados, almonds) are also good sources oleic acid.
** Despite the high content of oleic acid in listed oils, some also ocntain high levels of polysaturated fatty acids which may become pro-inflammatory due to oxidation that occurs during processing and/or cooking.

REPLETION INFORMATION

Although some margarines and shortenings are high in monounsaturated fats, a considerable amount is in the form of trans-monosaturated isomers (elaidic acid). Reductions in these foods are recommended to improve oleic acid status. No overt toxicity for fats rich in oleic acid is known, except for a laxative effect when consumed in large amounts (>50-100 grams per serving). Daily doses of 1-2 tablespoons of oleic-rich oils (olive, canola, avocado) are usually adequate to add significant dietary amounts of oleic acid. Although flaxseed oil (edible linseed oil) contains little oleic acid, it is an excellent source of the essential fatty acids, linoleic acid and linolenic (omega-3) acid. Daily doses of 1-2 tablespoons per day will provide sufficient essential fatty acids to prevent essential fatty acid deficiencies.

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Supplemental Information

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PHYSIOLOGICAL FUNCTION

Vitamin A is a family of fat soluble compounds (carotenoids) that play an important role in vision, bone growth, reproduction and cell differentiation. It also helps regulate the immune system, promoting optimal lymphocyte function in defending against bacterial and viral infections. Retinal (Vitamin A) promotes healthy surface linings of the eyes and respiratory, urinary and instestinal tracts. Vitamin A also promotes healthy skin function and integrity. Retinal is the most active form of Vitamin A and is synthesized in the body by conversion of provitamin A, primarily beta carotene, into retinal. Lycopene, lutein and zeaxathin are carotenoids that do not have Vitamin A activity, but have other health promoting properties. Studies are inconclusive in identifying vitamin A's role as an antioxidant.

DEFICIENCY SYMPTOMS

A large number of physiological systems may be affected by Vitamin A deficiency. Poor epithelial regeneration can result in skin hyperkeratinization, problems with the genitourinary reproductive system (reduced fertility) dysfunction within the gastroenterological/biliary system or the pulmonary system. Patients with Celiac disease, Crohn's disease and pancreatic disorders are pmiicularly susceptible to Vitamin A deficiency due to malabsorption. Vitamin A deficiency may result in night blindness and/or epithelial degeneration of the eye. The immune system may also be adversely affected, reducing white blood cell levels and impairing both cell-mediated and humoral defense systems. Vitamin A is also essential for the developing skeletal system and deficiency can result in growth retardation or abnormal bone formation. Vitamin A deficiency is most often associated with strict dietary restrictions and excess alcohol intake.

FOOD SOURCES

Food	Serving	µg RAE*
Beef liver	3 oz.	6582
Cod liver oil	1 tbsp	4080
Sweet potato	1/2 cup	1136
Pumpkin, canned	1/2 cup	953
Carrots	1/2 cup	595

Food	Serving	µg RAE*
Butternut squash	1/2 cup	572
Spinach, cooked	1/2 cup	472
Cantaloupe	1/2 melon	466
Red peppers	1/2 cup	117
Apricot	1 medium	74

*µg RAE = micrograms of Retinol Activity Equivalents

REPLETION INFORMATION

ADEQUATE ZINC IS REQUIRED to synthesize retinal binding protein (RAP) which transports vitamin A. Therefore a deficiency in zinc limits the body's ability to mobilize Vitamin A stores from the liver.

EXCESSIVE VITAMIN A INTAKE IS TOXIC AND MUST BE AVOIDED. Liver abnormalities, reduced bone density (osteoporosis) and central nervous system disorders may result from hypervitaminosis A. Early toxicity signs include peeling/itching skin, brittle nails, yellowish skin, alopecia (hair loss), and bone/joint pain. Provitamin A (beta carotene and mixed carotenoids) are much less toxic and not associated with the commonly noted side effects of excess Vitamin A intake.

Supplemental Information

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PHYSIOLOGICAL 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, itTitability, 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.

FOOD SOURCES

Food	Serving	(mcg)
Clams	3 oz.	84
Beef liver	3 oz.	70
Mussels	3 oz.	20
Mackerel	3 oz.	16
Crab	3 oz.	10

Food	Serving	(mcg)
Trout, wild	3 oz.	5.4
Troup, farmed	3 oz.	3.5
Salmon, farmed	3 oz.	2.4
Beef	3 oz.	2.1
Egg	1 large	0.6

REPLETION INFORMATION

No toxic effects of oral vitamin B12 intake have been demonstrated, even in doses over 1000 ug 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.