

**Nutraceuticals and Your Health:
Part I**

Valerie Albritton Oakley, PharmD,
FAARM, ABAAHP
oakley@threeoakspharmacy.com

- I have no relevant financial or nonfinancial relationships to disclose.

Objectives

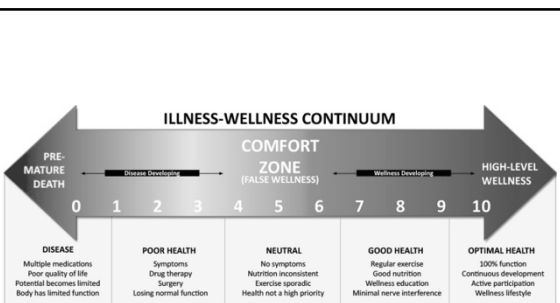
- Understand the importance of a comprehensive nutraceutical regimen for optimal health and wellness.
- Discuss the functions of various nutrients in the body.
- Identify clinical manifestations and/or chronic disease states associated with certain nutritional deficiencies.
- Identify common prescription drugs that cause nutrient depletions in the body.

Nutraceuticals Defined

- *nutraceutical* *nutrition* and *pharmaceutical*.
- Defined as chemicals found as a natural component of foods or other ingestible forms that have been determined to be beneficial to the human body in preventing or treating one or more diseases or improving physiological performance.⁸²

Nutraceuticals

- The RDA and the RDI assigned for vitamins and supplements are recommended to merely prevent disease.⁷⁴
- These numbers are not designed to maintain optimal health.⁷⁴
- These values do not account for individual differences, genetics, or current disease states.



<http://wellnessnorthwest.com/images/illness-wellness-continuum-small.jpg>

Everything Starts with the Gut

- 20
- body using 1/3 of the blood flow from the heart^{75,80}
- 70% of the human immune system is localized in the digestive tract.²⁸
- 80% of the lymph nodes in the body are around the GI tract.^{10,65,74,75,80}
- Metabolic activity in the gut is greater than in the liver^{28,74,75}
- Approximately 95% of the serotonin found in the body is synthesized in the GI tract¹⁷

Signs of Poor Gut Health⁷⁵

- Irregular bowel movements
- Chronic indigestion
- Restless sleep/waking up tired
- Frequently cold for no reason
- Depression without cause
- Feeling stress without cause
- Frequent mood swings and anxiety
- Shakiness
- Increase in pulse of 20-25 beats within 15 minutes after eating

Dysbiosis

- Microbial colonies found on or in the body are normally benign or beneficial.
- These colonies carry out a series of functions like aiding in digestion, protecting the body from the penetration of pathogenic microbes, and detoxification.
- Imbalance of intestinal bacteria causes an inflammatory disease of the gut known as dysbiosis.

**GI Symptoms associated with
Dysbiosis**

- Indigestion
-
- Acid reflux/Heartburn/GERD
- Abdominal pain
- GI Dysfunction
-

**Additional Symptoms associated with
Dysbiosis^{28,75}**

-
-
-
-
-
- Arthralgias
- Fatigue
- Malaise
- Skin rashes
- Pruritis
- Palpitations

Causes of Dysbiosis^{28,75}

- Antacids
- Proton Pump Inhibitors
- Diminished HCL
- Poor nutritional status
- Free Radical production
- Stress
- Alcohol
- NSAID
- Antibiotics
- Viruses
- Food allergies
- Yeast infections
- Decreased enzymes

GI Mucosa

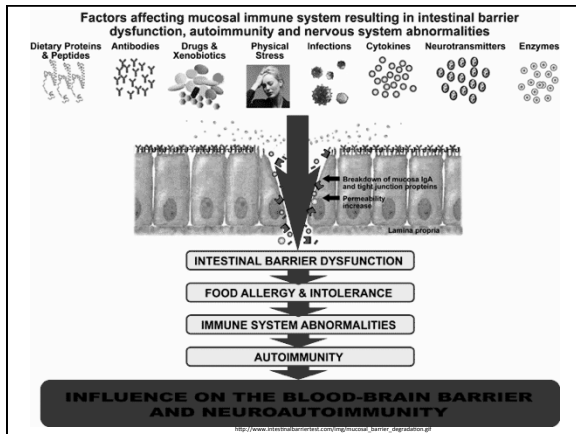
- Protective cell layer that provides the barrier between the inside of the body and the external world⁴⁹
- Responsible for nutrient absorption⁴⁹
- Plays an important role in protecting the stomach from ingested toxins, drugs, alcohol, pathogens, such as infectious bacteria or viruses.⁴⁹

Gut-Associated Lymphoid Tissue (GALT)

- Produces two layers of defense mechanisms to a foreign pathogen or antigen: secretory IgA (sIgA) and systemic IgE or IgG⁴⁹
- sIgA effectively prevents infection, neutralizes viruses, and removes antigens before they cross the mucosal barrier and reach systemic circulation⁴⁹
- If immunologically active materials escape the sIgA defense, GALT activates a second line of defense inducing a systemic immune response through IgE or IgG⁴⁹

Leaky Gut Syndrome

- Under normal conditions the mucosal barrier does not allow the flow of matter from the outside (lumen) to the inside of the body unless the matter goes through a protective cell layer
- When there is damage to the lining of the bowel, permeability is increased. This allows molecules of all types the ability to go around the cells and get into circulation, a condition known as intestinal permeability or “leaky gut”^{9,19,49,75}



Conditions associated with Leaky Gut Syndrome^{28,75}

- Acne
- Aging
- Allergies/food sensitivities
- Arthritis
- Asthma
- Autism
- Candida infections
- Celiac Disease
- Chronic Fatigue syndrome
- Eczema

Conditions associated with Leaky Gut Syndrome^{28,75}

- Crohn's disease
- Fibromyalgia
- ADHD
- IBS
- Liver dysfunction
- Lupus
- Psoriasis
- Schizophrenia
- Rheumatoid arthritis
- Ulcerative colitis

Nutrients for Gut Health^{28,75}

- Probiotics
- Glutamine
- EPA/DHA
- Fiber
- Digestive Enzymes
- Quercetin
- Antioxidants (oxidative stress is one of the main causes of intestinal damage)
 -
 -
 -
 -

Probiotics

- Microbial dietary adjuvants that beneficially affect the host physiology by modulating mucosal and systemic immunity, as well as improving nutritional and microbial balance in the intestinal tract.⁶²

Probiotic functions^{28,62,75}

- Make short-chain fatty acids
 - Specific SCFA may reduce the risk of developing gastrointestinal disorders, cancer, and cardiovascular disease⁶⁴
- Help produce digestive enzymes
- Act like natural antibiotics
- Maintain optimal pH of intestine
- Help digest fats
- Help with detoxification
- Protect against parasites
- Helps maintain healthy intestinal lining
 - Protects against food allergies

Therapeutic Uses of Probiotics^{28,77}

- Constipation
- Lactose intolerance
- Flatulence
- Diarrhea
- IBS
- IBD
- Intestinal hyperpermeability (leaky gut syndrome)

Therapeutic Uses of Probiotics⁷⁷

- Prevention and treatment of vaginal, UTI, GI infections
- Immune dysfunction
- Food allergies
- Atopic Eczema
- Prevention of ETOH liver disease
- Recolonization post-antibiotic use
- Hypercholesterolemia
 - Produce propionic acid which decreases the synthesis of cholesterol
 - Break down bile acids

Probiotics

- Contraindications
 - Pt with a severely compromised immune system should not use live probiotics since the organisms may cross the lining and be absorbed

Glutamine

- Most abundant amino acid in the body
- Shown to be depleted under conditions of extreme stress on the body
 - Injuries, surgeries, prolonged stress, illness, heavy exercising, etc.

Glutamine

- Stimulates intestinal mucosal growth and protects from mucosal atrophy^{42,57,75}
- Prevents intestinal hyperpermeability⁵⁷
- Plays an important role in acid-base homeostasis^{6,75,86}
- Balances blood sugar⁶
- Increases energy^{6,92}
- Improves mental alertness⁶
- Fueling source of the immune system⁶
- Immune support by increasing IL-6 and lymphocyte function⁵⁷

Glutamine

- Increasing glutathione^{57,75,91}
- Needed for the metabolism and maintenance of muscle⁶
- Elevates GH^{6,85}
- Promotes weight loss⁶
- Inhibitory neurotransmitter⁶
- Regulation of muscle proteolysis and can prevent loss of protein in the muscle^{54,75}
- Protects the body from stress⁶
- Neutralizes toxins⁶

Quercetin

- Bioflavonoid found in onions, blue-green algae
- Shown to inhibit pathogenic bacteria while stimulating the growth of beneficial bacteria, exerting prebiotic-like effects⁴⁷
- Antioxidant and anti-inflammatory that works by decreasing mast cell and basophil production^{13,14,75}
- Anti-inflammatory responses^{2,13}

Quercetin

- Promote relaxation of cardiovascular smooth muscle (antihypertensive, antiarrhythmic effects)
- Shown to have antiviral and carcinostatic properties.^{2,13}
- Protect low-density lipoprotein from oxidation (prevent atherosclerotic plaque formation)^{2,13}
- Prevent platelet aggregation (antithrombic effects)^{2,13}

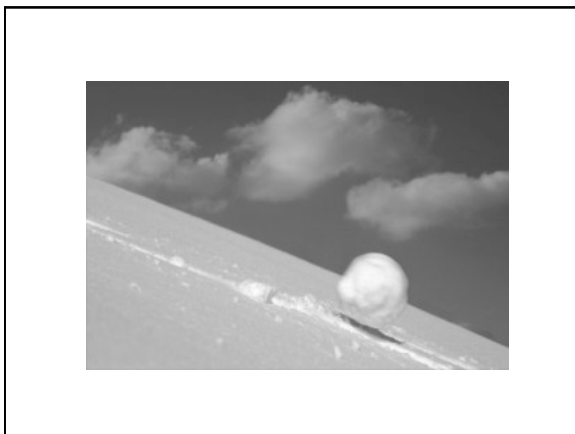
In the beginning disease is difficult to recognize but easy to cure. In the end, disease is easy to recognize, but difficult to cure.

Anton Mesmer, 1777



3 Stages of Stress

- Stage I (Alarm Stage)
- Stage II (Resistance Stage)
- Stage III (Exhausted Stage)



Cortisol

- A steroid hormone produced by the adrenal cortex
- Cortisol has many important functions in the body:
 - metabolism
 - Regulation of blood pressure
 - Insulin release for blood sugar control
 - Immune function
 - Inflammatory response

Prolonged Cortisol Production^{76,88}

- Immune suppression leading to increased number of infections
- Feelings of fear, anxiety, worry, depression, helplessness
- Hyperglycemia
- Insulin resistance
- Central adiposity
- Hypertension

Prolonged Cortisol Production^{76,88}

- Memory impairment (hippocampal damage)
- Hyperlipidemia
- Impaired T4 to T3 conversion
- Inflammation
- Inadequate sleep
- High levels correlate with defects in serotonin transporter

Nutraceuticals to Normalize Cortisol

- Relora
- L-theanine
- EPA/DHA
- DHEA
- B complex
- Adaptogens
 - Rhodiola
 - Ashwagandha

Relora

- Dietary supplement formulation consisting of a blend of extracts of Magnolia officinalis bark and Phellodendron amurense bark
- Reduce cortisol and increase dehydroandrostenedione (DHEA) levels in stressed subjects^{23,36,81}
- Reduce feelings of stress and anxiety and enhance feelings of well-being^{36,81}
- Reduction in stress-related caloric intake³⁶

L-theanine^{35,40,53}

- Amino acid contained in green tea
- Provides a sense of relaxation and calmness
 - Stimulates alpha brain waves directly promoting mental alertness and deep relaxation
 - Plays a role in the formation of GABA (an inhibitory neurotransmitter)
- Decreases neuroinflammation
- Improves learning
- Decreases blood pressure
- Supports the immune system

Adaptogens

- Definition: Must be innocuous and cause minimal disorders in the physiological functions of an organism, it must have a nonspecific action, and it usually has a normalizing action irrespective of the direction of the pathological state.
- These drugs either reduce stress reactions in the alarm phase or retard / prevent the exhaustion phase and thus provide a certain degree of protection against long-term stress.⁸⁴

Adaptogen	Botanical Name	Plant Part Used
American ginseng	<i>Panax quinquefolius</i>	Root
Amla	<i>Embilica officinalis</i>	Fruit
Ashwagandha	<i>Withania somnifera</i>	Root
Asian ginseng	<i>Panax ginseng</i>	Root
Astragalus	<i>Astragalus membranaceus</i>	Root
Chaga	<i>Inonotus obliquus</i>	Mushroom
Codonopsis (Dang shen)	<i>Codonopsis pilosula</i>	Root
Cordyceps	<i>Cordyceps sinensis</i>	Mushroom
Eleuthero	<i>Eleutherococcus senticosus</i>	Root, stem, bark
Guduchi	<i>Tinospora cordifolia</i>	Root, stem
He shou wu (Fo-ti)	<i>Polygonum multiflorum</i>	Root
Holy basil (Tulsi)	<i>Ocimum sanctum</i>	Herb
Jaogulan (Gynostemma)	<i>Gynostemma pentaphyllum</i>	Herb
Licorice	<i>Glycyrrhiza glabra</i>	Root
Lycium (Goji)	<i>Lycium chinensis</i>	Fruit
Maca	<i>Lepidium meyenii</i>	Root
Prince seng (Pseudostellaria)	<i>Pseudostellaria heterophylla</i>	Root
Reishi	<i>Ganoderma lucidum</i>	Mushroom
Rhaponticum	<i>Rhaponticum carthamoides</i>	Root
Rhodiola	<i>Rhodiola rosea</i>	Root
Schisandra	<i>Schisandra chinensis</i>	Fruit, seed
Shatavari	<i>Asparagus racemosus</i>	Root
Shilajit	<i>Asphaltum bitumen</i>	Pitch
Suma	<i>Platfia paniculata</i>	Root

<http://rebelkietttan.us/wp-content/uploads/2013/12/Adaptogen.jpg>

Magnesium

- Essential element that catalyzes more than 300 enzymatic reactions⁷⁴
- Involved in enzymatic pathways which control mitochondrial ATP production^{74,96}
- Overall incidence of hypomagnesemia in hospitalized patients can range from 7 to 52%⁴
- Deficiency linked with increased CRP levels^{26,41}

Functions of Magnesium^{4,74}

- Growth
- Sleep
- Heart function
- Wound healing
- Natural muscle relaxant
- Bone building
- Muscle function

Functions of Magnesium^{4,74,96}

- Decreases blood vessel constriction
- Improves glucose uptake by insulin
- Prevents production of chemicals in the body which increase inflammation
- Increases HDL
- Important in immune function
- Maintains normal rhythm of your heart
- Blocks NMDA receptors
- Promotes calmness

Symptoms of Magnesium Loss⁷⁴

- | | |
|-------------------|---------------|
| • Muscle weakness | • Fatigue |
| • Muscle cramps | • Depression |
| • Muscle twitches | • Insomnia |
| • Muscle soreness | • Confusion |
| • TMJ | • Memory Loss |
| • Irritability | • Anxiety |

Vitamin D

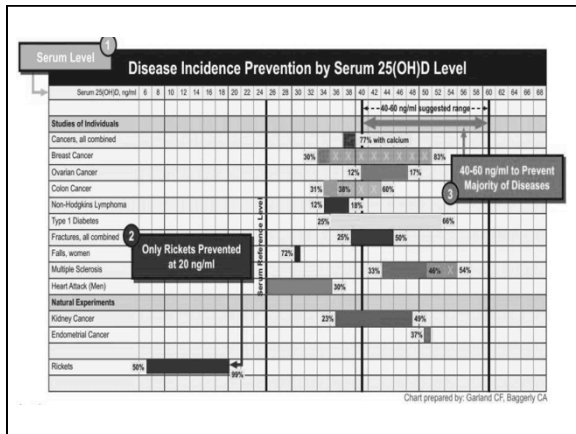
- One of the cheapest and easiest interventions in medicine that would save the most lives and the most money.
- Actually not a vitamin but a hormone^{71,74}
- Receptors are located in your bones, pancreas, intestine, kidneys, brain, spinal cord, male and female reproductive organs, thymus, adrenal glands, pituitary, and thyroid gland.⁷⁴

Vitamin D

- Vitamin D deficiency is now recognized as a pandemic.
- High rates of vitamin D deficiency
 - Vitamin D deficiency: < 20 ng/ml
 - Vitamin D insufficiency: < 32 ng/ml
 - 25(OH)D reference range: 32- 100 ng/ml

Consequence of Vitamin D deficiency

- Atleast 17 varieties of cancer ^{21,22,31,71}
- Heart disease, stroke, HTN^{16,31,71}
- Autoimmune disease, MS^{16,31,63}
- Type I and II Diabetes ^{31,71,74}
- Chronic pain^{16,24,32}
- Osteoarthritis ^{16,32,37,74}
- Osteoporosis^{16,32,71,74}
- Muscle weakness^{16,32}
- Infectious Disease^{16,31,32,71,74}



Coenzyme Q10

- Fat soluble nutrient
- Made in almost every tissue of your body⁷⁴
- The amount your body makes will decline with age⁷⁴
- Functions as a powerful antioxidant
- Mitochondrial coenzyme essential for the production of ATP in all cells^{45,74}

CoQ10

- Increase sperm count and motility^{8,44,76}
- Stabilizes and protects the cell membrane from oxidative stress^{1,44}
- Patients with periodontal disease are frequently deficient in Q10³⁰
- Helps to stop progression of hearing loss^{5,76}
- Enhances energy efficiency of myocytes⁶¹
- Potential ADR: GI distress, headache, loss of appetite, skin rash

CoQ10

- CoQ10 levels are frequently low in cancer patients⁷⁶
- Low levels associated with an increased risk of melanoma metastasis^{67,72}
- Supplementation of CoQ10 has been shown to extend the life span of patients with breast, colon, prostate, rectal, lung, and pancreatic cancers^{50,51,66,76}
- Dosages of 300-390 mg per day have resulted in complete regression of residual tumors in breast cancer^{50,51,76}

N-acetyl-cysteine (NAC)

- Modified version of the sulfur-containing amino acid cysteine
- Potent antioxidant which reduces the formation of nitric oxide
- Regulates the inflammatory response and inhibits NF- κ B^{11,12,39,52}
- Restores glutathione levels^{6,15,73}

N-acetyl cysteine (NAC)

- Reduces synaptic glutamatergic activity⁴⁶
- Effective in fighting *H. pylori* infections^{34,38}
- Reduces homocysteine levels²⁷
- Shown promising results in COPD patients nearly doubling the eradication of bacteria compared to standard therapy, while reducing the number and duration of COPD exacerbations^{68,78}
- Activity increased in the presence of adequate vitamin C and E.

Drug-Nutrient Depletions

- Beta blockers deplete the body of CoQ10 and melatonin
- Statin drugs dramatically lower serum Co Q10 levels up to 40%^{24,60,69}
 - Give atleast 100 mg CoQ10 per day to pt on statin drug
- Statins also deplete the body of folic acid, carnitine, vitamin E, omega 3 fatty acids, and glutathione

Drug-Nutrient Depletions

- Metformin depletes the body of folic acid, vitamin B12, and coenzyme Q10
- Oral contraceptives deplete the body of B vitamins, folic acid, zinc, and selenium
- Estrogen replacement depletes the body of B vitamins
- Benzodiazepines deplete the body of melatonin
- SSRI's deplete the body of folic acid and melatonin
- Acid suppressing drugs deplete folic acid, zinc, B12, vitamin D, calcium, and iron

The doctor of the future will give no medicine, but will interest his patients in the care of the human frame, in diet and in the cause and prevention of disease.

Attributed to Thomas Edison

http://www.functionalwellness.com/wp-content/uploads/2012/05/the_doctor_of_the_future.jpg
