

MITOCHONDRIAL HEALTH, INFLAMMATION & AUTOIMMUNITY

Could the health of your mitochondria and cells hold the key to disease prevention and longevity?



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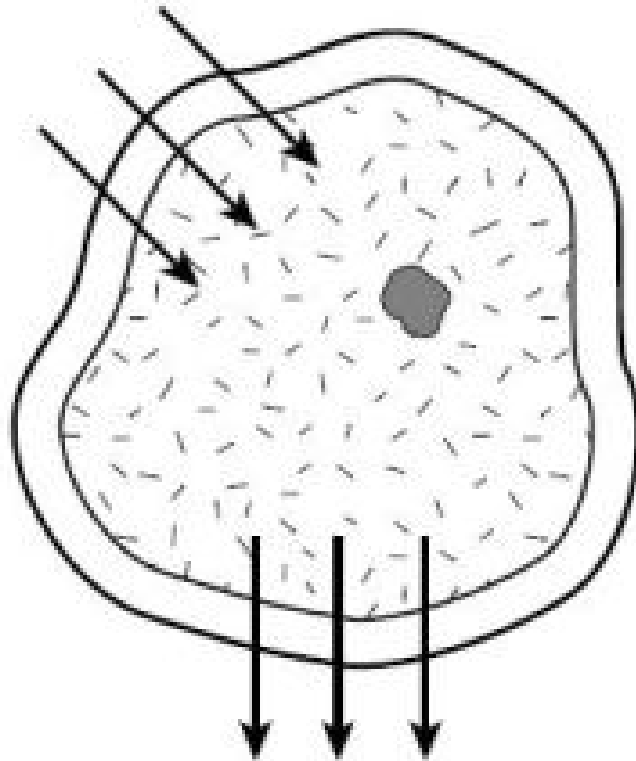
Homeoprophylaxis Practitioner

Intern of Doctorate / PHD degree program in Natural / Integrative
Medicine



Healthy Cell

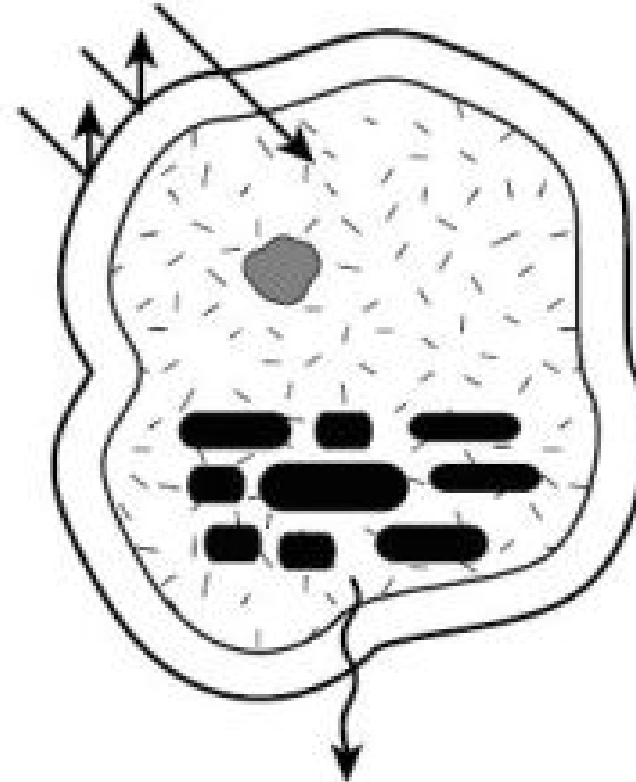
Nutrients pass in



Wastes pass out

Unhealthy Cell

Absorption inhibited

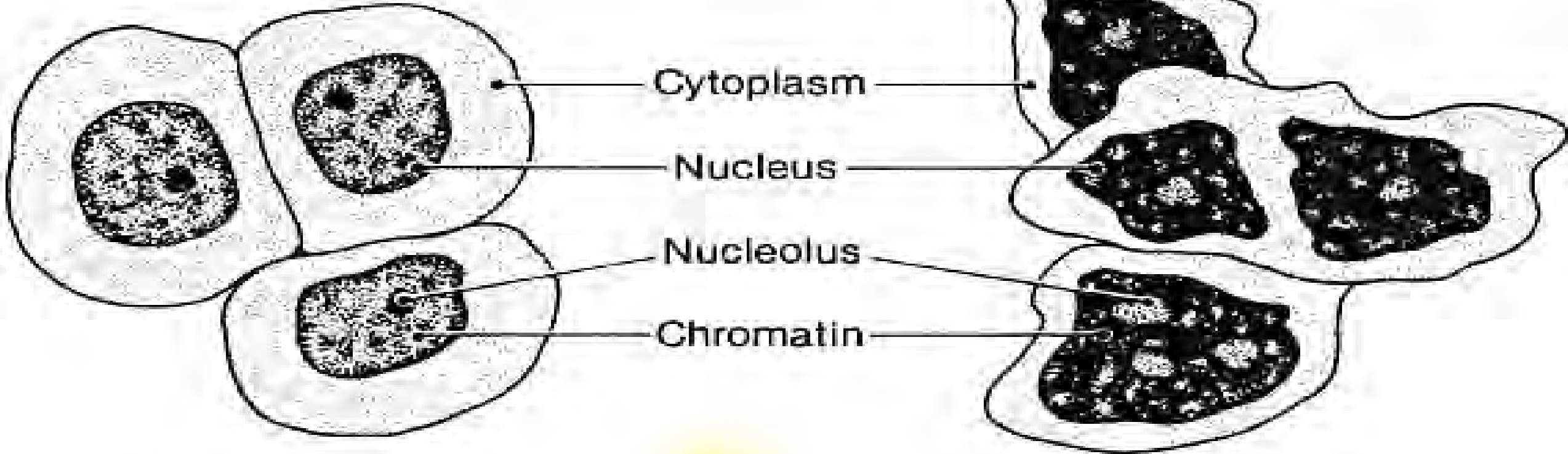


Elimination inhibited

Normal and Cancer Cells Structure

Normal

Cancer



Cytoplasm

Nucleus

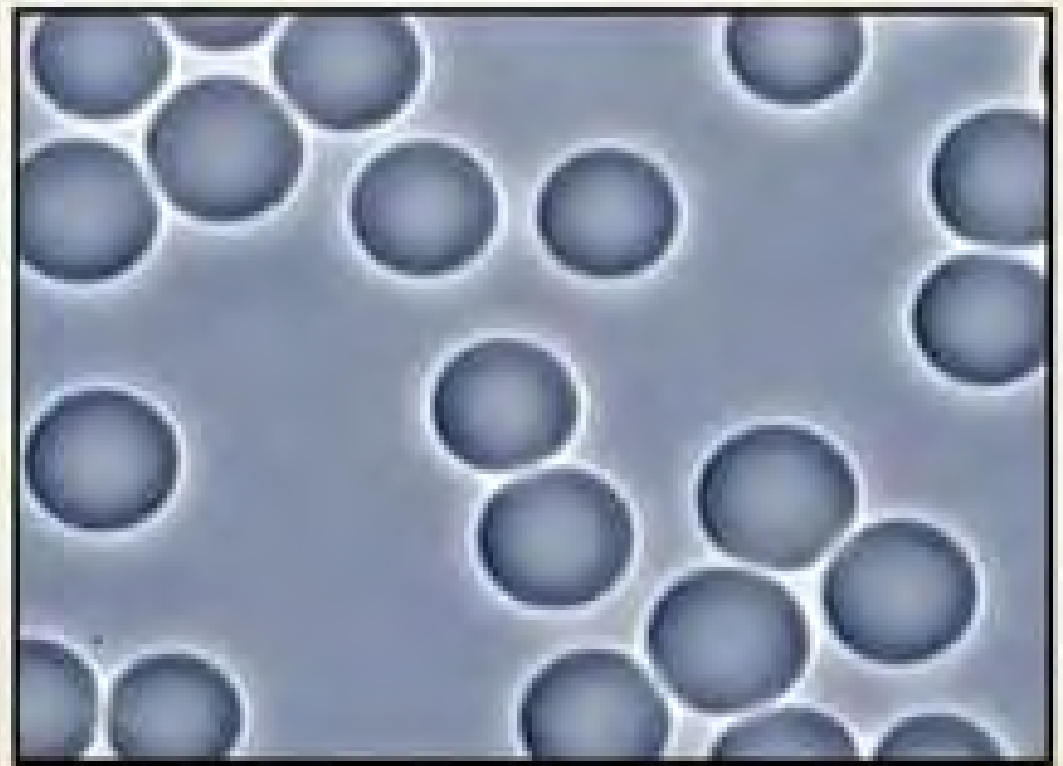
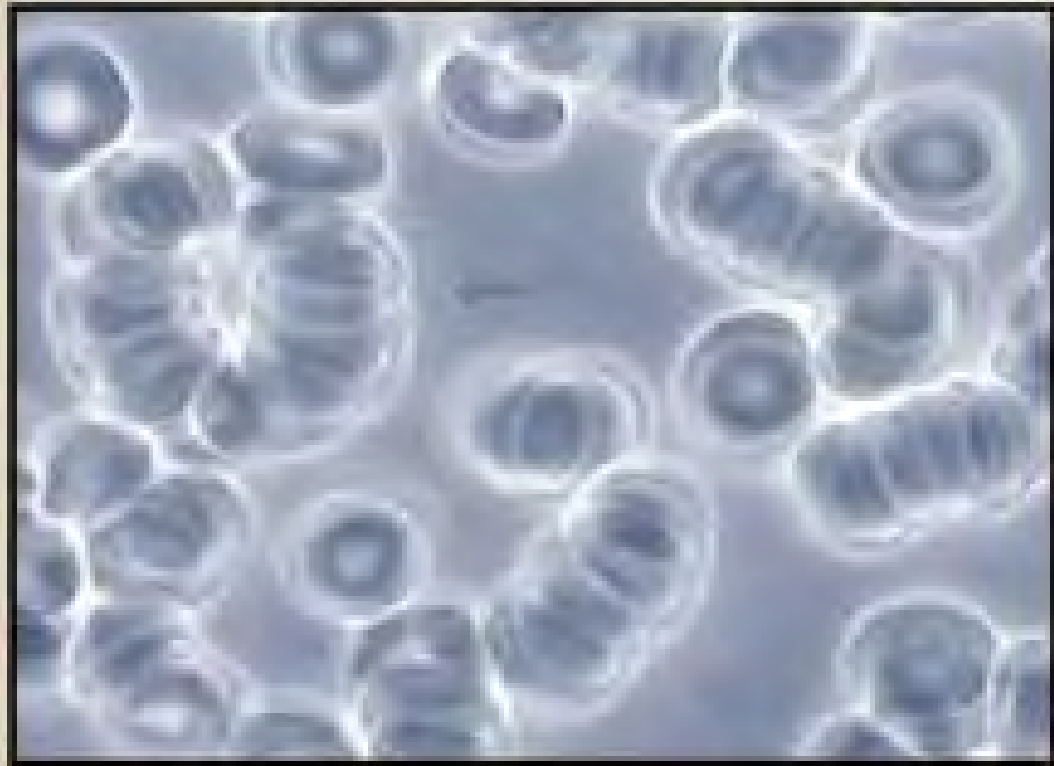
Nucleolus

Chromatin

- Large cytoplasm
- Single nucleus
- Single nucleolus
- Fine chromatin



- Small cytoplasm
- Multiple nuclei
- Multiple and large nucleoli
- Coarse chromatin





WHAT IS *Inflammation*

What is Inflammation?

Inflammation is the body's immune response to injury or foreign invaders (infections). Inflammation is involved in both self-protection and repair. It can be acute and chronic.

Normal levels of inflammation are good for the body for various reasons.

First, inflammatory cytokines and mediators (e.g. histamines, leukotrienes, prostaglandins, nitric oxides) are necessary for communication within the immune system.

Second, inflammation is also necessary for deep quality sleep. Inflammation only becomes bad when it is chronically elevated, when it can't resolve itself.

Your body's ability to produce inflammation is very important for health and survival because without it, you wouldn't be able to heal wounds or protect yourself from germs.



Most people will be aware of obvious symptoms of “bad” inflammation, including:

- Aches and pain
- Skin problems of any kind
- Digestive problems
- Swelling

There are also many conditions that are less obviously related to inflammation. Most people or even medical doctors may not associate these with inflammation:

- Brain fog or cognitive dysfunction
- Mood problems
- Anxiety, depression, or both
- Digestive problems
- Insomnia
- Poor quality sleep or too much sleep
- Neurodegenerative disorders like Alzheimer’s
- Cancers

It is possible to have inflammation without any detectable or visible damage in any organ system. In addition, some types of inflammation cannot be detected through a blood test, because the inflammation is localized to a specific area.



Main Reasons for Inflammation leading to Mitochondrial damage.

1. Injury
2. Food Allergy / Poor Diet
3. Toxicity / Chemicals / Metals
4. Infection - Bacterial / Fungal / Parasitic
5. Poor Sleep
6. Aging





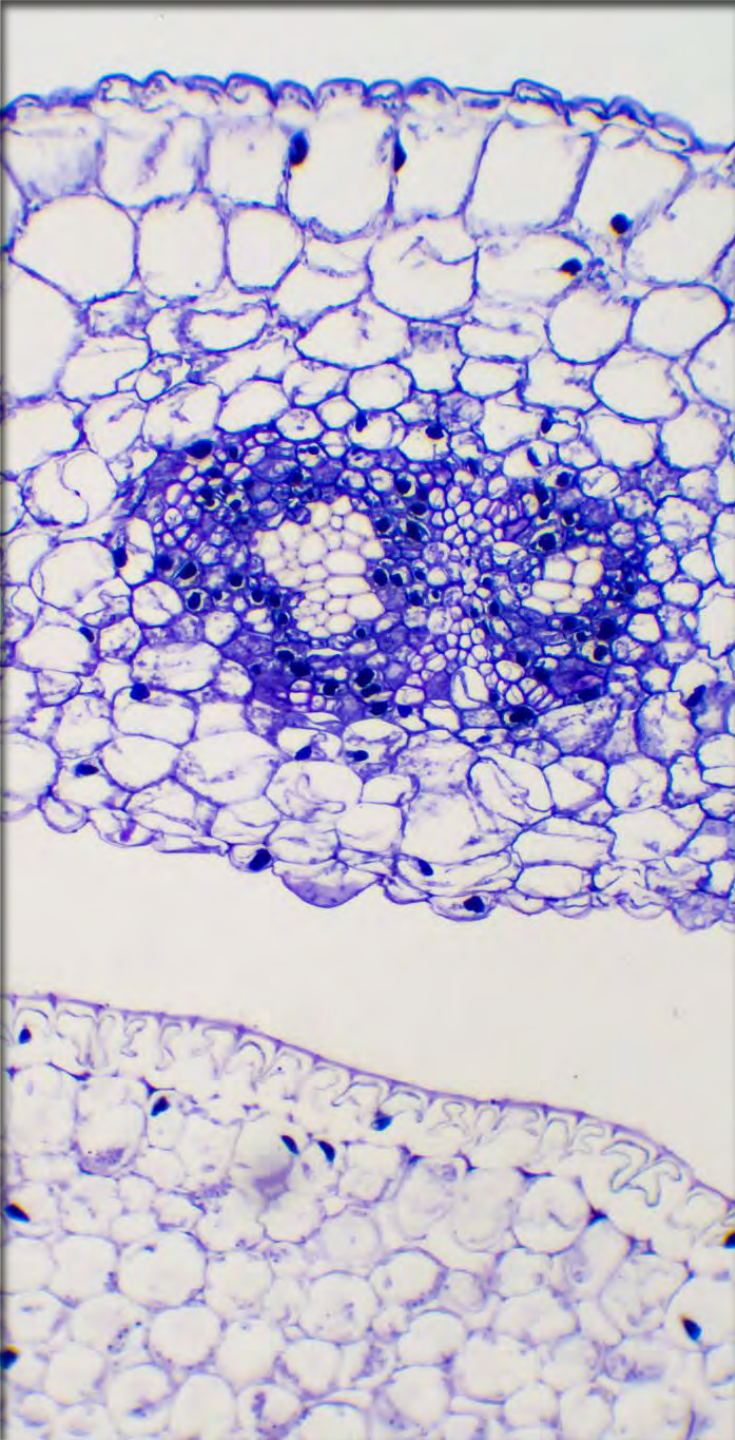
Mitochondria



“ The health of the mitochondria affects the health of nearly every cell in the body. Because the diet of most people is severely lacking in the micronutrients needed for mitochondria to have optimal cellular function, our bodies can experience progressive damage to the mitochondria and our cells, leading to cells that do not function well, which in turn leads to progressive , lasting damage to our bodies. Many other diseases worsen because of sick mitochondria; disease like asthma, chronic obstructive lung disease, hypertension, coronary heart disease, depression, obesity, bipolar disorder, and diabetes have all been shown to become worse as a result of mitochondrial stress and eventual failure. Mitochondrial failure drives the development of diabetes, heart disease, lung disease, heartburn from stomach acidity, Alzheimer’s, Parkinson’s, many psychiatric disorders, and multiple sclerosis. Improving the health of our mitochondria, by definition, improves the health of our cells. Healthy cells are necessary to have healthy organs; healthy organs lead to healthier bodies and restored vitality.”

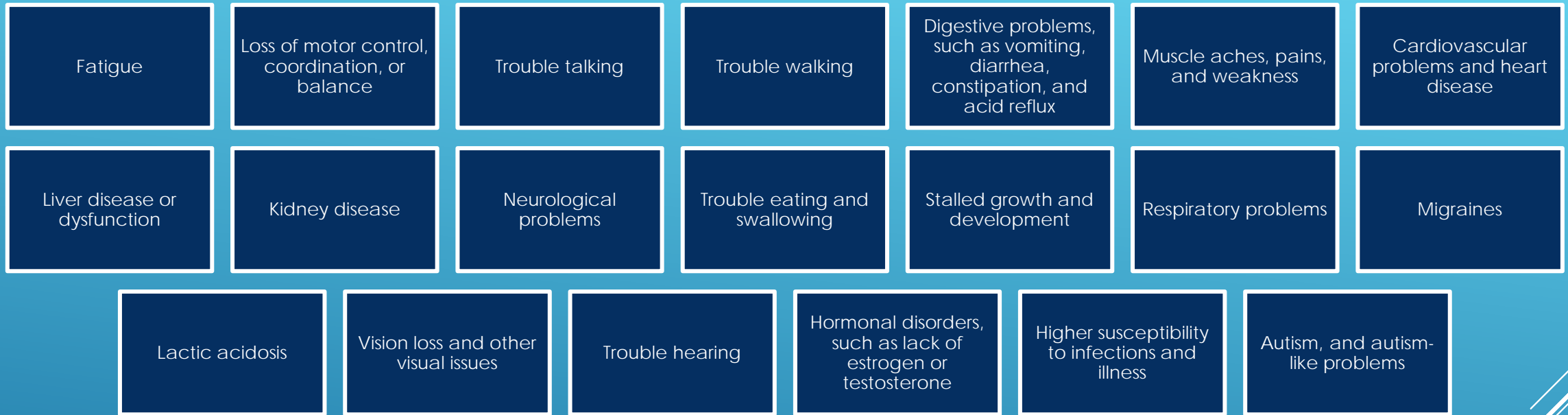
Terry L Wahls, M.D.





- ▶ Cellular Respiration
- ▶ Calcium Homeostasis
- ▶ Cellular Energy Production
- ▶ Promote Cell Growth and Multiplication
- ▶ Responsible for Cell Death
- ▶ Generate Oxidative Radicals
- ▶ Support Nervous System Function
- ▶ Heat Production
- ▶ Organs of Metabolism
- ▶ Synthesize Biomolecules

FUNCTIONS OF THE MITOCHONDRIA



MITOCHONDRIAL SYMPTOMS

KREBS CYCLE AND THE ELECTRON TRANSPORT CHAIN

Without mitochondria a cell if needed can produce two ATP molecules per glucose molecule.

With a healthy mitochondrion a cell can make a total of 38 ATP molecules from one glucose molecule.

Different cells have different energy needs. Cells can have hundreds to thousands of mitochondria making ATP.

Brain cells have some of the highest concentrations of mitochondria per cell. This is why it is vital to maintain mitochondrial health.



Riboflavin (B2) Used to make FADH, Niacinamide (B3) which is used to make NADH.

Ubiquinone (CoQ10)

B Vitamins and co-enzyme Q10 are important nutrients for healthy mitochondria.

COFACTORS REQUIRED TO GENERATE ATP





Anti-Inflammatory and Nutritious Diet:

- ▶ Eliminate inflammatory foods.
- ▶ Eat plenty of greens.
- ▶ Fill up on healthy fats.
- ▶ Focus on clean proteins.

Ketogenic Diet Improves Mitochondria:

- ▶ The keto diet is a high fat and low carb plan that uses ketones as an alternative energy source instead of glucose.
- ▶ Most people are using sugar (glucose) for energy.
- ▶ Research has shown that the ketogenic diet can slow the progression of a mitochondrial disease and positively influence longevity pathways.
- ▶ Ketogenic diets may reduce inflammation, increase mental clarity, focus, and concentration, provide you with more energy, slower aging and reduce the risk of chronic diseases.

STRATEGIES TO IMPROVE MITOCHONDRIAL HEALTH



Exercise:

We are meant to move our bodies for optimal health and well-being. However, the average person sits for about 13 hours a day. Considering that the recommended duration of sleep is 7 to 8 hours, it means that the average person spends 20 to 21 hours in a lying or sitting position.

Regular exercise can improve mitochondrial health, maintain your muscle tone, improve your sleep, boost your immune system, better your cognitive abilities, and increase your lifespan. Aerobic exercise can help change the mitochondrial shape, aid mitochondrial repair and promote the balance of mitochondrial cells.

A study found that interval training resulted in a 49 percent increase in mitochondrial capacity in younger volunteers and a 69 percent improvement in older ones. This is particularly important since the aging process can decrease your body's ability to make mitochondria. Therefore, it seems that exercise can slow this process and better your mitochondrial function even later in life





Chronic stress can increase inflammation, reduce immune function and increase fatigue. All of this can increase your risk of mitochondrial problems and related symptoms.



Improve Sleep:

According to research, less than seven hours of sleep per night can result in the reduction of mitochondrial DNA in the blood as well as poor cellular function. Even short-term sleep deprivation can result in mitochondrial dysfunction and oxidative stress.



Exposure to Toxins

Toxins can directly cause autoimmunity to develop and they can worsen the symptoms and the progression of the disease process.

Toxins are substances that cause a harmful reaction in your body and include things like heavy metals, mycotoxins (toxins from mold exposure), and chemicals in your environment. Some of the greatest exposures come from the foods you eat, the water you drink, the air you breathe and the personal-care products you use.

Gently optimizing your organs of detoxification will encourage your body to release toxins and help improve your body's overall functioning which will help you feel better.

Toxins are introduced in your body in two ways: through normal physiologic processes (like breathing or eating) and through exposures in your environment.

In theory, your body should be able to process the waste products and toxins you're exposed to. However, the environment has been flooded by an overwhelming number of chemicals that our body's have a hard time keeping up.





FOOD PESTICIDES
AND CHEMICALS



TIN POISONING



FLUORIDE



DIESEL



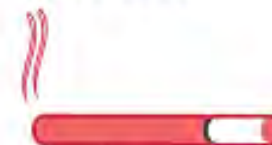
BPA
(BISPHENOL A)



LEAD



MERCURY



OVER 4000 CHEMICALS

TOXINS



ALUMINUM,
PARABENS



PERC
(PERCHLOROETHYLENE)



FLAME RETARDANTS



INSECT PESTICIDE



AMMONIA,
MANGANESE



EXHAUST AND
POLLUTION

Autoimmune Diseases Disproportionately Affecting Women



HASHIMOTO'S
THYROIDITIS



SYSTEMIC LUPUS
ERYTHEMATOSUS



SJOGREN'S
SYNDROME



PRIMARY BILIARY
CIRRHOSIS



SCLERODERMA



RHEUMATOID ARTHRITIS



MULTIPLE SCLEROSIS



23andMe

SHAMPOO

AVERAGE NUMBER OF CHEMICALS: 15
MOST WORRYING: Sodium Lauryl Sulphate; Tetrasodium and Propylene Glycol.
POSSIBLE SIDE-EFFECTS: Irritation; possible eye damage.

EYE SHADOW

CHEMICALS: 26
MOST WORRYING: Polyethylene terephthalate.
POSSIBLE SIDE-EFFECTS: Linked to cancer; infertility; hormonal disruptions and damage to the body's organs.

LIPSTICK

CHEMICALS: 33
MOST WORRYING: Polymethyl methacrylate.
POSSIBLE SIDE-EFFECTS: Allergies; links to cancer.

NAIL VARNISH

CHEMICALS: 31
MOST WORRYING: Phthalates.
POSSIBLE SIDE-EFFECTS: Linked to fertility issues and problems in developing babies.

PERFUME:

CHEMICALS: 250
MOST WORRYING: Benzaldehyde.
POSSIBLE SIDE-EFFECTS: Irritation to mouth, throat and eyes; nausea; linked to kidney damage.

FAKE TAN

CHEMICALS: 22
MOST WORRYING: Ethylparaben, Methylparaben, Propylparaben.
POSSIBLE SIDE-EFFECTS: Rashes; irritation; hormonal disruption.

HAIRSPRAY

AVERAGE NUMBER OF CHEMICALS: 11
MOST WORRYING: Octinoxate, Isophthalates.
POSSIBLE SIDE-EFFECTS: Allergies; irritation to eyes, nose and throat; hormone disruption, linked to changes in cell structure.

BLUSHER:

CHEMICALS: 16
MOST WORRYING: Ethylparabens, Methylparaben, Propylparaben.
POSSIBLE SIDE-EFFECTS: Rashes; irritation; hormonal disruptions.

FOUNDATION

CHEMICALS: 24
MOST WORRYING: Polymethyl methacrylate.
POSSIBLE SIDE-EFFECTS: Allergies; disrupts immune system; links to cancer.

DEODORANT:

CHEMICALS: 13
MOST WORRYING: Isopropyl Myristate, 'Parfum'.
POSSIBLE SIDE-EFFECTS: Irritation of skin, eyes and lungs; headaches; dizziness; respiratory problems.

BODY LOTION

CHEMICALS: 32
MOST WORRYING: Methylparaben, Propylparaben, Polyethylene Glycol, which is also found in oven cleaners.
POSSIBLE SIDE-EFFECTS: Rashes; irritation; hormonal disruption.

Intermittent and Extended Fasting:

Intermittent and extended fasting can be incredibly beneficial to improve your mitochondrial health. When you are fasting, damaged mitochondria become purged through a process called autophagy or specifically, mitophagy.

Autophagy plays an important role in maintaining the mitochondria. This process allows the mitochondria to remove damaged and unwanted debris, accumulated reactive oxygen and nitrogen species and unfolded proteins which lead to virus-like problems.

Research has also linked calorie restriction and fasting to improve mitochondrial function, better health, and increased longevity. Fasting can reduce oxidative stress byproducts and increase oxygen efficiency while maintaining critical ATP production



BENEFICIAL VITAMINS & NUTRIENTS

One of the best ways to ensure mitochondrial health is to use key beneficial mitochondrial support nutrients.



B-Vitamins: Inadequate intake of B vitamins has been associated with cognitive decline and multiple progressive causes of brain decline and neurodegeneration.

Vitamin B1 (Thiamine):

Thiamine supports mitochondrial function in the brain.

Supplement dose: no more than 100mg per day.

Thiamine food sources include: nutritional yeast, seaweed, spirulina, sunflower seeds, macadamia nuts, lentils and various beans, beef liver, asparagus, brussel sprouts, fish and pork (non farmed and organic), mushrooms, cabbage and kale.

Vitamin B2 (Riboflavin):

Used by mitochondria to convert energy stored in food to the energy stored in ATP which the cells use for daily functions.

Supplement dose: 200 milligrams a day

Riboflavin food sources include: beef liver, fish, broccoli, natural yogurt, asparagus, almonds, eggs, quinoa and mushrooms.



Niacinamide (B3):

Niacinamide is important for brain health and a key nutrient for mitochondria.

Supplement dose: 50-500mg. Higher doses need to be monitored as can damage liver in high doses.

Food sources include:

liver, mushrooms, organ meats, tuna, salmon, chicken breast, turkey, anchovies, pork, ground beef, avocado, green peas and brown rice.

Pyridoxine (B6):

Pyridoxine is very important in making many neurotransmitters, including serotonin and GABA.

Supplement dose: 100mg max for adult over 19 years age. Has it's risks if too much taken as can cause imbalances in nervous system.

Food sources include:

garlic, turkey breast, grass fed beef, cauliflower, bananas, celery, cabbage, asparagus, broccoli, kale, brussel sprouts, cod, pistachios, chicken breast, blackstrap molasses, sunflower and sesame seeds.



Folic Acid (Folate / Vitamin B9):

Folate is essential for normal brain function. Folate helps to reduce cardiovascular disease risk, Parkinson's, Alzheimer's, and Dementia. Folate also helps improve heart health, prenatal health and neural tube development. It aids in cell division and helps make new cells by copying and creating DNA.

Food sources: green leafy vegetables, asparagus, liver and kidney.

Supplement dose: 400-800 mcg.

Cobalamin (B12):

Cobalamin is required to make hemoglobin.

Food sources include:

liver, venison, shrimp, scallops, salmon and beef. Vegetarians and vegans can get some B12 from seaweed, algae(spirulina), brewers yeast and fermented plant foods like tempeh, miso or tofu.

Supplement dose: 1000mcg.*



L-Carnitine:

L-Carnitine is a type of amino acid that benefits energy levels by transporting fatty acids into the mitochondria where they can be burned up and used as fuel. Although many people take L-carnitine as a way to speed up weight loss and fat-burning, carnitine benefits include enhancing brain function, preventing muscle damage, regulating blood sugar and increasing endurance as well. As it is primarily found in animal products, vegans and vegetarians are at a higher risk of deficiency.

Supplement dose: The standard L-carnitine dosage is 500-2,000 milligrams daily. Based on most current research available, a dose of up to two grams per day can be used safely and effectively with minimal side effects.

Food sources: L-carnitine is primarily found in dairy products and red meat.

Resveratrol:

Resveratrol is a powerful compound that regenerates the body all the way at the cellular level. It decreases the risk of heart disease among other common health concerns. Resveratrol helps to keep arteries clear from plaque buildup and protects an aging heart, this phytonutrient also helps reduce inflammation, helps to prevent obesity and protects cognitive health as we age.

Food Sources: Red wine, purple grape juice, raw cocoa, blueberries, cranberries and pistachios.

Supplement Dose: 250-500 mg / day. However, some studies say up to 2000-5000mg are tolerable.



Creatine Monohydrate:

Increases the availability of cellular ATP.

To date, well over 500 research studies have evaluated the effects of its supplementation on muscle growth, metabolism, exercise capacity and many other markers of health. It has demonstrated that taking additional creatine has neuroprotective properties, improve muscle strength in people with Parkinson's and the frail elderly.

Food sources: Fish, red meat and organ meats. (animal foods) Wild game meats have highest sources of creatine.

Supplement dose: 5-10 grams per day. If a power and strength athlete, then higher doses may be tolerated. Extremely frail individuals and those going through an intestinal permeability healing protocol may also be able to handle more.

D-Ribose:

D-Ribose is a specific form of sugar that your body produces naturally. It plays an important role in energy production in the form of ATP, and for increasing muscle energy, and by being a building block of RNA. It can increase your energy, improve sleep, lower pain, and improve mental clarity. D-Ribose is often recommended for people with chronic fatigue and fibromyalgia.

Food sources: poultry, beef, eggs, dairy, and mushrooms.

Supplement dose: 5 grams 3 times a day



Magnesium:

Magnesium is a crucial mineral that plays an important role in over 300 enzymatic reactions within your body, including transmission of nerve impulses, metabolism of food, and synthesis of fatty acids. It is important for energy, calcium absorption, muscle, and bone health and also supplies relief from PMS and anxiety and further helps to prevent heart disease, diabetes, and migraines.

Supplement Dose: depending on type of magnesium. 375-500mg usually is sufficient.

Food sources: Nuts and seeds, grass fed dairy products, dark leafy greens, dark chocolate, fatty fish, avocados, sea vegetables, various sprouts, legumes, pink salts, oysters.

Curcumin:

Curcumin is a powerful antioxidant. It is the active compound of one of the most potent anti-inflammatory herbs, turmeric. It holds an abundance of health benefits, including reducing inflammation and pain, improving diabetes, ulcerative colitis, osteoarthritis as well as preventing and fighting cancer.

Food sources: Turmeric and curry powder.

Supplement dose: 500mg 3 times a day. Best with piperine and fat for best absorption



Alpha-Lipoic Acid (ALA):

ALA is a vitamin-like antioxidant that acts as a free-radical scavenger.

Food sources: spinach, broccoli, beef, brewers yeast, organ meats, brussel sprouts, beets, carrots and peas.

Supplement Dosage: Dosage recommendations differ depending on who you ask, here are some general guidelines that are within the safe range:

50-100 milligrams for antioxidant purposes in generally healthy adults

600-800 milligrams for patients with diabetes (divided into two doses)

600-1,800 milligrams for patients with neuropathy and diabetic neuropathy (dosages this high should only be taken with supervision from a doctor)



Co-enzyme Q10:

CoQ10 is for the mitochondria to generate ATP and is a very good intracellular antioxidant.

Food Sources:

dark leafy green vegetables, organ meats, grass fed beef, herring, sardines, broccoli, cauliflower, eggs, strawberries, sesame seeds and pistachio nuts.

Supplement Dosage: 100mg daily standard dose. However, 200-400mg seems to have a noticeable positive effect.



ADDITIONAL BENEFICIAL SUPPLEMENTS FOR MITOCHONDRIAL HEALTH



Nutritional information:	1 capsule (842 mg)
Astragalus (3% astragalosides)	450 mg
N-acetyl-L-cysteine	195 mg
R(+)-alpha-lipoic acid	25 mg
Vitamin C (L-ascorbic acid)	10 mg
Vitamin E (10 IU)	6,7 mg α-TE (56%*)

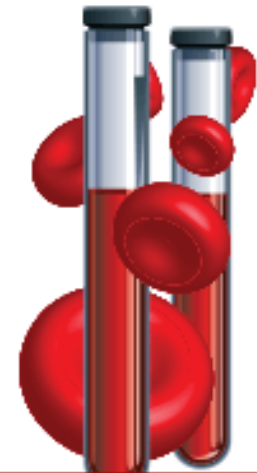
Important antioxidants that protect mitochondrial function, preventing cellular oxidation and aging



Nutritional information:	1 enteric capsule (851 mg)
Superoxide dismutase	7 250 IU SOD
Catalase	112,5 Baker Units
Goji (30% polysaccharides)	40 mg
N-acetyl-L-cysteine	25 mg
Riboflavin (vitamin B ²)	5 mg (357%*)
Vitamin E (DL-alpha-tocopheryl acetate) (5 IU)	3,35 mg α-TE (28%*)
Folate (calcium-L-methylfolate)	60 µg (30%*)
Selenium (from L-selenomethionine)	11 µg (20%*)
L-Cysteine (hydrochloride)	10 mg
DL-alpha-lipoic acid	25 mg
L-Glutathione (reduced)	10 mg
Hydrolyzed wheat protein	25 mg

Ingredients strengthen cell membranes, enhance nutrient absorption, increase cellular energy production and protect the DNA

Comprehensive Blood Analysis



Vitamin D Test-

Vitamin D is not actually a vitamin, it's a hormone. A hormone that plays an extremely important role in the modulation, or balancing, of the immune system. Since vitamin D influences blood calcium levels, it is necessary to have your vitamin D levels rechecked often until optimal levels are achieved. Vitamin D is needed for strong bones and teeth, Vitamin D helps your body absorb the amount of calcium and phosphorus it needs. It also has other roles in the body, including modulation of cell growth, neuromuscular and immune function, and reduction of inflammation.

Average lab range: 30-125 nmol/L

Optimal range: 124 - 224

C- Reactive Protein (HS-CRP)-

C-Reactive Protein is a type of protein produced by the liver that present during episodes of acute as well as chronic inflammatory processes such as obesity, cardiovascular disease, arthritis, inflammatory bowel disease, elevated blood sugar imbalances, cancer, autoimmune diseases, and psychological issues. It is an acute phase reactant, which means it increases or decreases in concentration with inflammation or trauma.

Average lab range: less than 5.0mg/L

Optimal range: less than 1.5mg/L



Erythrocyte Sedimentation Rate (ESR) -

An Erythrocyte Sedimentation Rate (ESR) is also known as a Sedimentation Rate (sed rate). An ESR is a blood test used to look for inflammation and tissue destruction.

Average lab range: under 12 mm/hr

Optimal range: under 5mm/hr

Ferritin -

This blood test measures ferritin levels in the blood. Ferritin is a protein produced in the liver for the storage of iron. Ferritin is used to evaluate iron stores in the body. Ferritin helps identify iron deficiency anemia and may be a better indicator of iron deficiency anemia than hemoglobin. Low levels of ferritin indicate iron deficiency which causes anemia, a reduction in the number of red blood cells.

Ferritin is an acute phase reactant. This makes a ferritin test useful in detecting a chronic disease process. Elevated levels of ferritin can indicate inflammation, liver disease, chronic infection, autoimmune disorders, and some types of cancer.

Average lab range: 22-275 ng/ml

Optimal range: 30-70 ng/ml



Homocysteine -

Homocysteine a marker used to measure inflammation. Elevated homocysteine levels are associated with Alzheimer's disease and chronic illness. Often used to evaluate heart inflammation.

Average lab ranges: 0.00 - 14.50 umol/L

Optimal range: 0.00 - 7.20 umol/L

Iron (Fe) -

This blood test measures Iron levels. Iron is an essential nutrient needed in small amounts to help develop healthy red blood cells (RBC) and is found in all living organisms. Iron is a critical component of hemoglobin, the protein in red blood cells that binds oxygen in the lungs and releases it as blood travels throughout the rest of the body.

Average lab range: 11.6 - 31.3 umol/L

Optimal lab range: 15.22 - 23.27 umol/L



Red Blood Cell Width (RDW): -

Red Cell Distribution Width (RDW) is an excellent test to detect inflammation in the body. RDW reflects overall inflammation and oxidative stress. Elevated RDW is associated with multiple diseases.

Average lab range: 11.5 - 14.5 %
Optimal lab range: 11.7 - 13.0 %

Vitamin B12 -

Vitamin B12 is necessary for red blood cell production and neural function. A Vitamin B12 deficiency can cause anemia, neurologic disorders and an elevation in the inflammatory marker homocysteine, which has been implicated in Alzheimer's disease.

Average lab range: 147.56 - 811.58 pmol/L
Optimal lab range: 332.01 - 590.24 pmol/L





Lactic Acid Dehydrogenase (LDH) -

LDH is an enzyme that is present in most tissues in the body. LDH represents a group of enzymes that are involved in carbohydrate metabolism. Elevated levels of LDH are associated with cardiovascular disease, anemia, tissue destruction, viral infections and Vitamin B12 deficiency. Increased levels of LDH are used to evaluate the presence of tissue damage to the cell causing a rupture in the cellular cytoplasm. LDH is found in many of the tissues of the body, especially the heart, liver, kidney, skeletal muscle, brain, red blood cells, and lungs. Damage to any of these tissues will cause an elevated serum LDH level.

Average lab range: 119 - 226 U/L

Optimal lab range: 140 - 200 U/L

Fasting Insulin:

Fasting insulin test is a valuable for detecting levels of inflammation. Insulin helps transport glucose from the blood to cells. When the body recognizes that blood sugar is elevating, the pancreas releases insulin. High or low insulin levels can be problematic. A high insulin level is a sign of insulin resistance or diabetes. It has been associated with obesity, insulin resistance, and chronic low-grade inflammation.

Average lab range: 18.06 - 34.72 pmol/L

Optimal lab range: 18.06 - 172.92 pmol/L

Hemoglobin A1c:

Hemoglobin A1C (HbA1c) gives the average amount of glucose in the blood, or blood sugar, over the past 3 months. It is one of the top tests for determining whether a person has inflammation.

Average lab range: 4.60 - 5.50 %

Optimal lab range: 4.80 - 5.60 %

Dehydroepiandrosterone (DHEA-s)

DHEA is produced primarily from the adrenals and is the most abundant circulating steroid in the human body and influences more than 150 known anabolic (repair) functions throughout the body and brain. It is the precursor for the sex hormones: testosterone, progesterone, and estrogen.

Decreased levels are associated with many common age-related conditions, including diseases of the nervous, cardiovascular, and immune systems such as metabolic syndrome, coronary artery disease, osteoporosis, mood disorders and sexual dysfunction. Ideally, DHEA levels should be maintained at the level of a healthy 30-year-old order to maximize the anti-aging effects.

Average lab range: 1.36 - 18.73 umol/L

Optimal lab range: 9.50 - 18.73 umol/L



Uric Acid -

Uric acid is produced as an end product of purine, nucleic acid, and nucleoprotein metabolism. Levels can increase due to over-production by the body or decreased excretion by the kidneys. Increased uric acid levels are associated with gout, atherosclerosis, oxidative stress, arthritis, kidney dysfunction, circulatory disorders and intestinal permeability.

Average lab ranges: 205 - 475 umol/L

Optimal range: 208.18 - 350.93

AST (Aspartate Aminotransferase)-

AST is an enzyme present in highly metabolic tissues such as skeletal muscle, the liver, the heart, kidney, and lungs. This enzyme is at times released into the bloodstream following cell damage or destruction. AST levels will be increased when liver cells and/or heart muscle cells and/or skeletal muscle cells are damaged. The cause of the damage must be investigated.

Average lab ranges: 5 - 36 IU/L

Optimal range: 10 - 26 IU/L



IMMUNOGLOBULINS: MEASURING TOTAL QUANTITATIVE IMMUNOGLOBULIN (IG) LEVELS ARE A KEY COMPONENT TO ANY IMMUNOLOGIC EVALUATION. IG LEVELS REFLECT B CELL FUNCTION (HUMORAL PRODUCTION AND T CELL INTERACTION) AND SERUM IG LEVELS AID IN DISEASE DETECTION.

IgG

Increased:

Infection, inflammation, hyperimmunization, IgG multiple myeloma, liver disease, rheumatic fever, systemic rheumatic disease.

Decreased:

Agammaglobulinemia, amyloidosis, leukemia, myeloma, pre-eclampsia

IgM

Increased:

Early HIV infection, infectious mononucleosis, lymphoma, macroglobulinemia, myeloma, rheumatoid arthritis

Decreased:

Rarely agammaglobulinemia, amyloidosis, leukemia, myeloma

IgA

Increased:

Chronic Infections (especially in gastrointestinal tract), inflammatory bowel disease, myeloma, rheumatic fever

Decreased:

Agammaglobulinemia, hereditary IgA deficiency, myeloma or protein losing enteropathy



FUNCTIONAL MEDICINE TESTS



Conventional diagnosis of autoimmune diseases is commonly done through a blood test that looks for antibodies against healthy cells. After these antibodies are found, conventional medicine recommends taking immune suppressive drugs and/or hormone replacement therapy for life – with risks that greatly outweigh the benefits. Functional Medicine has powerful and natural tools that dramatically improve the lives of those with autoimmune diseases without these risks.

The reason why conventional medicine has failed with autoimmunity is that their model is not designed to look for the individual cause (or promoters) of the immune dysfunction. Two different people with Hashimoto's hypothyroidism will have very different immune dysfunctions, therefore, will need different protocols. The key is to get a clear picture of the individual's unique immune system can only be achieved through functional laboratory testing.

OATS TEST – ORGANIC ACIDS TEST

The Organic Acids test is a nutritional test providing insights into organic acids and a view into the body's cellular metabolic processes. Identifying metabolic blocks that can be treated nutritionally allows individual tailoring of interventions that maximize patient responses and lead to improved patient outcomes.

Organic acids are metabolic intermediates that are produced in pathways of central energy production, detoxification, neurotransmitter breakdown, or intestinal microbial activity. Marked accumulation of specific organic acids detected in urine often signals a metabolic inhibition or block. The metabolic block may be due to a nutrient deficiency, an inherited enzyme deficit, toxic build-up or drug effect. Several of the biomarkers are markers of intestinal bacterial or yeast overgrowth.

The test profile provides vital patient information from a single urine specimen. This organic acids nutritional test is valuable for determining:

- Functional vitamin and mineral status
- Amino acid insufficiencies like carnitine and NAC
- Oxidative damage and antioxidant need
- Phase I & Phase II detoxification capacity
- Functional B-complex vitamin need
- Neurotransmitter metabolites
- Mitochondrial energy production
- Methylation sufficiency
- Lipoic acid and CoQ10 status
- Markers for bacterial and yeast overgrowth



Comprehensive Gastrointestinal Profile - Stool



The Comprehensive Stool Profile is an advanced stool test that provides immediate, actionable clinical information for the management of gastrointestinal health. Utilizing cutting-edge technologies and biomarkers, this test offers valuable insight into digestive function, intestinal inflammation, and the intestinal microbiome.

The Comprehensive Stool Profile can reveal important information about the root cause of many common gastrointestinal symptoms such as gas, bloating, indigestion, abdominal pain, diarrhea, and constipation. This stool analysis utilizes biomarkers such as Calprotectin to differentiate between Inflammatory Bowel Disease (IBD) and Irritable Bowel Syndrome (IBS). In addition, this test can be used to evaluate patients with a clinical history that suggests a gastrointestinal infection or dysbiosis.

Gut microbes are codependent with one another and with their human host, and the health of one affects the other. A sizeable volume of research associates a dysbiotic, or imbalanced gut microbiome with multiple disease states both within and outside of the GI tract. The diverse metabolic activities of the microbiome ultimately impact the human host, and the activities of the human host ultimately affect the health of their microbiome.



Toxic Metals - Hair



Heavy metals toxicity caused by increasing levels of pollution and use of chemicals in industry is a growing threat to our health and development of our children. High levels of toxic metals deposited in body tissues and subsequently in the brain, may cause significant developmental and neurological damage.

A Metals Hair Test is ideal for checking current exposure to toxic metals. Hair provides important information that can assist the practitioner with an early diagnosis of physiological disorders associated with aberrations in essential and toxic element metabolism.

Nutrient elements including magnesium, chromium, zinc, copper and selenium are co-factors for hundreds of important enzymes and also are essential for the normal functions of vitamins. The levels of these elements in hair are correlated with levels in organs and other tissues.

Toxic elements may be 200-300 times more highly concentrated in hair than in blood or urine. Therefore, hair is the tissue of choice for detection of recent exposure to elements such as arsenic, aluminum, cadmium, lead, antimony, and mercury.

Hair element analysis is a valuable and inexpensive screen for physiological excess, deficiency or maldistribution of elements. It should not be considered a stand-alone diagnostic test for essential element function and should be used in conjunction with patient symptoms and other laboratory tests.

Genetic Testing



Genetic testing is a type of medical test that identifies changes in chromosomes, genes, or proteins. The results of a genetic test can confirm or rule out a suspected genetic condition or help determine a person's chance of developing or passing on a genetic disorder.

Several methods can be used for genetic testing:

Molecular genetic tests (or gene tests) study single genes or short lengths of DNA to identify variations or mutations that lead to a genetic disorder.

Chromosomal genetic tests analyze whole chromosomes or long lengths of DNA to see if there are large genetic changes, such as an extra copy of a chromosome, that cause a genetic condition.

Biochemical genetic tests study the amount or activity level of proteins; abnormalities in either can indicate changes to the DNA that result in a genetic disorder.



FOOD = MOOD

FRUIT+VEGGIES+PROTEIN → HAPPY

SUGAR+PROCESSED FOOD
+ALCOHOL+CAFFEINE → DEPRESSION, ANXIETY
AND FATIGUE

Stop eating

crap

C -carbonated drinks

R -refined sugars

A -artificial food

P -processed food

USDA Food Pyramid

Fats, Oils & Sweets

USE SPARINGLY

Milk, Yogurt &
Cheese Group

2-3 SERVINGS

Vegetable Group

3-5 SERVINGS

Key

● Fat (naturally occurring and added)

○ Sugars (added)

These symbols show fats and added sugars in foods.

Meat, Poultry, Fish, Dry
Beans, Eggs & Nuts Group

2-3 SERVINGS

Fruit Group

2-4 SERVINGS

Bread, Cereal,
Rice & Pasta Group

6-11 SERVINGS

**DRINK PLENTY
OF WATER**

SPARINGLY

VERY SMALL AMOUNTS



2

**MEAT, CHICKEN, PEAS, BEANS
FISH, & ALTERNATIVES**

3

**MILK, CHEESE
& YOGURT**



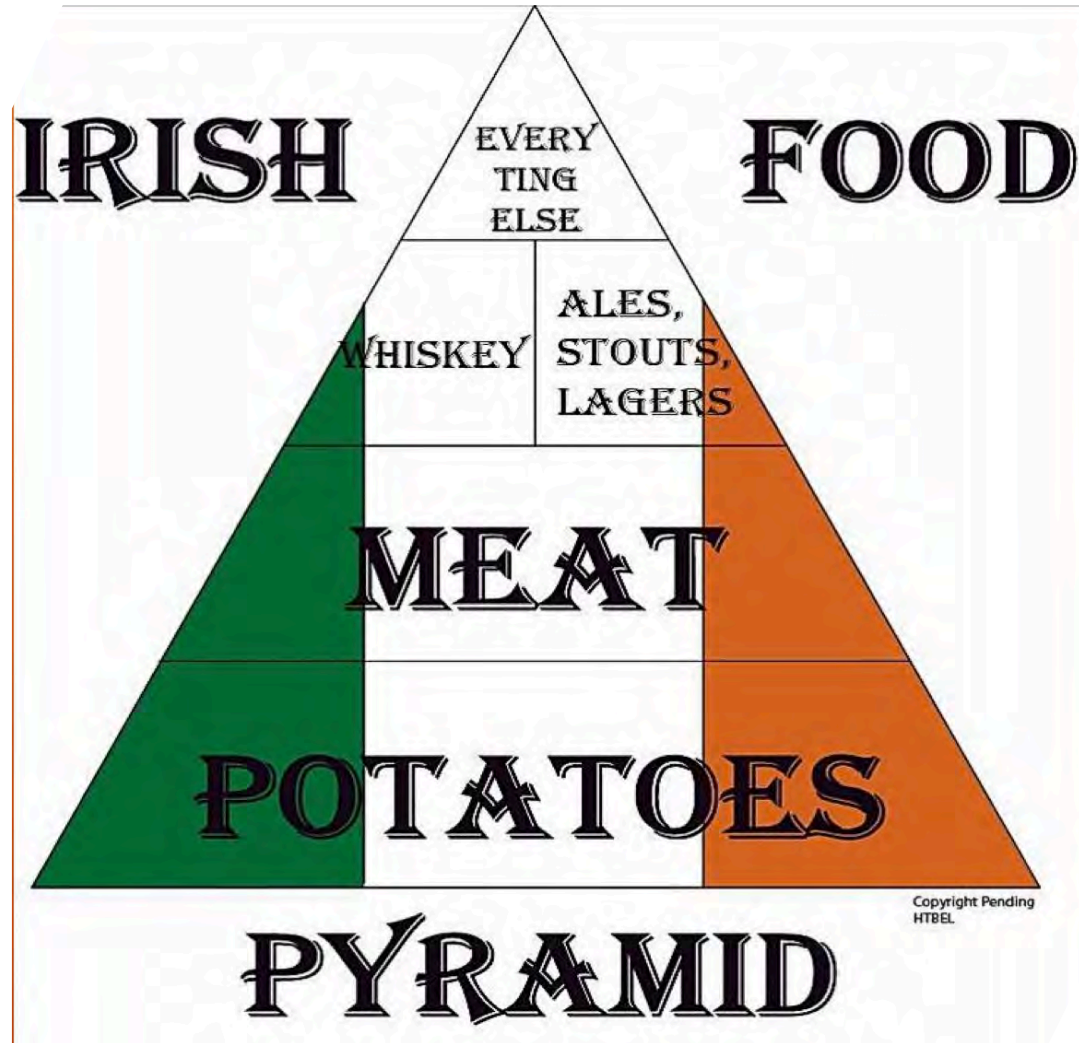
5

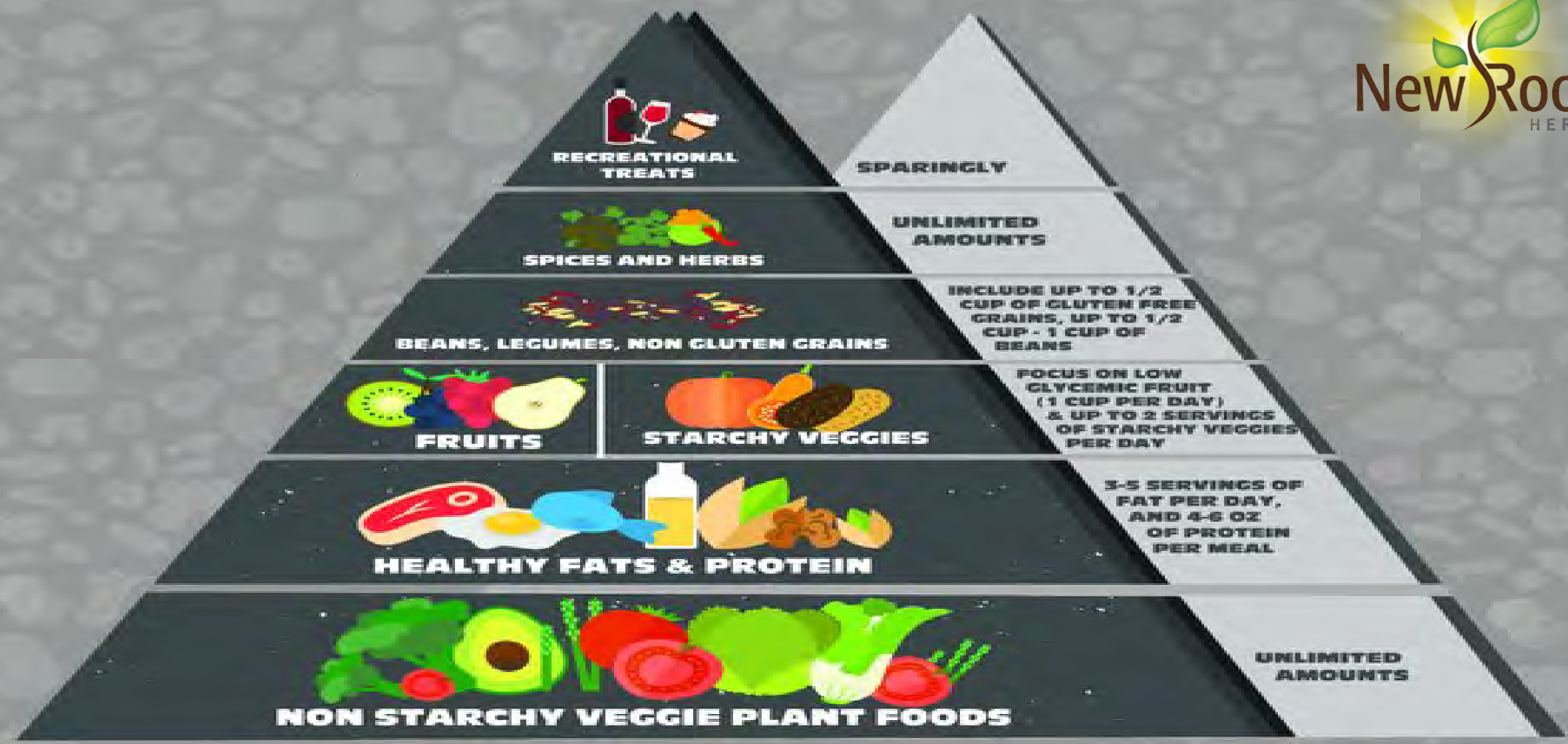
**FRUIT, FRUIT JUICE
& VEGETABLES**

6+

**BREAD, CEREALS
POTATOES, RICE
& PASTA**







**DR. MARK HYMAN'S
PEGAN FOOD PYRAMID**

GENERAL DIET RECOMMENDATIONS

For optimal health, it is critical to maximize the micronutrients in your diet.

Fruit and vegetables are important but more so vegetables than fruit. Half your veg should be green veg and the rest different and mixed coloured vegetables.

Avoid high glycaemic foods such as white potatoes, corn, rice, and grains.

Avoid or limit dairy especially if you are reactive to it. Some people can include unpasteurized or fermented dairy foods in their diet but should be limited.

Eat plenty of healthy fats from non-farmed fish and seafood, grass fed meats and farmed raised free range eggs.

Eat organ meats at least once a week as they are a fantastic source of B vitamins and important mitochondrial nutrients.

NEXT STEPS: ACCESS THE LANDING PAGE

Newrootsherbal.eu/en/mitochondrial-health

1. Win 3 New Roots Herbal Formulas of your choice (Valid until 10th Dec 21)
2. Mitochondrial Health Meal Plans x 3
3. Healthpath Pro Mitochondrial Medicine Guide
4. Additional discounts off Healthpath Pro tests & Supplements



THANK YOU

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