Evaluation Report

Lab Date: 6/30/2009
Patient: Mrs. Sandra Microbe
Gender: Male   Age: 43

Test Name	Results
ANISOCYTES	**Mild**

Findings & Considerations
Anisocytosis is a term that refers to the size of erythrocytes. Normally sized erythrocytes are called normocytes. Macrocytes are larger and microcytes are smaller than normally sized cells. For shape variants see poikilocytes (irregularly-shaped cells) and spherocytes (globular cells) in this program.

Red blood cell destruction is normally the result of aging or senescence. Aging of red blood cells is accompanied by a decline in function of various cellular enzyme systems, particularly those that result in ATP production. Anisocytosis or change in cell shape is an inevitable consequence of reduction in ATP production owing to loss of membrane integrity.

Variably sized red blood cells are observed in a variety of disease states, including anemias, thalassemias and iron deficiency (Simel et al, 1988).

Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day
- B12 (methylcobalamine): 1000 Mcg/day
- B6 (pyridoxyl-5-phosphate): 100 Mg, 1-2x/day
- CoQ10 (coenzyme): 100-400mg day
- EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.
- Folic Acid (5-Formyl Tetrahydrofolate): 400 mcg/day
- Iron (Iron Glycinate): 25-300 mg/day

Test Name	Results
B CELLS	**Moderate**

Findings & Considerations
B cells are lymphocytes that play an essential role in the humoral immune response (as opposed to the cell-mediated immune response, which is governed by T cells). The principal functions of B cells are to make antibodies against antigens, perform the role of Antigen Presenting Cells (APCs) and eventually develop into memory B cells after activation by antigen interaction. B cells are an essential component of the adaptive immune system.

Aberrant antibody production by B cells is implicated in many autoimmune diseases, such as rheumatoid arthritis and systemic lupus erythematosus. Most forms of leukemia, lymphoma, and other hematological malignancy are derived from B cells.

Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day

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- Asian Ginseng Root Extract (Panax Ginseng): 200-400 Mg
- Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.
- Immunoglobulins or Supplemental Proteins: 16-32 Grams/day
- Raw Thymus Concentrate: 120-240 Mg/day

Test Name	Results
BASOPHILS	**Moderate**

Findings & Considerations

A basophil is characterized by a lobed nucleus and it is filled by large blue-black granules that sometimes cover the nucleus. The average basophil is 8-10 microns in size. They contain large cytoplasmic granules which obscure the cell nucleus under the microscope. However, when unstained, the nucleus is visible and it usually has 2 lobes. The mast cell, a cell in tissues, has many similar characteristics. For example, both cell types store histamine, a chemical that is secreted by the cells when stimulated in certain ways (histamine causes some of the symptoms of an allergic reaction). Like all circulating granulocytes, basophils can be recruited out of the blood into a tissue when needed.

Basophils appear in many specific kinds of inflammatory reactions, particularly those that cause allergic symptoms. Basophils contain anticoagulant heparin, which prevents blood from clotting too quickly. They also contain the vasodilator histamine, which promotes blood flow to tissues. They can be found in unusually high numbers at sites of exoparasite infection, e.g., ticks. They also appear in tissues where allergic reactions are occurring and probably contribute to the severity of these reactions. Basophils have protein receptors on their cell surface that bind IgE antibody very tightly. It is the bound IgE antibody that confers a selective response of these cells to environmental substances, for example, pollen proteins. Recent studies in mice suggest that basophils may also regulate the behavior of T cells and mediate the magnitude of the secondary immune response.

When activated, basophils degranulate to release histamine, proteoglycans (e.g. heparin and chondroitin), and proteolytic enzymes (e.g. elastase and lysophospholipase). They also secrete lipid mediators like leukotrienes, and several cytokines. Histamine and proteoglycans are pre-stored in the cell's granules while the other secreted substances are newly generated. Each of these substances contributes to inflammation. Recent evidence suggests that basophils are an important source of the cytokine, interleukin-4, perhaps more important than T cells. Interleukin-4 is considered one of the critical cytokines in the development of allergies and the production of IgE antibody by the immune system. There are other substances that can activate basophils to secrete which suggests that these cells have other roles in inflammation.

Basopenia (a low basophil count) is difficult to demonstrate as the normal basophil count is so low; it has been reported in association with autoimmune urticaria a chronic itching condition). Basophilia is also uncommon but may be seen in some forms of leukaemia or lymphoma.

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Recommended Nutritional Compounds

· Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.

· Echinacea: 200-400mg/day

· Flavonoids (Mixed): 1-2/day

· Germanium: 200-400 mg/day

Test Name	Results
CHOLESTEROL	**Severe**

Findings & Considerations

Cholesterol is a lipidic, waxy steroid found in the cell membranes and transported in the blood plasma of all animals[1]. It is an essential component of mammalian cell membranes where it is required to establish proper membrane permeability and fluidity.

Function

Cholesterol is required to build and maintain cell membranes; it regulates membrane fluidity over the range of physiological temperatures. The hydroxyl group on cholesterol interacts with the polar head groups of the membrane phospholipids and sphingolipids, while the bulky steroid and the hydrocarbon chain are embedded in the membrane, alongside the nonpolar fatty acid chain of the other lipids. In this structural role, cholesterol reduces the permeability of the plasma membrane to protons (positive hydrogen ions) and sodium ions.[2]

Within the cell membrane, cholesterol also functions in intracellular transport, cell signalling and nerve conduction. Cholesterol is essential for the structure and function of invaginated caveolae and clathrin-coated pits, including caveola-dependent and clathrin-dependent endocytosis. The role of cholesterol in such endocytosis can be investigated by using methyl beta cyclodextrin (MβCD) to remove cholesterol from the plasma membrane. Recently, cholesterol has also been implicated in cell signaling processes, assisting in the formation of lipid rafts in the plasma membrane. In many neurons a myelin sheath, rich in cholesterol since it is derived from compacted layers of Schwann cell membrane, provides insulation for more efficient conduction of impulses.[3]

Within cells, cholesterol is the precursor molecule in several biochemical pathways. In the liver, cholesterol is converted to bile, which is then stored in the gallbladder. Bile contains bile salts, which solubilize fats in the digestive tract and aid in the intestinal absorption of fat molecules as well as the fat soluble vitamins, Vitamin A, Vitamin D, Vitamin E and Vitamin K. Cholesterol is an important precursor molecule for the synthesis of Vitamin D and the steroid hormones, including the adrenal gland hormones cortisol and aldosterone as well as the sex hormones progesterone, estrogens, and testosterone and their derivatives.

Some research indicates that cholesterol may act as an antioxidant.[4]

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Dietary sources
Animal fats are complex mixtures of triglycerides, with lesser amounts of phospholipids and cholesterol. Consequently all foods containing animal fat contain cholesterol to varying extents.[5] Major dietary sources of cholesterol include cheese, egg yolks, beef, pork, poultry, and shrimp.[6] Human breast milk also contains significant quantities of cholesterol.[7] Cholesterol is not present in plant based food sources unless it has been added during the food's preparation.[8] However, plant products such as flax seeds and peanuts contain healthy cholesterol-like compounds called phytosterols, which are suggested to help lower serum cholesterol levels.[9]

Total fat intake, especially saturated fat and trans fat, plays a larger role in blood cholesterol than intake of cholesterol itself. Saturated fat is present in full fat dairy products, animal fats, several types of oil and chocolate. Trans fats are derived from the partial hydrogenation of unsaturated fats, and in contrast to other types of fat, they are not essential for life. It is recommended that trans fats be consumed extremely rarely or not at all as they are said to be more harmful than naturally occurring oils. Trans fat can be found in the commercial food supply including fast food, snack foods, fried food and baked goods.

A change in diet may help reduce blood cholesterol in addition to other lifestyle modifications. Avoiding animal products may decrease the cholesterol levels in the body not through dietary cholesterol reduction alone, but primarily through a reduced saturated fat intake. Those wishing to reduce their cholesterol through a change in diet should aim to consume less than 7% of their daily calories from saturated fat and less than 200 mg of cholesterol per day.[10]

The view that a change in diet (specifically, a reduction in dietary fat and cholesterol) can lower blood cholesterol levels, and thus reduce the likelihood of development of, amongst others, coronary artery disease (CHD) has been challenged. An alternative view is that any reductions to dietary cholesterol intake are counteracted by the organs such as the liver, which will increase or decrease production of cholesterol to keep blood cholesterol levels constant.[11]

According to the lipid hypothesis, abnormally high cholesterol levels (hypercholesterolemia), or, more correctly, higher concentrations of LDL and lower concentrations of functional HDL are strongly associated with cardiovascular disease because these promote atheroma development in arteries (atherosclerosis). This disease process leads to myocardial infarction (heart attack), stroke and peripheral vascular disease. Since higher blood LDL, especially higher LDL particle concentrations and smaller LDL particle size, contribute to this process more than the cholesterol content of the LDL particles,[12] LDL particles are often termed "bad cholesterol" because they have been linked to atheroma formation. On the other hand, high concentrations of functional HDL, which can remove cholesterol from cells and atheroma, offer protection and are sometimes referred to colloquially as "good cholesterol". These balances are mostly genetically determined but can be changed by body build, medications, food choices and other factors.[13]

It is recommended by the American Heart Association to test cholesterol every 5 years for people aged 20 years or older.[14]

A blood sample taken after fasting is taken by a doctor or a home cholesterol monitoring device to determine a lipoprotein profile. This measures total cholesterol, LDL (bad) cholesterol, HDL (good) cholesterol and triglycerides. It is recommended to have cholesterol tested more frequently than 5 years if a person: has total cholesterol of 200 mg/dL or more, if a man over age 45 or a woman over age 50, has HDL (good) cholesterol less than 40 mg/dL, or other risk factors for heart disease and stroke.

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Recommended Nutritional Compounds

- Glycine: 100-200 Mg/day
- Niacin (inositol hexanicotinate): 1000 mg/day
- Resveratrol (Polygonum Cuspidatum): 68-410mg/day

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- Soluble and Insoluble Fibers: Take 1-2 servings per day.
- Taurine: 100 Mg, 1-2x/day
- Vitamin E: 400-800 IUs/day.

Test Name	Results
CHYLOUS	**Moderate**

Findings & Considerations

The microscopic appearance of chylous material is that of cells undergoing fatty degeneration.

A milky fluid consisting of lymph and emulsified fat extracted from chyme by the lacteals during digestion and passed to the bloodstream through the thoracic duct. Its presence could signifiy a significant health issue. An increased viscosity of blood is probably and should be clinically coorelated with other laboratory.

Chyle is a noninflammatory, lymphocyte-predominant fluid that may cause a pleural effusion as a consequence of thoracic duct leakage into the pleural space. Although chyle is reported to have protein concentrations in the transudative range, chylous effusions are typically exudative, as defined by the standard criteria.

Chylous ascites is a rare clinical condition that occurs as a result of disruption of the abdominal lymphatics. Multiple causes have been described, including the following:

-Abdominal surgery, blunt abdominal trauma, malignant neoplasms, hepatoma, small bowel lymphoma, small bowel angiosarcoma, and retroperitoneal lymphoma, spontaneous bacterial peritonitis, Cirrhosis - Up to 0.5% of patients with ascites from cirrhosis may have chylous ascites. Pelvic irradiation, peritoneal dialysis, abdominal tuberculosis, carcinoid syndrome and congenital defects of lacteal formation,

Laboratory Studies
-Routine laboratory tests may show hypoalbuminemia, lymphocytopenia, anemia, hyperuricemia, elevated alkaline phosphatase and liver enzymes, and hyponatremia. Usually, serum cholesterol and triglyceride levels are normal.

Recommended Nutritional Compounds

- Choline (as Choline Bitartrate): 300 mg/day
- Ox Bile Extract: Use as directed.
- Taurine: 100 Mg, 1-2x/day

Test Name	Results
ECHINOCYTES	**Mild**

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Findings & Considerations
Spiculated erythrocyte with short, equally-spaced projections. Conditions associated with the formation of echinocytes include: uremia, pyruvate kinase deficiency, liver disease and artifact due to improper drying.

Nutritional considerations must be based upon a comprehensive medical workup including condition(s)/diagnose(s) that accompany this microscopic finding.

Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day
- EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.

Test Name	Results
EOSINOPHIL	**Mild**

Findings & Considerations
The eosinophils are quite rare in the blood. Eosinophils represent between 1 and 3% of the total white blood cell count throughout life. They have the same size as the neutrophils; between 10-15 microns in size. In generally, their nucleus is bi-lobed, but even nuclei with three or four lobes have been observed. The cytoplasm is full of granules which assume a characteristic pink-orange color when stained, or as dark granules under dark field microscopy.

Eosinophil granulocytes, usually called eosinophils (or, less commonly, acidophils), are white blood cells that are one of the immune system components responsible for combating infection and parasites in vertebrates. Along with mast cells, they also control mechanisms associated with allergy and asthma. They are granulocytes that develop during haematopoiesis in the bone marrow before migrating into blood.

In normal individuals eosinophils make up about 1-6% of white blood cells, and are about 12-17 micrometers in size.[1] They are found in the medulla and the junction between the cortex and medulla of the thymus, and, in the lower gastrointestinal tract, ovary, uterus, spleen, and lymph nodes, but not in the lung, skin, esophagus, or some other internal organs under normal conditions. The presence of eosinophils in these latter organs is associated with disease. Eosinophils persist in the circulation for 8-12 hours, and can survive in tissue for an additional 8-12 days in the absence of stimulation. [2]

Eosinophilia
An increase in eosinophils, i.e., the presence of more than 500 eosinophils/microlitre of blood is called an eosinophilia, and is typically seen in people with a parasitic infestation of the intestines, a collagen vascular disease (such as rheumatoid arthritis), malignant diseases such as Hodgkin's disease, extensive skin diseases (such as exfoliative dermatitis), Addison's disease, in the squamous epithelium of the esophagus in the case of reflux esophagitis, eosinophilic esophagitis, and with the use of certain drugs such as penicillin. In 1989, contaminated L-tryptophan supplements caused a deadly form of eosinophilia known as eosinophilia-myalgia syndrome.

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Recommended Nutritional Compounds

- Bioflavanoids: 150-300 mg/day
- Bromelain: 100 - 600 mg/day

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- Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.
- EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.
- For Parasitic Infection - Garlic (Allium Sativum): 600-1200 Mg/day
- For Parasitic Infection - Horsetail Aerial Parts: 400 mg/day
- For Parasitic Infection - Probiotics: 15-30 Billion organisms 1-2/day
- For Parasitic Infection - Sweet Wormwood Whole Plant Extract (Artemisia annua): 1500-3000 mg/day

Test Name	Results
FUNGAL FORMS	**Moderate**

Findings & Considerations
Fungi may appear microscopically as round-ovoid structures or as elongated tube-like structures (filamentous). Fungi are heterotrophic and form either a single cell (yeast), or hyphae that are multicellular, and / or filamentous (i.e., mold, mushrooms). Reproduction of fungi is asexual. A distinct fruiting body (sporangium) produces spores (conidia). Fungal infections often occur in those on long-term antibiotic therapies, corticosteroids, and immunosuppressant drugs. This type of opportunistic infection is common in those with the acquired immunodeficiency syndrome, commonly known as AIDS, and also CFIDS (chronic fatigue syndrome). Candidiasis may clinically manifest and oral thrust, fungal esophagitis and vulvo-vaginitis (mouth and vaginal).

Human fungal disease may be caused by Candida albicans, parapsilosis and species of Candida, encapsulated pathogenic yeast (Cryptococcus neoformans), methylotrophic yeast (Pichia pastoris), basidiomycete and sterigmata (Fellomyces). Candida albicans exists in a yeast and hyphae stage and commonly occurs on human skin, in the upper respiratory, alimentary & female genital tracts. This fungus has a dimorphic life cycle with yeast and hyphal stages. This yeast produces hyphae (strands) and pseudohyphae. The pseudohyphae can give rise to yeast cells by apical or lateral budding.

In a hospital setting blood cultures are essential for fungal organism identification. Blood tests measuring fungal antibodies are also available, but do not distinguish past from current infection.

FOODS THAT YEAST/CANDIDA MAY FEED ON
Because of advertising in America and the high sugar, high fat American diet, many of the following foods may have become staples in your home but they will feed Candida so it's time to part from old ways that made us sick. Stay away from Boxed and Packaged Foods!

FOODS HIGH IN SUGAR CONTENT
Brown, Granulated , Maple, Date, Turbinado, Powdered, Dextrose, Fructose, Galactose, Flucose, Gylcogen, Lactose, Maltose,

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Mannitol, Monosaccharide, Polysaccharides, Sorbitol, Sucrose and Molasses.

ARTIFICIAL SWEETENERS, INCLUDING:
Nutrasweet, Equal, and Saccharin (Stevia or Splenda can be used in moderation).

TABLE SALT, CAFFEINE, CITRIC ACID, YEAST AND YEASTED PRODUCTS, INCLUDING ALCOHOLIC AND BAKED GOODS:

Mushrooms, cheeses with rinds, coffee, most teas, condiments containing vinegar (ketchup, mustard, mayonnaise, salad dressing), fermented foods and drinks (cider, root beer), bottles or canned fruit juices, dried fruits, strawberries, melons, canned fruits, leftovers (older than 24 hours), malted products (barley malt, malted milk, cereals, candies), peanuts, pistachios, peanut oil, peanut butter, processed and/or smoked meats and fish (beef jerky, corned beef, hot dogs, luncheon meats, pastrami, sausages), pickled foods, tempeh and misco.

Recommended Nutritional Compounds

- Barberry Root (Berberis Vulgaris): 70 -140 mg/day
- Chromium (as picolinate): 200-1000 mcg/day
- Cordycepts Mycelium Extract (Paecilomyces Hepialid): 400-800 Mg/day
- For Parasitic Infection - Garlic (Allium Sativum): 600-1200 Mg/day
- For Parasitic Infection - Probiotics: 15-30 Billion organisms 1-2/day
- Full spectrum, balanced, high potency B-vitamins, high B12 for methylation and homocysteine metabolism, amino acid chelates: 2, 3x/day
- Grape Seed Extract: 5mg/day
- Horse Chestnut Seed Extract: 250mg/day
- Licorice Root Extract (Glycyrrhiza Glabra): 900-1800 Mg/day
- NAC contains: N-acetylcysteine 500 mg 1 tablets 2-3 times daily.

Test Name	Results
HELMIT CELLS	**Moderate**

Findings & Considerations
Helmit cells are infested or parasitized RBCs. These cells are infected with rod forms and embryonic bacteria. Internal parasitization has occurred in addition to invisible spindle threads in the rbc membrane. Healthy RBCs will not present this type of degeneration and progression even when they are isopathically provoked, mechanically stressed, or aged.

With this level of infestation, you should explore for catabolic or anabolic imbalance, and consider including intracellular detoxification in the treatment plan. Including an alkaline approach, Vitamin A, Vitamin B, probiotics, and spleenic glandular.

Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day

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- Betacarotene: 25,000 IU/day
- For Parasitic Infection - Garlic (Allium Sativum): 600-1200 Mg/day
- Horse Chestnut Seed Extract: 250mg/day
- L-Glutamine: 750-1500 Mg/day
- Spleen Glandular: 100 - 200 mg/day.
- Sylimarin (Milk Thistle): 140 - 250 mg/day

Test Name	Results
HEMOLYSIS	**Severe**

Findings & Considerations
Hemolysis is the breakdown of red blood cells. Hemolyzed red blood cells are fundamentally broken down and fragmented red blood cells. Red blood cells normally live for about 120 days. After that, they die and break down. Some diseases cause red blood cells to break down before the end of the rbc normal life cycle.

Red blood cells carry oxygen to all of the body. If red blood cells are breaking down abnormally, there will be fewer of them to carry oxygen. Some blood tests used to help diagnose the potential cause of hemolysis include the red blood cell count (RBC), serum hemoglobin (Hgb) and serum haptoglobin.

There are a large number of conditions associated with hemolysis including: infections (i.e., bacterial, fungal and viral), drug reactions, autoimmune diseases, glucose-6-phosphatedeficiency disease, cholelithiasis and exposure to certain toxins - just to name a few.

Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day
- NAC contains: N-acetylcysteine 500 mg 1 tablets 2-3 times daily.
- Spleen Glandular: 100 - 200 mg/day.

Test Name	Results
L-FORM BACTERIA	**Moderate**

Findings & Considerations
L-form bacteria are difficult-to-culture bacteria that lack a cell wall and are not detected by traditional culturing processes. Sometimes referred to as cell wall deficient bacteria, they are pleomorphic, that is, they can change size and shape. During much of their lifetimes they are tiny, about 0.01 microns in diameter. L-form bactera also appear in filament form that can reach 60-70 microns in length. As L-forms have no cell wall, their morphology is different from the strain of bacteria from which they are derived. Typically L-form cells are spheres or spheroids. For example, L-forms of the rod shaped bacterium Bacillus subtilis appear round when viewed by phase contrast microscopy or by transmission electron microscopy. Although L-forms can develop from gram-positive as well as from gram-negative bacteria the L-forms are always gram-negative, due to the lack of a cell wall.

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Since they are smaller than viruses or fungal particles, they cannot be seen with a normal optical microscope. Sometimes referred to as cell wall deficient bacteria. are often referred to as coccoid bodies. Coccoid bodies sometimes group together, assuming the appearance of a string of pearls

In the lab they can grow into long, thin biofilmA structured community of microorganisms encapsulated within a self-developed protective matrix and living together.

L-form bacteria also known as L-phase bacteria, L-phase variants or cell wall deficient (CWD) bacteria, are strains of bacteria that lack cell walls. Two types of L-forms are distinguished: unstable L-forms, spheroplasts which are capable of dividing, but can revert to the original morphology and stable L-forms, L-forms which are unable to revert to the original bacteria. Bacterial morphology is determined by the cell wall.

The cell wall is important for cell division which, in most bacteria, occurs by binary fission. The lack of cell wall in L-forms means that division is disorganised, giving rise to a variety of cell sizes, from very tiny to very big.

L-forms can be generated in the laboratory from many bacterial species that usually have cell walls, such as Bacillus subtilis or Escherichia coli. This is done by inhibiting peptidoglycan synthesis with antibiotics or treating the cells with lysozyme, an enzyme which digests cell walls.

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Recommended Nutritional Compounds

- Aloe Vera Extract (Aloe Barbadensis): 50-100mg/day
- B. bifidum: 500 million/day with synergistic bifido and acidophilus species.
- ECGC: 100 Mg/day
- Glutamine: 500-1500 mg/day

Test Name	Results
LIVER SPICKLES	**Moderate**

Findings & Considerations

Liver or protein spickles may be present non-specifically in any condition that directly or indirectly involves the liver, or conditions involving the coagulation pathway involving fibrinogen. Liver spickles are fibrin, (a.k.a Factor 1a); fibrin is made from fibrinogen (a soluble plasma glycoprotein that is synthesized by the liver). It is involved in the complex process of blood clotting by polymerizing and forming a mesh-like haemostatic plug. The presence of excessive liver spickles, in the context of appropriate signs, symptoms and other clinical and laboratory tests, may suggest a hyperviscosity of blood.

Target cell and spicules accumulate as red blood cells become cholesterol loaded.

Conditions may be associated with elevated liver spickles include: acute infections, cancer, coronary heart disease, myocardial, infarction, stroke, inflammatory disorders (like rheumatoid arthritis and glomerulonephritis) and trauma.

Recommended Nutritional Compounds

- CoQ10 (coenzyme): 100-400mg day
- Curcumin: 500—1000mg/day
- EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.
- Ginko Biloba (120mg) contains: Standardized to 24% ginkgo flavonoglycosides, 6% terpene lactones (by HPLC). 1-2/day
- Liver glandular or protomorphogen: 400-1200mg/day
- NAC contains: N-acetylcysteine 500 mg 1 tablets 2-3 times daily.

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· Niacin (inositol hexanicotinate): 1000 mg/day

· Silymarin (Milk Thistle): 100-500mg/day

Test Name	Results
LYMPHOCYTES	**Moderate**

Findings & Considerations

Lymphocyte: Pale blue non granular cytoplasm and deep purplish blue on lobulated nucleus. Cell outline is distinct. Small and Large Lymphocytes exist: Small Lymphocyte: 7-10 Micron size
Nucleus round or slightly indented, fills almost entire cell, cytoplasm scanty, may be seen as a distinct perinuclear ring.
- Large Lymphocyte: 12-15 Micron size.
Nucleus usually indented, fills almost entire cell, cytoplasm to nucleus ratio more than small lymphocyte.

Lymphocytes vary in number with aging of the individual. There is a decline in the number of lymphocytes at around age 21 where in the adult the average concentration ranges from between 20 to 40% of the total leukocyte count.

Changes in the concentration of neutrophils in the peripheral blood smear is often the very first sign of underlying pathology.

The term neutropenia describes a reduction in the number of neutrophils in circulation while the term granulocytopenia more specifically defines a decrease in the granulocytes, which as a group include the neutrophils, basophils and eosinophils.

The process of phagocytosis in the neutrophil is the product of the hexose-monophosphate (HMP) shunt, which runs by the production of NADPH. Some neutrophilic energy from the process of phagocytosis is derived from the tricarboxylic acid. Nutritionally speaking it is important to recognize that the process of phagocytosis generates an energy burst of oxidizing compounds through the HMP shunt.

The membrane bound oxidase involved in this process uses NADPH as an electron donor and produces the following oxygen and non-oxygen dependent antimicrobial systems: Myeloperoxidase-dependent, which involves hydrogen peroxide, superoxide anion, hydroxyl radicals and singlet oxygen. The myeloperoxidase-dependent system is another oxygen dependent system as well. Oxygen independent antimicrobial systems include: Acid pH of phagosome, cationic proteins in primary granules, lactoferrin in secondary granules and lysosome in primary granules. Considering these essential antimicrobials systems in the neutrophil nutritional approaches towards an increased number of neutrophils in the peripheral blood smear should consider a full spectrum antioxidant, vitamins B2 and vitamins B3.

A lymphocyte is a type of white blood cell in the vertebrate immune system.[1] Microscopically, in a Wright's stained peripheral blood smear, a normal lymphocyte has a large, dark-staining nucleus with little to no basophilic cytoplasm. In normal situations, the coarse, dense nucleus of a lymphocyte is approximately the size of a red blood cell (about 7 micrometres in diameter). Some lymphocytes show a clear perinuclear zone (or halo) around the nucleus or could exhibit a small clear zone to one side of the nucleus. Polyribosomes are a prominent feature in the lymphocytes and can be viewed with an electron microscope. The ribosomes are involved in protein synthesis allowing the generation of large quantities of cytokines and immunoglobulins by these cells.

By their appearance under the light microscope, there are two broad categories of lymphocytes, namely the large granular lymphocytes and the small lymphocytes. Functionally distinct subsets of lymphocytes correlate with their appearance. Most, but not

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all large granular lymphocytes are more commonly known as the natural killer cells (NK cells). The small lymphocytes are the T cells and B cells. Lymphocytes play an important and integral role in the body's defenses. See T and B lymphocytes for more information about these two important subclasses of lymphocytes.

It is impossible to distinguish between T cells and B cells in a peripheral blood smear.[2] Normally, flow cytometry testing is used for specific lymphocyte population counts. This can be used to specifically determine the percentage of lymphocytes that contain a particular combination of specific cell surface proteins, such as immunoglobulins or cluster of differentiation (CD) markers or that produce particular proteins (for example, cytokines using intracellular cytokine staining (ICCS)). In order to study the function of a lymphocyte by virtue of the proteins it generates, other scientific techniques like the ELISPOT or secretion assay techniques can be used.[3]

A lymphocyte count is usually part of a peripheral complete blood cell count and is expressed as percentage of lymphocytes to total white blood cells counted. An INCREASE in lymphocytes is usually a sign of a viral infection (in some rare case, leukemias are found through an abnormally raised lymphocyte count in an otherwise normal person). A general increase in the number of lymphocytes is known as lymphocytosis whereas a decrease is lymphocytopenia.

The total lymphocyte count may be DECREASED in conditions affecting bone marrow production or may be low from genetic causes and from certain medications (i.e., steroids), multiple sclerosis, myasthenia gravis, and Guillain-Barre. However, the most common causes of a low lymphocyte count is malnutrition and infection.   A decrease in lymphocytes occurs when the human immunodeficiency virus (HIV) infects and destroys T cells (specifically, the CD4+ subgroup of T lymphocytes). Without the key defense that these T cells provide, the body becomes susceptible to opportunistic infections that otherwise would not affect healthy people. The extent of HIV progression is typically determined by measuring the percentage of CD4+ T cells in the patient's blood. The effects of other viruses or lymphocyte disorders can also often be estimated by counting the numbers of lymphocytes present in the blood.

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Recommended Nutritional Compounds

· Antioxidants (Mixed): 1-2/day

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· Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.

· Comprehensive multivitamin and mineral: As directed

· Echinacea: 200-400mg/day

· Ginko Biloba (120mg) contains: Standardized to 24% ginkgo flavonoglycosides, 6% terpene lactones (by HPLC). 1-2/day

· Thymus Glandular (Defatted Product): 400-800mg/day

· Vitamin A (Retinyl Palmitate): 5000IU/day

· Zinc (as zinc gluconate): 10-30mg

Test Name	Results
MACROCYTES	**Severe**

Findings & Considerations
A red cell that is larger than a normal red cell (> 7 microns, but averaging over 9 microns). On any given blood smear, the size of a normal red cell is approximately that of the nucleus of a very small lymphocyte. Depending on the percentage of macrocytes present, the MCV may also be elevated. However, there may be months or potentially years between the formation of macrocytes and an increased MCV. If the RDW is increased (due to anisocytosis), the MCV may not reflect the degree of macrocytosis because the iron anemia (increased RDW, low Hg, low Hct, low RBCs) predominates).

Increased red blood cell mass is commonly associated with increased blood viscosity. Macrocytic or enlarged cells commonly occur as a megaloblastic anemia, which results from nuclear maturation defects due to ineffective red blood cell production. 95% of megaloblastic anemias are caused by either vitamin B12 or cobalamin deficiencies or folic acid deficiencies; these are vitamins, which are required as coenzymes for nucleic acid synthesis.

In a large number of cases of B12 megaloblastic anemia these are due to deficiency of intrinsic factor. Megaloblastic cells from folic acid deficiency are due to inadequate dietary intake and/or malabsorption disorders. Clinically speaking, early signs of megaloblastic anemia include dyspeptic symptoms along with insidious anemic symptoms of weakness and lethargy along with a waxy or yellow pallor. Weight loss as well as loss of appetite are common complaints, which may or may not be associated with atrophy of the gastric parietal cells, which results from decreased intrinsic factor secretion and reduced hydrochloric acid output. These changes in the gastrointestinal tract may be associated with bouts of diarrhea.

Neurologic symptoms certainly may occur with deficiencies of B12, but not from folic acid. Importantly, neurologic symptoms may develop long before macrocytosis itself is obvious under the peripheral blood smear. Numbness, tingling and weakness in the extremities reflect peripheral neuropathy with or without loss of vibratory and proprioceptive or positioned sense in the lower

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extremity and abnormal gait. Certainly memory disturbances along with irritability and depression may be noted in those with megaloblast and this is sometimes called megaloblastic madness; a term describing various severe psychotic manifestations of B12 deficiency. However, most people with moderate to severe anemia may actually be asymptomatic, clinically speaking.

Megaloblastic anemia usually occurs along with oval macrocytes as well as Howell-Jolly bodies and hypersegmented neutrophils. It should be noted that other laboratory findings associated with macrocytic anemias include increase in serum iron and perhaps indirect bilirubin and urobilinogen. Increases in the fractions of LDH-1 and 2 (serum lactic dehydrogenase) is partially due to the increased destruction of the megaloblast, which are of course rich in LDH. There may be a proportion increase in LDH with the degree of the anemia. Typically, alkaline phosphatase, haptoglobin and uric acid are decreased. Metabolism of glutamic acid and histadine occurs in folic acid deficiency and causes urine excretion of FIGLU (formiminoglutamic acid), which is an intermediate metabolite after histadine administration.

Conditions that may be associated with macrocytosis can include alcoholism, liver disease, reticulocytosis, mixed edema, myeloproliferative and myelodysplastic syndromes, respiratory failure, hypoplastic anemia, obstructive jaundice, acquired sideroblastic anemia, post-splenectomy, obstructive jaundice, hypothyroidism, pregnancy, myeloma, physiologic macrocytosis of the newborn, macroglobulinemia, leukocytosis and laboratory artifacts-culled agglutinins, hyperglycemia.

Recommended Nutritional Compounds

- Comprehensive multivitamin and mineral: As directed
- EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.
- Folic Acid (5-Formyl Tetrahydrofolate): 400 mcg/day
- Pancreatic Enzymes: 100-200,000 USP Units of Amylase, Lipase and Protease, 2-3x/day
- Sylimarin (Milk Thistle): 140 - 250 mg/day

Test Name	Results
MICROCYTES	**Moderate**

Findings & Considerations

Microcytic cells vary in size, but are certainly smaller than the average RBC in diameter (under seven microns in diameter for microcytic cells). Microcytosis, or microcythemia, is a condition where red blood cells are unusually small when their mean corpuscular volume (MCV) is measured.[1] MCV by itself, or in addition to low values of mean corpuscular hemoglobin concentration (MCHC) and mean corpuscular hemoglobin (MCH), reinforces the extent of microcytosis. Decreased red blood cell mass may result in a reduced hemoglobin concentration and therefore tissue hypoxia. This condition is generally known as anemia. Anemia is compensated for in part by increasing the rate of blood flow to hypoxic tissues and this may result in hemolysis. Also see target cells.

When associated with anemia, it is known as microcytic anemia. Anemia upon blood testing typically demonstrates a low hemoglobin, hematocrit and sometimes a low rbc count. Reinforcing lab values for iron anemia include: an increased RDW (red blood cell distribution width), increased TIBC, decreased percent saturation and potentially a serum low ferritin (if the anemia is long standing).

Microcytosis and anisocytosis considered along with an increased RDW are usually the very first peripheral blood morphologic signs

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to develop even before anemia is present in the individual. A clinically important bit of information is that the typical iron anemia in a patient when viewed under the peripheral blood smear may be masked if that patient has a concurrent folic acid deficiency. Furthermore, the underlying microcytosis may only become visible under the peripheral blood smear once the folic acid deficiency has been satisfied.

Thalassemia can cause microcytosis. Depending upon how the terms are being defined, thalassemia can be considered a cause of microcytic anemia, or it can be considered a cause of microcytosis, but not a cause of microcytic anemia.

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Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day
- Folic Acid (5-Formyl Tetrahydrofolate): 400 mcg/day
- Iron (Iron Glycinate): 25-300 mg/day

Test Name	Results
NEUTROPHIL - NORMAL	**Moderate**

Findings & Considerations

Neutrophilic cells are between 12-14 microns in size. Neutrophil granulocytes, generally referred to as neutrophils, are the most abundant type of white blood cells in mammals and form an essential part of the immune system. They form part of the polymorphonuclear cell family (PMNs) together with basophils and eosinophils. Neutrophils are normally found in the blood stream. However, during the beginning (acute) phase of inflammation, particularly as a result of bacterial infection and some cancers[1][2], neutrophils are one of the first group of inflammatory cells to migrate toward the site of inflammation, firstly through the blood vessels, then through interstitial tissue, following chemical signals (such as Interleukin-8 (IL-8), Interferon-gamma (IFN-gamma), and C5a) in a process called chemotaxis. They are the predominant cells in pus, accounting for its whitish/yellowish appearance. Neutrophils react within an hour of tissue injury and are the hallmark of acute inflammation.[3] Neutrophil granulocytes have an average diameter of 12-15 micrometers (µm) in peripheral blood smears.

With the eosinophil and the basophil, they form the class of polymorphonuclear cells, named for the nucleus's characteristic multilobulated shape (as compared to lymphocytes and monocytes, the other types of white cells). Neutrophils are the most abundant white blood cells in humans (approximately 10^11 are produced daily) ; they account for approximately 70% of all white blood cells (leukocytes). The average half-life of non-activated neutrophils in the circulation is about 12 hours.

Neutrophils are much more numerous than the longer-lived monocyte/macrophage phagocytes. A pathogen (disease-causing microorganism or virus) is likely to first encounter a neutrophil. Neutrophils are phagocytes, capable of ingesting microorganisms or particles. They can internalise and kill many microbes, each phagocytic event resulting in the formation of a phagosome into which reactive oxygen species and hydrolytic enzymes are secreted. The consumption of oxygen during the generation of reactive oxygen species has been termed the "respiratory burst," although unrelated to respiration or energy production.

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The respiratory burst involves the activation of the enzyme NADPH oxidase, which produces large quantities of superoxide, a reactive oxygen species. Superoxide dismutates, spontaneously or through catalysis via enzymes known as superoxide dismutases (Cu/ZnSOD and MnSOD), to hydrogen peroxide, which is then converted to hypochlorous acid (HOCl, also known as chlorine bleach) by the green heme enzyme myeloperoxidase. It is thought that the bactericidal properties of HOCl are enough to kill bacteria phagocytosed by the neutrophil, but this has not been proven conclusively.

LOW neutrophil counts are termed neutropenia. This can be congenital (genetic disorder) or it can develop later, as in the case of aplastic anemia or some kinds of leukemia. It can also be a side-effect of medication, most prominently chemotherapy. Neutropenia predisposes heavily for infection. Neutropenia can be the result of colonization by intracellular neutrophilic parasites.

The neutrophilic white blood cells represent the most abundant WBCs in the body. These cells are directed against bacterial infections and pyrogenic infections. An ELEVATED neutrophil (absolute count) likely represents the presence of an infective process, or a myeloproliferative disorder. These cells promote an inflammatory cascade which when chronically elevated may result in tissue damage. Immature neutrophils are known as band cells. Stab or band cells are non-segmented young neutrophils. An increase in band cells demonstrates a developing latent infection.

Functional disorders of neutrophils are often hereditary. They are disorders of phagocytosis or deficiencies in the respiratory burst (as in chronic granulomatous disease, a rare immune deficiency, and myeloperoxidase deficiency).

In alpha 1-antitrypsin deficiency, the important neutrophil enzyme elastase is not adequately inhibited by alpha 1-antitrypsin, leading to excessive tissue damage in the presence of inflammation - most prominently pulmonary emphysema.

In Familial Mediterranean fever (FMF), a mutation in the pyrin (or marenostrin) gene, which is expressed mainly in neutrophil granulocytes, leads to a constitutively active acute phase response and causes attacks of fever, arthralgia, peritonitis, and - eventually - amyloidosis.[4]

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Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day
- Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.
- Comprehensive multivitamin and mineral: As directed
- Thymus Glandular (Defatted Product): 400-800mg/day

Test Name	Results
PLAQUE	**Mild**

Findings & Considerations

Plaque is a pale yellow substance that is amorphous in shape due to microscopic slide preparation. It is always accompanied by a large amount of bacteria that are derived from the tissue sample that the plaque was obtained from.

Atherosclerosis, though typically asymptomatic for decades, eventually produces two main problems: First, the atheromatous plaques, though long compensated for by artery enlargement (see IMT), eventually lead to plaque ruptures and clots inside the artery lumen over the ruptures. The clots heal and usually shrink but leave behind stenosis (narrowing) of the artery (both locally and in smaller downstream branches), or worse, complete closure, and, therefore, an insufficient blood supply to the tissues and organ it feeds.

These complications of advanced atherosclerosis are chronic, slowly progressive and cumulative. Most commonly, soft plaque suddenly ruptures (see vulnerable plaque), causing the formation of a thrombus that will rapidly slow or stop blood flow, leading to death of the tissues fed by the artery in approximately 5 minutes. This catastrophic event is called an infarction. One of the most common recognized scenarios is called coronary thrombosis of a coronary artery, causing myocardial infarction (a heart attack). Even worse is the same process in an artery to the brain, commonly called stroke. Another common scenario in very advanced disease is claudication from insufficient blood supply to the legs, typically due to a combination of both stenosis and aneurysmal segments narrowed with clots. Since atherosclerosis is a body-wide process, similar events occur also in the arteries to the brain,

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intestines, kidneys, legs, etc.

Modifiable Lifestyle Factors
- Having diabetes[1] or Impaired glucose tolerance (IGT) +
- Dyslipoproteinemia[12] (unhealthy patterns of serum proteins carrying fats & cholesterol):
- High serum concentration of low-density lipoprotein (LDL, "bad if elevated concentrations and small"), and / or very low density lipoprotein (VLDL) particles, i.e., "lipoprotein subclass analysis"
- Low serum concentration of functioning high density lipoprotein (HDL "protective if large and high enough" particles), i.e., "lipoprotein subclass analysis"
- An LDL:HDL ratio greater than 3:1

Tobacco smoking, increases risk by 200% after several pack years [2]
- Having high blood pressure +, on its own increasing risk by 60%[11]
- Elevated serum C-reactive protein concentrations[2]

Nonmodifiable or Difficult to Modify Lifestyle Factors
- Advanced age [2]
- Male sex[2]
- Having close relatives who have had some complication of atherosclerosis (eg. coronary heart disease or stroke)[2]
- Genetic abnormalities,[2] e.g. familial hypercholesterolemia

The role of dietary oxidized fats / lipid peroxidation (rancid fats) in humans is not clear. Laboratory animals fed rancid fats develop atherosclerosis. Rats fed DHA-containing oils experienced marked disruptions to their antioxidant systems, as well as accumulated significant amounts of peroxide in their blood, livers and kidneys.[3] In another study, rabbits fed atherogenic diets containing various oils were found to undergo the greatest amount of oxidative susceptibility of LDL via polyunsaturated oils.[18] In a study involving rabbits fed heated soybean oil, "grossly induced atherosclerosis and marked liver damage were histologically and clinically demonstrated".[4]

Rancid fats and oils taste very bad even in small amounts; people avoid eating them.[5] It is very difficult to measure or estimate the actual human consumption of these substances.[6] In addition, the majority of oils consumed in the United States are refined, bleached, deodorized and degummed by manufacturers. The resultant oils are colorless, odorless, tasteless and have a longer shelf life than their unrefined counterparts.[7] This extensive processing serves to make peroxidated, rancid oils much more elusive to detection via the various human senses than the unprocessed alternatives.

The French paradox is the observation that despite having a diet similar to those United States in terms of fat intake, rates of heart disease are lower in France. There is evidence to suggest the French paradox is due to underestimation of the rates of heart disease in France.[8]

Diet and Dietary Supplements
Vitamin B3, AKA niacin, in pharmacologic doses, (generally 1,000 to 3,000 mg/day), sold in many OTC and prescription formulations, tends to improve (a) HDL levels, size and function, (b) shift LDL particle distribution to larger particle size and (c) lower lipoprotein(a), an atherosclerosis promoting genetic variant of LDL. Additionally, individual responses to daily niacin, while mostly evident after a month at effective doses, tends to continue to slowly improve further over time. (However, careful patient understanding of how to achieve this without nuisance symptoms is needed, though not often achieved.) Research work on

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increasing HDL particle concentration and function, beyond the usual niacin effect/response, even more important, is slowly advancing.

Dietary changes to achieve benefit have been more controversial, generally far less effective and less widely adhered to with success. One key reason for this is that most cholesterol, typically 80-90%, within the body is created and controlled by internal production by all cells in the body (true of all animals), with typically slightly greater relative production by hepatic/liver cells. (Cell structure relies on fat membranes to separate and organize intracellular water, proteins and nucleic acids and cholesterol is one of the components of all animal cell membranes.)

Caldwell B Esselstyn Jr. MD has had an article published in Preventive Cardiology 2001;4: 171-177 in which he has published angiograms showing regression of atherosclerosis brought about by a very low fat vegan diet in some cases with cholesterol lowering medications.[9]

While the absolute production quantities vary with the individual, group averages for total human body content of cholesterol within the U.S. population commonly run about ~35,000 mg (assuming lean build; varies with body weight and build) and ~1,000 mg/day ongoing production. Dietary intake plays a smaller role, 200-300 mg/day being common values; for pure vegetarians, essentially 0 mg/day, but this typically does not change the situation very much because internal production increases to largely compensate for the reduced intake. For many, especially those with greater than optimal body mass and increased glucose levels, reducing carbohydrate (especially simple forms) intake, not fats or cholesterol, is often more effective for improving lipoprotein expression patterns, weight and blood glucose values. For this reason, medical authorities much less frequently promote the low dietary fat concepts than was commonly the case prior to about year 2005. However, evidence has increased that processed, particularly industrial non-enzymatic hydrogenation produced trans fats, as opposed to the natural cis-configured fats, which living cells primarily produce, is a significant health hazard.

Dietary supplements of Omega-3 oils, especially those from the muscle of some deep salt water living fish species, also have clinical evidence of significant protective effects as confirmed by 6 double blind placebo controlled human clinical trials[citation needed].

There is also a variety of evidence, though less robust, that homocysteine and uric acid levels, including within the normal range promote atherosclerosis and that lowering these levels is helpful, up to a point.

In animals Vitamin C deficiency has been confirmed as an important role in development of hypercholesterolemia and atherosclerosis, but due to ethical reasons placebo-controlled human studies are impossible to do.[34] Vitamin C acts as an antioxidant in vessels and inhibits inflammatory process.[35] It has therapeutic properties on high blood pressure and its fluctuation,[36][37] and arterial stiffness in diabetes.[38] Vitamin C is also a natural regulator of cholesterol[39] and higher doses (over 150 mg/kg daily) may confer significant protection against atherosclerosis even in the situation of elevated cholesterol levels.[40][41]

The scale of vitamin C benefits on cardiovascular system led several authors to the theory, that vitamin C deficiency is the primary cause of cardiovascular diseases.[42] The theory was unified by twice Nobel prize winner Linus Pauling and Matthias Rath. They suggest, that clinical manifestations of cardiovascular diseases are merely overshoot of body defense mechanisms, that are involved in stabilisation of vascular wall, after it is weakened by the vitamin C deficiency and the subsequent collagen degradation. They discuss several metabolic and genetic predispositions and their pathomechanism.[43]

Trials on Vitamin E have been done, but they have failed to find a beneficial effect, for various reasons, but for some patients at high risk for atherosclerosis there may be some benefits.[44]

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Menaquinone (Vitamin K2), but not phylloquinone (Vitamin K1), intake is associated with reduced risk of CHD mortality, all-cause mortality and severe aortic calcification.[45][46][47]

It has been suggested that excess iron may be involved in development of atherosclerosis[48][49], but one study found reducing body iron stores in patients with symptomatic peripheral artery disease through phlebotomy did not significantly decrease all-cause mortality or death plus nonfatal myocardial infarction and stroke.[50] Further studies may be warranted.

Surgical Intervention
Other physical treatments, helpful in the short term, include minimally invasive angioplasty procedures that may include stents to physically expand narrowed arteries[51] and major invasive surgery, such as bypass surgery, to create additional blood supply connections that go around the more severely narrowed areas.

Prophylaxis
Patients at risk for atherosclerosis-related diseases are increasingly being treated prophylactically with low-dose aspirin and a statin. The high incidence of cardiovascular disease led Wald and Law[52] to propose a Polypill, a once-daily pill containing these two types of drugs in addition to an ACE inhibitor, diuretic, beta blocker, and folic acid. They maintain that high uptake by the general population by such a Polypill would reduce cardiovascular mortality by 80%. It must be emphasized however that this is purely theoretical, as the Polypill has never been tested in a clinical trial.

Medical treatments often focus predominantly on the symptoms. However, over time, the treatments which focus on decreasing the underlying atherosclerosis processes, as opposed to simply treating the symptoms resulting from the atherosclerosis, have been shown by clinical trials to be more effective.

In summary, the key to the more effective approaches has been better understanding of the widespread and insidious nature of the disease and to combine multiple different treatment strategies, not rely on just one or a few approaches. In addition, for those approaches, such as lipoprotein transport behaviors, which have been shown to produce the most success, adopting more aggressive combination treatment strategies has generally produced better results, both before and especially after people are symptomatic. However, treating asymptomatic people remains controversial in the medical community.

Because many blood thinners, particularly salicylates such as warfarin and aspirin thin the blood by interfering with Vitamin K, there is recent evidence that blood thinners which work by this mechanism, can actually worsen arterial calcification in the long term even though they thin the blood in the short term.[53][54] [3][4]

Recent Research
An indication of the role of HDL on atherosclerosis has been with the rare Apo-A1 Milano human genetic variant of this HDL protein. A small short-term trial using bacterial synthetized human Apo-A1 Milano HDL in people with unstable angina produced fairly dramatic reduction in measured coronary plaque volume in only 6 weeks vs. the usual increase in plaque volume in those randomized to placebo. The trial was published in JAMA in early 2006. Ongoing work starting in the 1990s may lead to human clinical trials—probably by about 2008. These may use synthesized Apo-A1 Milano HDL directly. Or they may use gene-transfer methods to pass the ability to synthesize the Apo-A1 Milano HDLipoprotein.

Methods to increase high-density lipoprotein (HDL) particle concentrations, which in some animal studies largely reverses and remove atheromas, are being developed and researched.

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Niacin has HDL raising effects (by 10 - 30%) and showed clinical trial benefit in the Coronary Drug Project and is commonly used in combination with other lipoprotein agents to improve efficacy of changing lipoprotein for the better. However most individuals have nuisance symptoms with short term flushing reactions, especially initially, and so working with a physician with a history of successful experience with niacin implementation, careful selection of brand, dosing strategy, etc. are usually critical to success.

However, increasing HDL by any means is not necessarily helpful. For example, the drug torcetrapib is the most effective agent currently known for raising HDL (by up to 60%). However, in clinical trials it also raised deaths by 60%. All studies regarding this drug were halted in December 2006.[55]

The ERASE trial is a newer trial of an HDL booster which has shown promise.[56]

The ASTEROID trial used a high-dose of rosuvastatin—the statin with typically the most potent dose/response correlation track record (both for LDLipoproteins and HDLipoproteins.) It found plaque (intima + media volume) reduction.[8] Several additional rosuvastatin treatment/placebo trials for evaluating other clinical outcomes are in progress.

The actions of macrophages drive atherosclerotic plaque progression. Immunomodulation of atherosclerosis is the term for techniques which modulate immune system function in order to suppress this macrophage action.[57] Immunomodulation has been pursued with considerable success in both mice and rabbits since about 2002. Plans for human trials, hoped for by about 2008, are in progress.

Research

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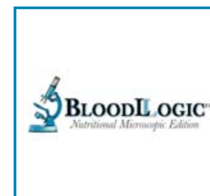

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Recommended Nutritional Compounds

· Antioxidant Comprehensive Formula: As directed.

· Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.

· Calcium, Vitamin D and other synergistic bone support: As directed

· Comprehensive multivitamin and mineral: As directed

· EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.

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- Folic Acid (5-Formyl Tetrahydrofolate): 400 mcg/day
- Ginko Biloba (120mg) contains: Standardized to 24% ginkgo flavonoglycosides, 6% terpene lactones (by HPLC). 1-2/day
- Niacin (inositol hexanicotinate): 1000 mg/day
- Soluble and Insoluble Fibers: Take 1-2 servings per day.
- Vitamin E: 400-800 IUs/day.

Test Name	Results
POIKILOCYTES	**Mild**

Findings & Considerations
Poikilocytosis refers to the presence in the blood of poikilocytes or abnormally shaped RBCs. Poikilocytosis can refer to an increase in abnormal red blood cells of any shape where they make up 10% or more of the total population.

Normal red blood cells are round, flattened disks that are thinner in the middle than at the edges, whereas a poikilocyte is either a distortion of that normal shape or an entirely different shape.

Poikilocytes are abnormally shaped cells that occur non-specifically in many disease states.Therefore, the medical and nutritional approach in a patient with this finding must be directed towards the underlying cause(s). Abnormal shapes of red blood cells do indicate a distortion (potentially oxidative in nature) of the rbc membrane.

ASSOCIATED DISEASE STATES: POIKILOCYTOSIS

Echinocyte (sea urchin) or burr cell or cremated cell diseases associated with the presence of econocytes include liver disease, pyruvate kinase deficiency, uremia, cancer of the stomach, peptic ulcers, heparin therapy.

Acanthocyte, also known as burr cell, may manifest in diseases such as alcoholic liver disease, abetalipoproteinemia, post splenectomy, retinitis, pigmentosa, fat malabsorption, disorders of lipid metabolism.

Diseases associated with the elliptocyte, also known as the ovalocyte, tensile cell or sagora cell may include iron deficiency anemia, hereditary elliptocytosis, anemia associated with leukemia and thalassemia.

Diseases associated with dacryocytes or tear dropped or racquet shaped cells include thalassemia and myeloblastic anemias.

Diseases associated with the codocyte or bell shaped or target cell also known as the Mexican hat cell may include thalassemias, hemoglobinopathies, obstructive liver disease, splenectomy, renal disease, LCAT deficiency.

The schistocyte or cut cell also known as the fragment cell may manifest in conditions including DIC, microangiopathic hemolytic anemia, heart valve hemolysis, uremia, and severe burns.

Diseases that may be associated with the finding of keratocytes or horn or helmet shaped cells may include microangiopathic hemolytic anemias, Heinz-body hemolytic anemia, heart valve hemolysis, globmerulo nephritis and cavernous hemangiomas.

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Spherocytes, which are red blood cells with dense hemoglobin or hyperchromic hemoglobin content, lack a central area of pallor due to osmotic fergility (that is increased) may occur in conditions such as immune hemolytic anemias, heredity spherocytosis, ABO incompatibility, severe burns and Heinz-body anemias.

Stomatocytes or mouth cells or mushroom-capped cells may appear in conditions such as hereditary stomatocytosis, alcoholic cirrhosis, spherocytosis, anemia associated with Rh null disease, neoplasms and lead intoxication.

Leptocytes or thin cells may occur in iron deficiency anemia, thalassemia, liver disease and hemoglobinopathies.

Knizocytes, which are red blood cells with two concavities noted on stained smears having a pale hemoglobin center at either end, may occur in conditions where spherocytes are present.

Zerocytes, which are irregularly contracted dense cells where the hemoglobin within the cell is concentrated at its periphery, occur in familial zerocytosis.

Mean ranges for poikilocytosis of RBCs /10 fields.

Abnormal shape	Normal	Slight	Moderate	Severe
Spherocyte	0	1-5	6-15	>15
Acanthocyte	0	1-5	6-15	>15
Sickle Cell	0	1-5	6-15	>15
Rouleau forms	0	1-5	6-15	>15

Abnormal shape	Normal	Slight	Moderate	Severe
Bizarre forms	0-1	2-5	6-15	>15
Tailed red blood forms	0-1	2-5	6-15	>15
Target cells	0-1	2-5	6-15	>15
Schistocytes	0-1	2-5	6-15	>15
Ovalocytes	0-1	2-5	6-15	>15
Elliptocytes	0-1	2-5	6-15	>15
Burr cells	0-1	2-5	6-15	>15
Stomatocytes	0-1	2-5	6-15	>15
Blister cells	0-1	2-5	6-15	>15

Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day
- EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.
- Vitamin E: 400-800 IUs/day.

Test Name	Results
PROTEIN LINKAGE	**Moderate**

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Evaluation Report

Lab Date: 6/30/2009
Patient: Mrs. Sandra Microbe
Gender: Male   Age: 43

Findings & Considerations
Protein linkage represents a stickiness that occurs between red blood cells. Protein linked RBCs resemble lemons on a string (see photo). Stabilization of the lipid bilayer membrane in red blood cells by its association with an underlying membrane-associated cytoskeleton is likely compromised.

Protein inadequacies and/or deficiencies therefore may certainly result in deformation of the red blood cell membrane along with reduced life span of the RBC. Importantly, the RBC may be dysfunctional in one or more essential metabolic pathways; producing deformations, RBC linkages and rouleaux formation.

The red blood cell has three essential metabolic pathways including the Embden-Meyerhof pathway, which is involved in ATP, which regulates intracellular ions including sodium, potassium, calcium and magnesium via ion pumps. There was also the Hexose-monophosphate shunt that provides NADPH and glutathione to reduce cellular oxidants. There is the Rappaport-Leubering pathway that forms 2, 3-BPG, which facilitates oxygen release into various tissues. Finally, there is the Methemoglobin reductase that protects hemoglobin from oxidation via methemoglobin reductase and NADH. Therefore, co-enzyme-q10 copper, iron, B2, B3, NAC, lipoic acid, glutamine and vitamin C may be considered for insufficient red blood cell production.

Red blood cell linkage or agglutination appears in the peripheral blood smear as red blood cells that are irregularly clumped due to antigen antibody reactions. Associated disease state, which agglutination or protein leakage may appear within include cold agglutinins and various autoimmune hemolytic anemias. Specifically, IgM immunoglobins (culled agglutinins) are directed against red blood cell antigens causing the potential for erythrocytes to agglutinate forming various sized irregularly shaped clusters. These clusters are commonly referred to as grape-like clusters. Importantly, with the use of automated cell counters a low erythrocyte count occurring along with a significantly elevated MCV is highly suggestive of culled reacting agglutinins.

This phenomenon may be caused by the large number of conditions that result in improper cellular production of ATP, accumulation of intracellular calcium, states of acute and chronic mental and emotional stress, inflammatory and autoimmune processes and improper protein digestion and/or assimilation. Red blood cells may lose some of their ability of membrane physiology, stability and thus exchange of gaseous or other molecules between the inner and outer cellular membrane.

Recommended Nutritional Compounds

- Antioxidant Comprehensive Formula: As directed.
- Comprehensive multivitamin and mineral: As directed
- CoQ10 (coenzyme): 100-400mg day
- EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.
- Lipoic Acid: 100 Mg, 1x/day
- NAC contains: N-acetylcysteine 500 mg 1 tablets 2-3 times daily.
- Pancreatic Enzymes: 100-200,000 USP Units of Amylase, Lipase and Protease, 2-3x/day

Test Name	Results
RED BLOOD CELLS	**Moderate**

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Findings & Considerations

Erythrocyte: The erythrocyte of red blood cell is biconcave and is approximately between 7 to 7.5 um in diameter and 80 to 100 fL in volume. The normal erythrocyte life span is 100 to 120 days. The erythrocyte has a highly deformable membrane where it can actually squeeze into a corpuscle as tiny as 3 um.RBCs are the most numerous circulating blood cell in any species. The average normal sized rbc is seven microns in diameter. In humans and most mammals, erythrocytes are anucleate (contain no nucleus), and therefore, no genetic material and generally have the shape of a biconcave lens.

Red blood cells are rich in hemoglobin, a protein that binds and transports oxygen. Hemoglobin is a tetramer composed of four heme groups, each of which is attached to a globin chain. The heme moiety consists of a tetrapyrrole ring containing an iron atom in the ferrous (Fe^{2+}) state. The globin chains are present in identical pairs that are designated as alpha chains and beta chains. Erythrocytes also partially recover carbon dioxide produced as waste product of cellular respiration. The biconcave shape of these cells increases the surface area to cytoplasmic volume ratio. These characteristics increase the efficiency of oxygen diffusion. The biconcave disk also allows erythrocyte flexibility and deformability so erythrocytes can traverse the microvasculature.

The RBC membrane is composed of a bi-lipid lipid protein complex composed of biconcave protein, lipid and carbohydrate complex at 52, 40 and 8% respectively. As mature erythrocytes do not have organelles such as a mitochondria or a nucleus, damage to their membranes cannot be repaired thus they are removed (culled) from circulation by the spleen. Therefore, nutritional efforts as well as generalized health programs are geared towards improving the overall health of the red blood cell for subsequent red blood cells as opposed to those viewed under the microscope at the current time of the peripheral blood smear.

Blood diseases involving the red blood cells include:
•Anemias (or anaemias) are diseases characterized by low oxygen transport capacity of the blood, because of low red cell count or some abnormality of the red blood cells or the hemoglobin.
oIron deficiency anemia is the most common anemia; it occurs when the dietary intake or absorption of iron is insufficient, and hemoglobin, which contains iron, cannot be formed
oSickle-cell disease is a genetic disease that results in abnormal hemoglobin molecules. When these release their oxygen load in the tissues, they become insoluble, leading to mis-shaped red blood cells. These sickle shaped red cells are rigid and cause blood vessel blockage, pain, strokes, and other tissue damage.
oThalassemia is a genetic disease that results in the production of an abnormal ratio of hemoglobin subunits.
oSpherocytosis is a genetic disease that causes a defect in the red blood cell's cytoskeleton, causing the red blood cells to be small, sphere-shaped, and fragile instead of donut-shaped and flexible.
oPernicious anemia is an autoimmune disease wherein the body lacks intrinsic factor, required to absorb vitamin B12 from food. Vitamin B12 is needed for the production of hemoglobin.
oAplastic anemia is caused by the inability of the bone marrow to produce blood cells.
oPure red cell aplasia is caused by the inability of the bone marrow to produce only red blood cells.
 Effect of osmotic pressure on blood cells
•Hemolysis is the general term for excessive breakdown of red blood cells. It can have several causes and can result in hemolytic anemia.
oThe malaria parasite spends part of its life-cycle in red blood cells, feeds on their hemoglobin and then breaks them apart, causing fever. Both sickle-cell disease and thalassemia are more common in malaria areas, because these mutations convey some protection against the parasite.
•Polycythemias (or erythrocytoses) are diseases characterized by a surplus of red blood cells. The increased viscosity of the blood can cause a number of symptoms.
oIn polycythemia vera the increased number of red blood cells results from an abnormality in the bone marrow.
•Several microangiopathic diseases, including disseminated intravascular coagulation and thrombotic microangiopathies, present with

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pathognomonic (diagnostic) RBC fragments called schistocytes. These pathologies generate fibrin strands that sever RBCs as they try to move past a thrombus.
•Hemolytic transfusion reaction is the destruction of donated red blood cells after a transfusion, mediated by host antibodies, often as a result of a blood type mismatch.
Several blood tests involve red blood cells, including the RBC count (the number of red blood cells per volume of blood) and the hematocrit (percentage of blood volume occupied by red blood cells). The blood type needs to be determined to prepare for a blood transfusion or an organ transplantation.

Recommended Nutritional Compounds

- Iron (Iron Glycinate): 25-300 mg/day

Test Name	Results
RODS	**Moderate**

Findings & Considerations
Bacillus species are either obligate or facultative aerobes, and test positive for the enzyme catalase. Ubiquitous in nature, Bacillus includes both free-living and pathogenic species. Under stressful environmental conditions, the cells produce oval endospores that can stay dormant for extended periods.

Most pathogenic bacteria in humans are gram-negative organisms. Classically, six gram-positive genera are typically pathogenic in humans. Two of these, Streptococcus and Staphylococcus, are cocci (round bacteria). The remaining organisms are bacilli (rod-shaped bacteria) and can be subdivided based on their ability to form spores. The non-spore formers are Corynebacterium and Listeria (a coccobacillus), while Bacillus and Clostridium produce spores. The spore-forming bacteria can again be divided based on their respiration: Bacillus is a facultative anaerobe, while Clostridium is an obligate anaerobe.

Recommended Nutritional Compounds

- Aloe Vera Extract (Aloe Barbadensis): 50-100mg/day
- ECGC: 100 Mg/day
- L-Glutamine: 750-1500 Mg/day

Test Name	Results
ROULEAU FORMATION	**Mild**

Findings & Considerations
Rouleau, or a stacking of coins, is a phenomenon of RBCs that occurs when they are allowed to stand in laboratory tubes. Rouleau is also associated with conditions in which there is an abnormality or increased concentration of plasma proteins such as multiple myeloma or various other gammopathies. Laboratory may demonstrate an increased fibrinogen or immunoglobins along with peripheral blood evidence of rouleau. It should be kept in mind that rouleau formation may be inhibited or prevented if they are concentrated or suspended in saline or when RBCs assume various abnormal shapes, which prevent the architectural stacking phenomenon, which is typical of rouleau formation.

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One would expect a high ESR (erythrocyte sedimentation rate) upon blood testing which indicates the presence of an inflammatory disease or condition.[1] Agglutination, or the sticking together or red blood cells in coin-formations, is due to the presence of antibodies on the surface of the erythrocytes which joins them together (not all antibodies reactions result in this reaction).

Agglutination may be observed in cases of immune-mediated hemolytic anemia, and also during cryoglobulinemia (a rare condition). However, rouleau formation is far more common than is generally suspected by traditionally trained medical hematologist/oncologists. The presence of rouleau formation is often not associated with a specific disease or condition and often results from overall toxicity and ill-health. Clinical correlation is always indicated when rouleaux formation is present.

The erythrocyte of red blood cell is biconcave and is approximately between 7 to 7.5 um in diameter and 80 to 100 fL in volume. The normal erythrocyte life span is 100 to 120 days. The erythrocyte has a highly deformable membrane where it can actually squeeze into a corpuscle as tiny as 3 um. Interestingly, the red blood cell membrane changes its shape, but maintains its cell surface area.

A decrease in the deformability of the red blood cell membrane, which might occur if it loses a fluidity, will decrease the ability of the erythrocyte to deform through various sized vessels and organs. Reduced deformability leads to red blood cell fragmentation occurring under the normal stressors of the hemodynamic-circulatory system. The RBC membrane is composed of a bi-lipid lipid protein complex composed of biconcave protein, lipid and carbohydrate complex at 52, 40 and 8% respectively.

As mature erythrocytes do not have organelles such as a mitochondria or a nucleus, damage to their membranes cannot be repaired thus they are removed (culled) from circulation by the spleen. Therefore, nutritional efforts as well as generalized health programs are geared towards improving the overall health of the red blood cell for subsequent red blood cells as opposed to those viewed under the microscope at the current time of the peripheral blood smear.

Protein inadequacies and/or deficiencies therefore may certainly result in deformation of the red blood cell membrane along with reduced life span of the RBC. Importantly, the RBC may be dysfunctional in one or more essential metabolic pathways; producing deformations, RBC linkages and rouleaux formation.

The red blood cell has three essential metabolic pathways including the Embden-Meyerhof pathway, which is involved in ATP, which regulates intracellular ions including sodium, potassium, calcium and magnesium via ion pumps. There was also the Hexose-monophosphate shunt that provides NADPH and glutathione to reduce cellular oxidants. There is the Rappaport-Leubering pathway that forms 2, 3-BPG, which facilitates oxygen release into various tissues. Finally, there is the Methemoglobin reductase that protects hemoglobin from oxidation via methemoglobin reductase and NADH. Therefore, co-enzyme-q10 copper, iron, B2, B3, NAC, lipoic acid, glutamine and vitamin C may be considered for insufficient red blood cell production.

Red blood cell linkage or agglutination appears in the peripheral blood smear as red blood cells that are irregularly clumped due to antigen antibody reactions. Associated disease state, which agglutination or protein leakage may appear within include cold agglutinins and various autoimmune hemolytic anemias. Specifically, IgM immunoglobins (culled agglutinins) are directed against red blood cell antigens causing the potential for erythrocytes to agglutinate forming various sized irregularly shaped clusters. These clusters are commonly referred to as grape-like clusters. Importantly, with the use of automated cell counters a low erythrocyte count occurring along with a significantly elevated MCV is highly suggestive of culled reacting agglutinins.

Kinetics of Linear Rouleaux Formation
According to Smoluchowski, the kinetics of aggregation of colloids is based on the assumption that each particle is surrounded by a

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"sphere influence". Single spherical particles, which undergo Brownian motion collide and cause sticking of particles. As aggregation proceeds, the average diffusion constant of the aggregate population decreases. The aggregation of red blood cells progresses in the same manner except that cells are biconcave rather than spherical.

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Recommended Nutritional Compounds

· Antioxidants (Mixed): 1-2/day

· Bromelain: 100 - 600 mg/day

· Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.

· Curcumin: 500—1000mg/day

· EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.

· Lipoic Acid: 100 Mg, 1x/day

· Pancreatic Enzymes: 100-200,000 USP Units of Amylase, Lipase and Protease, 2-3x/day

Test Name	Results
SEGMENTED NEUTROPHILS	**Mild**

Findings & Considerations

Neutrophils are between 12 - 14 microns in size. Neutrophils have a multilobed nucleus that contains between 2-5 lobes connected by chromatin threads purplish blue in colour. Cytoplasm is plenty, bluish pink with plenty of fine pink granules. Cell outline is usually distinct. Neutrophils with greater than 5 lobes may be considered hypersegmented. Hypersegmented neutrophils is commonly caused by folic acid, vitamin B12 and/or folic acid deficiency.

Neutrophil granulocytes, commonly referred to as just neutrophils, are the most abundant type of white blood cells in mammals and form an essential part of the cell mediated immune system. Neutrophils form part of the polymorphonuclear cell family (PMNs) together with basophils and eosinophils; these three subtypes of wbc's are known as the granulocytes. Hyperlobulated neutrophils,

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otherwise known as segmented neutrophils, by definition contain five or more nuclei (or segments). These overabundant segments are commonly associated with vitamin B12 and/or folic acid deficiency. Malabsorption, malnutrition, liver disease, alcoholism or eating disorders may result in an abundance of segmented neutrophils.

Neutrophil granulocytes have an average diameter of 12-15 micrometers (µm) in peripheral blood smears and account for approximately 70% of all white blood cells (leukocytes).

Lifespan
The average half-life of non-activated neutrophils in the circulation is about 12 hours. Upon activation, they marginate (position themselves adjacent to the blood vessel endothelium), and undergo selectin-dependent capture followed by integrin-dependent adhesion in most cases, after which they migrate into tissues, where they survive for 1-2 days.

Chemotaxis
Neutrophils undergo a process called chemotaxis, which allows them to migrate toward sites of infection or inflammation. Cell surface receptors are able to detect chemical gradients of molecules such as interleukin-8 (IL-8), interferon gamma (IFN-gamma), and C5a, which these cells use to direct the path of their migration.

Function
Neutrophil being highly motile quickly congregate at a focus of infection, attracted by cytokines expressed by activated endothelium, mast cells, and macrophages.

Phagocytosis
Neutrophils are phagocytes, capable of ingesting microorganisms or particles. They can internalize and kill many microbes, each phagocytic event resulting in the formation of a phagosome into which reactive oxygen species and hydrolytic enzymes are secreted. The consumption of oxygen during the generation of reactive oxygen species has been termed the "respiratory burst," although unrelated to respiration or energy production.

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Recommended Nutritional Compounds

- B12 (methylcobalamine): 1000 Mcg/day
- B6 (pyridoxyl-5-phosphate): 100 Mg, 1-2x/day
- Folic Acid (5-Formyl Tetrahydrofolate): 400 mcg/day

Test Name	Results
T CELLS	**Moderate**

Findings & Considerations

Helper T cell (small cell) and B cell (large cell) are the two major types of white blood cells produced by the thymus gland; darkfield microscopy these cells cannot be distinguished from one another. The helper and killer T cells exit and pass back into the bloodstream, ready to battle antigens. When Helper T cells detect the presence of specific antigens, they produce various secretions that signal other cells to multiply and attack. Helper T cells instruct B cells to start making antibody-producing plasma cells and memory B cells. Helper T cells also foster the production of cytotoxic / killer T cells. Helper T cells can also release interleukin which stimulates other T cells. B cells can also digest the foreign material.

An INCREASED T cell count may be due to:
Infectious mononucleosis, multiple myeloma and acute lymphoblastic leukemia.

Congenital T-cell DEFICIENCY disease
Nezelof syndrome, DiGeorge syndrome, Wiskott-Aldrich syndrome, B cell proliferative disorders, Acquired, immunodeficiency syndrome, Chronic lymphocytic leukemia, Waldenstrom's macroglobulinemia

Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day
- Asian Ginseng Root Extract (Panax Ginseng): 200-400 Mg

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- Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.
- Raw Thymus Concentrate: 120-240 Mg/day
- Vitamin E: 400-800 IUs/day.

Test Name	Results
TARGET CELLS	**Moderate**

Findings & Considerations

Target cells are also called coodocytes. Erythrocytes with an increased surface area to volume ratio; appear as targets with a bulleye. Target cell and spicules accumulate as red blood cells become cholesterol loaded. Decreased red blood cell mass may result in a reduced hemoglobin concentration and therefore tissue hypoxia. This condition is generally known as anemia. Anemia is compensated for in part by increasing the rate of blood flow to hypoxic tissues and this may result in hemolysis.

Target cells are a common and essential finding in anemia. Additional laboratory investigations to correlate with the presence of target cells found on a peripheral blood smear that help define iron anemia should include the following: The total erythrocyte count, hemoglobin concentration, hematocrit, red blood cell count, MCV, MCHC, and MCH. A reticulocyte count as well as leukocyte and platelet numbers and perhaps bone marrow examination may be of essential importance in the complete workup of anemia.

Conditions associated with the formation of target cells include, but are not limited to: liver disease, iron deficiency or anemia, post-splenectomy, decreased lecithin cholesterol acetyltransferase activity and thalassemia (hemoglobinopathy).

Recommended Nutritional Compounds

- Antioxidants (Mixed): 1-2/day
- Iron (Iron Glycinate): 25-300 mg/day
- Spleen Glandular: 100 - 200 mg/day.

Test Name	Results
THROMBOCYTES	**Severe**

Findings & Considerations

Thrombocytes are cells that play a key role in blood clotting. In mammals, thrombocytes are anucleated cell fragments called platelets. thrombocytes commonly appear as tiny clusters of cells (thrombocytes clumped together - see photo).

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Platelets, or thrombocytes, are small, irregularly shaped anuclear cells, 2-4 µm in diameter, which are derived from fragmentation of precursor megakaryocytes. The average lifespan of a platelet is between 8 and 12 days. Platelets play a fundamental role in hemostasis and are a natural source of growth factors[1]. They circulate in the blood of mammals and are involved in hemostasis, leading to the formation of blood clots.

If the number of platelets is too low, excessive bleeding can occur. However, if the number of platelets is too high, blood clots can form (thrombosis), which may obstruct blood vessels and result in a stroke and/or a heart attack. An abnormality or disease of the platelets is called a thrombocytopathy[2], which could be either a low number of platelets (thrombocytopenia), a decrease in function (thrombasthenia) or an increase in the number of (thrombocytosis). Paradoxically, there are disorders that reduce the number of platelets, such as heparin-induced thrombocytopenia (HIT) or thrombotic thrombocytopenic purpura (TTP) that typically cause thromboses, or clots, instead of bleeding.

Platelets release a multitude of growth factors including platelet-derived growth factor (PDGF), a potent chemotactic agent, and transforming growth factor-β, which stimulates the deposition of extracellular matrix. Both of these growth factors have been shown to play a significant role in the repair and regeneration of connective tissues. Other healing-associated growth factors produced by platelets include basic fibroblast growth factor, insulin-like growth factor-1 (IGF-1), platelet-derived epidermal growth factor, and vascular endothelial growth factor. Local application of these factors in increased concentrations through PRP (platelet-rich plasma) has been used as an adjunct to wound healing for several decades[3][4][5][6][7][8][9].

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Recommended Nutritional Compounds

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· Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.

· Curcumin: 500—1000mg/day

· EPA/DHA (Liquid High Concentrate): 1500 - 3000 mg/day or the quivalent in capsules.

· Ginko Biloba (120mg) contains: Standardized to 24% ginkgo flavonoglycosides, 6% terpene lactones (by HPLC). 1-2/day

· Niacin (inositol hexanicotinate): 1000 mg/day

· Soluble and Insoluble Fibers: Take 1-2 servings per day.

Test Name	Results
URIC ACID CRYSTALS	**Severe**

Findings & Considerations

The urate crystal has a needle-like morphology and strong negative birefringence under polarised light. This test may be difficult to perform, and a trained observer does better in distinguishing this crystal from others. Many physicians do not perform this test, relying instead on a variety of less specific clinical signs and laboratory tests. Uric acid is produced by xanthine oxidase from xanthine and hypoxanthine, which in turn are produced from purine. Uric acid in excess is more toxic to tissues than either xanthine or hypoxanthine.

In humans, uric acid is the final oxidation (breakdown) product of purine metabolism and is excreted in urine. Both uric acid and ascorbic acid are strong reducing agents (electron donors) and potent antioxidants. In humans, over half the antioxidant capacity of blood plasma comes from uric acid.In humans, about 70% of daily uric acid disposal occurs via the kidneys, and in 5-25% of humans impaired renal (kidney) excretion leads to hyperuricemia.[5]

In human blood plasma, the reference range of uric acid is between 3.6 mg/dL (~214µmol/L) and 8.3 mg/dL (~494µmol/L) (1mg/dL=59.48 µmol/L). [7] This range is considered normal by the American Medical Association. Uric acid concentrations in blood plasma above and below the normal range are known, respectively, as hyperuricemia and hypouricemia. Similarly, uric acid concentrations in urine above and below normal are known as hyperuricosuria and hypouricosuria.

High uric acid
-Excess serum accumulation of uric acid can lead to a type of arthritis known as gout. [8]

Elevated serum uric acid (hyperuricemia) can result from high intake of purine-rich foods, high fructose intake (regardless of fructose's low glycemic index (GI) value) and/or impaired excretion by the kidneys. Saturation levels of uric acid in blood may result in one form of kidney stones when the urate crystallizes in the kidney. These uric acid stones are radiolucent and so do not appear on an abdominal plain x-ray or CT scan. Their presence must be diagnosed by ultrasound for this reason. Very large stones may be

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detected on x-ray by their displacement of the surrounding kidney tissues. Some patients with gout eventually get uric kidney stones.

Gout can occur where serum uric acid levels are as low as 6 mg/dL (~357µmol/L), but an individual can have serum values as high as 9.6 mg/dL (~565µmol/L) and not have gout[9].

Lesch-Nyhan syndrome
-Lesch-Nyhan syndrome, an extremely rare inherited disorder, is also associated with very high serum uric acid levels. [11]

Spasticity, involuntary movement and cognitive retardation as well as manifestations of gout are seen in cases of this syndrome. [12]

Cardiovascular disease
-Although uric acid can act as an antioxidant, excess serum accumulation is often associated with cardiovascular disease. It is not known whether this is causative (e.g., by acting as a prooxidant) or a protective reaction taking advantage of urate's antioxidant properties.

Diabetes
The association of high serum uric acid with insulin resistance has been known since the early part of the 20th century, nevertheless, recognition of high serum uric acid as a risk factor for diabetes has been a matter of debate. In fact, hyperuricemia has always been presumed to be a consequence of insulin resistance rather than its precursor [14]. However, it was shown in a prospective follow-up study that high serum uric acid is associated with higher risk of type 2 diabetes independent of obesity, dyslipidemia, and hypertension [15].

Metabolic syndrome
Hyperuricemia is associated with components of metabolic syndrome and it has been debated for a while to be a component of it. It has been shown in a recent study that fructose-induced hyperuricemia may play a pathogenic role in the metabolic syndrome. This agrees with the increased consumption of fructose-base drinks in recent decades and the epidemic of diabetes and obesity [16].

Folic acid supplementation between 1-5 or more milligrams is also effective for reducing high uric acid levels.

Uric acid stone formation
Uric acid stones, which form in the absence of secondary causes such as chronic diarrhea, vigorous exercise, dehydration, and animal protein loading, are felt to be secondary to obesity and insulin resistance seen in metabolic syndrome. Increased dietary acid leads to increased endogenous acid production in the liver and muscles which in turn leads to an increased acid load to the kidneys. This load is handled more poorly because of renal fat infiltration and insulin resistance which are felt to impair ammonia excretion (a buffer). The urine is therefore quite acidic and uric acid becomes insoluble, crystallizes and stones form. In addition, naturally present promotor and inhibitor factors may be affected. This explains the high prevalence of uric stones and unusually acid urine seen in patients with type 2 diabetes. Uric acid crystals can also promote the formation of calcium oxalate stones, acting as "seed crystals" (heterogenous nucleation). [17]

Low uric acid
-Multiple sclerosis
Lower serum values of uric acid have been associated with Multiple Sclerosis. Multiple sclerosis (MS) patients have been found to have serum levels ~194µmol/L, with patients in relapse averaging ~160µmol/L and patients in remission averaging ~230µmol/L. Serum uric acid in healthy controls was ~290µmol/L.[18] Conversion factor: 1 mg/dL=59.48 µmol/L[7]

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A 1998 study completed a statistical analysis of 20 million patient records, comparing serum uric acid values in patients with gout and patients with multiple sclerosis. Almost no overlap between the groups was found. [19]

Uric acid has been successfully used in the treatment and prevention of the animal (murine) model of MS. A 2006 study found that elevation of serum uric acid values in multiple sclerosis patients, by oral supplementation with inosine, resulted in lower relapse rates, and no adverse effects. [20]

Oxidative stress
Uric acid may be a marker of oxidative stress,[21] and may have a potential therapeutic role as an antioxidant.[22] On the other hand, like other strong reducing substances such as ascorbate, uric acid can also act as a prooxidant,[23] particularly at elevated levels. Thus, it is unclear whether elevated levels of uric acid in diseases associated with oxidative stress such as stroke and atherosclerosis are a protective response or a primary cause.[24][25]

For example, some researchers propose that hyperuricemia-induced oxidative stress is a cause of metabolic syndrome.[26][27] On the other hand, plasma uric acid levels correlate with longevity in primates and other mammals.[28] This is presumably a function of urate's antioxidant properties.

Sources of uric acid
In many instances, people have elevated uric acid levels for hereditary reasons. Diet may also be a factor; eating large amounts of sea salt can cause increased levels of uric acid. (Medical consultation is recommended before using large quantities of sea salt in daily cooking.) Pureness are found in high amounts in animal internal organ food products, such as liver.[29] A moderate amount of purine is also contained in beef, pork, poultry, fish and seafood, asparagus, cauliflower, spinach, mushrooms, green peas, lentils, dried peas, beans, oatmeal, wheat bran and wheat germ.[30] Examples of high purine sources include: sweetbreads, anchovies, sardines, liver, beef kidneys, brains, meat extracts (e.g Oxo, Bovril), herring, mackerel, scallops, game meats, and gravy. Moderate intake of purine-containing food is not associated with an increased risk of gout. [31]
Serum uric acid can be elevated due to high fructose intake [26], reduced excretion by the kidneys, and or high intake of dietary purine. Added fructose can be found in processed foods and soda beverages as sucrose, or in some countries, as high fructose corn syrup.

Causes of low uric acid
Low uric acid (hypouricemia) can have numerous causes.
Low dietary zinc intakes cause lower uric acid levels. This effect can be even more pronounced in women taking oral contraceptive medication. [32]
Sevelamer, a drug indicated for prevention of hyperphosphataemia in patients with chronic renal failure, can significantly reduce serum uric acid. [33]

Normalizing low uric acid
Correcting low or deficient zinc levels can help elevate serum uric acid [34]. Folic acid supplementation between 1-5 or more milligrams is also effective for reducing high uric acid levels.
Inosine can be used to elevate uric acid levels. [35]

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Recommended Nutritional Compounds

· Antioxidants (Mixed): 1-2/day

· Buffered Vitamin C Powder: 2 - 6 g/day. How to perform a vitamin C flush: Have the patient remain home near a toilet. The patient is to dissolve 1 level tsp of vitamin C powder in 1-2 ounces of water or juice and repeat this every 30 minutes while not consuming foods or fluids. During this process gas and bloating is to be expected. This process is to continue until the patient experiences a watery-diarrhea. If watery-diarrhea does not occur within 5 hours, then the patient is to stop and expect that later during the day, or the following day, a loose stool may occur. However, if a flush does not occur on the first day of attempt, then this procedure is to be repeated on another day. The patient records the number of level tsp of vitamin C is consumed to produce the watery-diarrhea or flush reaction. The amount of vitamin C the patient is to consume each day is 75% of the amount of vitamin C it took to produce the flush. This smaller amount of vitamin C should not cause diarrhea, but should improve bowel transit time (if too long) as well as many other physiologic functions.

· Chromium (as picolinate): 200-1000 mcg/day

· Folic Acid (5-Formyl Tetrahydrofolate): 400 mcg/day

· Glucosamine Sulfate or Hydrochloride (for person’s over 50 yrs of age): 1000 mg elemental) derived from 1,250 mg Glucosamine HCI. 3 capsules/day

· Pantothenic Acid (as D-Calcium Pantothenate): 500-1000 Mg/day

· Zinc (as zinc gluconate): 10-30mg

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