Part 1

General Principles of Detoxification

The Problem with Detoxification

- Part 1: The Problem
  - Detoxification from What?
- Part 2: The Solution
  - Avoidance
  - Enhancing Coping Mechanisms

Overload Principles

- Spreading: Increasing sensitivity to ever more foods or chemicals (Tricia)
- Switching: Responses to the same substance can trigger different symptoms over a period of time (brain dysfunction => joint pain => diarrhea => irregular heartbeat)
- Biochemical Individuality: Reactivity is based on unique genetic susceptibilities

William Rea’s Rain Barrel: Total Body Load

- Physical:
  - Weather change, heat & cold, radon, irradiation, light, noise, EMF fields, injury
- Chemical:
  - Toxic metals (Pb, Ce, Hg, Al As) chlorine, oxygen free radicals, pesticides, herbicides, plastics, formaldehyde, fluoride, drugs
- Biological:
  - Mold, dust, pollen, food sensitivity, bacteria, virus, amoeba, worms, protozoa
- Emotional:
  - Oxidation of stress hormones—Isolation, conflict, legal trouble, divorce

How Do Toxic Substances Do Their Damage?

- Oxidation (lead, rancid fat)
- Gut pathogens: gluten, H. Pylori (physical damage, release of toxins)
- Hormone disruption (BPA)
- Hapten reactions & Glycation (aspirin, sugar, fluoride)
- Enzyme inhibition: Organophosphate pesticides inhibit the enzyme acetylcholinesterase which halts nerve impulses at the appropriate time. They are among the most acutely toxic of all pesticides. Symptoms of poisoning: nausea, headaches, twitching, trembling, excessive salivation, tearing, breathing difficulty, behavioral problems in children (ADHD). Parkinson’s, reduced sex hormones, prenatal exposure lowers IQ. Washing fresh produce well will not remove all the residues but it does make a difference.

• Raloff, Janet. Pesticides tied to lower IQ in children. Science News, April 21, 2011; Vol. 179:15

Part 2

Plastics
Excitotoxins
Pesticides
Toxic Minerals
Gut Toxicity
In 1987 Dr. Anna Soto and associates were studying estrogen-sensitive breast cancer cells. The cells began multiplying wildly. Two years later they identified the culprit: Corning had added a resin to their plastic called \( p \)-nonylphenol to make the plastic less breakable.


"...we analyzed commercially available mineral water ... and detected estrogenic contamination in 60% of all samples. ...This provides first evidence that substances leaching from plastic food packaging materials act as functional estrogens in vivo. ...Our results demonstrate a widespread contamination of mineral water with xenoestrogens that partly originates from compounds leaching from the plastic packaging material."


The stem cells that normally become connective tissue become fat cells when a baby mouse is exposed to BPA in the womb. In 6 months mice were 20% heavier and had 36% more body fat than unexposed mice.


Canned foods and cash register receipts pose the most frequent exposures. BPA Free: Eden Foods, Hain Celestial, Health Valley, Earth’s Best, Westbrae Natural, ConAgra. Contained BPA: Coca-Cola, Del Monte, Kraft, Unilever, Kroger, Safeway, Supervan, Wal-Mart, many Whole Foods and Trader Joe’s.

Best way to avoid: Eat fresh food!

2. HDPE: High-Density Polyethylene. Considered safe.
3. V: Vinyl, PVC: Polyvinyl Chloride. The cheapest, most commonly used, and most dangerous.
4. LDPE: Low-Density Polyethylene. Considered safe.
5. PP: Polympropylene. The safest form of plastic.
7. Other or Mixture: Avoid unless BPA free.

1950’s Neuroscientist T. Hayashi injected MSG into the brains of dogs. The dog would fall down in its cage and begin to convulse wildly. MSG caused neurons to fire spontaneously and continuously.

Common excitotoxins: MSG, Nutrasweet

70 excitatory amino acids have been discovered. Hypoglycemia increases the likelihood of cell death when exposed to excitotoxins. Glycemic response control is important.

Zinc shuts down ion channel most powerfully. Mg & B6 also close channel.

Is Zinc Deficiency a Problem?

• “We have found that in the elderly population, 30 percent have zinc deficiency. For this reason they have immune dysfunction, they are oxidatively stressed, and they also generate increased amounts of inflammatory cytokines.”

• Prasad, Ananda S., M.D., Ph.D., The Role of Zinc in Human Biology, Wise Traditions, Winter 2012, 13(4), 32. Prasad was the man who identified dwarfism, hypogonadism and compromised immune function with zinc deficiency.

Pesticides & Fat Loving Toxins


“Individuals in the highest category of exposure (> 90th percentile) of the six pollutants (dioxins, biphenyls, oxychlordane, etc.) combined had a prevalence of diabetes 38 times higher than those in the lowest category of exposure (<25th percentile)(p for trend < 0.001)”

The Dirty Dozen Plus

Apple
Celery
Sweet bell peppers
Peaches
Strawberries
Nectarines-imported
Grapes
Spinach
Lettuce
Cucumbers
Blueberries-domestic
Pineapples
Avocado
Cabbage
Sweet peas
Asparagus
Mangoes
Eggplant
Kale

The Clean 15

Onions
Sweet corn
Plums
Avocado
Lettuce
Broccoli
Squash
Hummus
Tomato
Carrots
Leafy greens
Socially Sustainable Foods
BioDynamic Foods
Organic Foods

Enzyme Inhibition

• Organophosphate pesticides inhibit the enzyme acetylcholinesterase which halts nerve impulses. Nerves go into hyperdrive and can die.

• Organophosphates are among the most acutely toxic of all pesticides.

• Symptoms of poisoning: nausea, headaches, twitching, trembling, excessive salivation, tearing, breathing difficulty, behavioral problems in children (ADHD), Parkinson’s, reduced sex hormones, prenatal exposure lowers IQ.

• Washing fresh produce well will not remove all the residues but it does make a difference.

• Raloff, Janet, Pesticides tied to lower IQ in children, Science News, April 21, 2011; Vol. 179:15
**Common Features of Detox**
- Sweat (sauna and exercise)
- Scrub
- Replacement of contaminated fats
- Supplementation: Multiple, Vitamin C, B Complex, sulfur containing compounds, protein, fiber
- Healing the cell membrane with phospholipid therapy is the highest priority in detoxification. Foster, John, M.D., Kane, Patricia, Ph.D., and Speight, Neal, M.D., The Detoxx System: Detoxification of Biotoxins in Chronic Neurotoxic Syndromes.

**Reduction in Fat Loving Toxins**
- Hubbard method (sweat, scrub, and replace) reduced blood levels of PCB's in capacitor workers by 42% and fat levels by 30%. Benefits persisted at 4 month follow-up.
- Levels in blood and fat increased in controls not treated.
- Clinically, at post-treatment all patients reported a marked improvement in symptoms, with most of these improvements retained at follow-up. No such improvements were noted in controls.

**Basic Liver Detoxification Process**
- Phase 1: Enzymatic Transformation: Fat soluble made water soluble: often increased toxicity. Many vitamins and minerals.
- Phase 2: Conjugation: Increase solubility and decrease toxicity (conjugation) (garlic, cruciferous plus, protein (glutathione), B Complex) * Weak Link
- Phase 3: Transport: Carry the solubilized compounds out of the cell and body. Protein. Requires healthy elimination.

**Toxic Minerals & Their Antagonists**
- Arsenic: Widely used as a wood preservative, fungicide, pesticide, herbicide, and added to chicken feed as a growth stimulant until 2009. Contaminant of drinking water. Protective nutrients: Selenium, sulfur, vitamin E.

**Toxic Metals**
- Cadmium: Exposure–stabilizer in PVC pipes, contaminant of commercial fertilizers, burning of plastics and tires, Ni-Cad batteries, yellow to red pigment in paints (sometimes used in plastic toys).
- Cadmium acts as an estrogen mimic in living rats at a level of one hundred-thousandth of a part per billion. Authors suggested it is a causative agent in breast and uterine cancer. Toxic to the kidney (high blood pressure)
- Major antagonist: Zinc
**Toxic Minerals**

- **Lead**: Additive to gasoline and paint for many years leading to soil contamination. Lead pipes deliver water in some cities. Leaded glass and pottery. Protective nutrients: Calcium, Iron, Zinc, Vitamin C, Vitamin E.
- **Mercury**: Doctors dispensed quicksilver (a mercury containing medication). The name was shortened to quacks and applied to these doctors. Used in dental fillings, fungicides, algaecides, insecticides. Protective nutrients: Selenium, sulfur (garlic, onion, cruciferous vegetables, cilantro, egg), zinc, iron.

**Rice Contamination**

- Rice imported from Asia, Europe and South America was found to have levels of lead so high that consuming it daily would result in exposure levels many times greater than the FDA recommends.
- Both organic and commercial rice grown in the United States were found to be contaminated with significant quantities of arsenic.

**Fluoride-Hydrogen Bond**

- “Fluoride’s hydrogen bond with amides is the second strongest bond ever found.”

**Enzyme Inhibition**

- Fluoride, bromine, chlorine are iodine antagonists.
  - “The effects of fluoride on the thyroid gland have been studied so extensively, that it baffles the mind how experts on thyroid disease from Harvard or the University of Toronto can claim that fluorides do not affect thyroid gland function, especially when it has been used as medication to do just that!”
Summary on Minerals

- Toxic minerals are antagonized by beneficial minerals.
- Minerals are often in short supply in the American diet due to widespread use of herbicides like Roundup which are strong chelating agents (they bind to minerals and do not release them—this is how they kill weeds). Food processing take a further toll on minerals.
- Sulfur containing compounds (Cruciferous Plus) and antioxidants (Betagard) can offer further protection.

Gut Detoxification

Why are coffee enemas and colonics such a common feature of detoxification programs?

The digestive tract is the gateway for nutrient appropriation. Microbial toxins or food allergens can block nutrient utilization and release systemic toxins into the bloodstream.

Factors that Disturb Microflora

- Antibiotics
- Infections
- Chemotherapy and radiation
- Stress
- Travel
- Antacids
- Low HCL or enzyme secretion
- Poor diet:
  - Beneficial: Fiber, cultured dairy, aloe, raw & fermented foods.
  - Harmful: Excess red meat, sugar (yeast overgrowth), carbon dioxide, alcohol, white flour (slows transit time), consumption of food allergens

Obesity Associated with Gut Microbes

- Obese people have increased numbers of bacteria which extract calories from food.
- Inoculation of germ-free mice with intestinal bacteria from obese animals results in significantly more body fat than if they are inoculated with gut microbes from lean animals. This may explain why domestic animals gain more weight when they are raised with antibiotics in their feed.
- https://commons.wikimedia.org/wiki/File:Fatmouse.jpg
Malnutrition Associated with Gut Microbes

• Twins were studied. Gut bacteria were different between malnourished and well-nourished twins. Gut bacteria in malnourished children lacked the ability to synthesize vitamins and digest carbohydrates. [Note: You can be malnourished on an adequate diet if you have the wrong gut microbes.]

Atherosclerosis, Blood Pressure & Gut Microbes

• Intestinal bacteria were found to play a role in creating atherosclerosis in animals by synthesizing TMAO.
  - Koeth, Robert A., et al., Intestinal microbiota metabolism of L-carnitine, a nutrient in red meat, promotes atherosclerosis, Nature Medicine, April 7, 2013; doi:10.1038/nm.3145
• Bacteria encouraged by a high fiber diet were associated with lower blood pressure. A low fiber diet encouraged bacteria that raised blood pressure by synthesis of formic acid.

Diabetes & Gut Microbes

• 80% of diabetics experience remission within days when surgery short circuits the small intestine changing the composition of the microbes in the gut.
• Disturbances in the microbiome have been associated with Type 1 diabetes, asthma, eczema, and multiple sclerosis.
  - http://www.nasa.gov/cgibin/srv Apple_100300002

Rheumatoid Arthritis

• Microbial agents may be causative in RA.

Rheumatoid Arthritis: Infection

• Proteus mirabilis & Klebsiella overgrowth in those with rheumatoid arthritis.
  - https://commons.wikimedia.org/wiki/File:Proteus_mirabilis.jpg
  - https://commons.wikimedia.org/wiki/File:Klebsiella_pneumoniae.jpg

Ulcers & Gut Microbes

• Barry Marshall of the Royal Perth Hospital in Australia ingested Helicobacter pylori in 1985. He developed severe gastritis which vanished without treatment.
  - https://commons.wikimedia.org/wiki/File:Helicobacter_pylori_diagram.png
Support for the Upper Digestive Tract

Robert Koch

In 1885 Koch, the father of bacteriology, learned he could predictably infect guinea pigs with cholera by delivering the organisms with bicarbonate. The threshold of infection increased 10,000 fold.


The Gastric Barrier


Gastric Juice Nitrite & Stomach Cancer

“Neutral gastric juice contains metabolically active bacteria capable both of generating nitrite from nitrate and of catalysing nitrosation. In this way an intragastric environment suitable for the formation of carcinogenic nitrosamines exists in the hypochlorhydric and achlorhydric stomach, providing a possible mechanism for the high incidence of gastric cancer in these subjects.”


Salmonella Infection

- Normal stomach acid: 1 liter of diarrhea per day for less than 6 days duration.
- Low stomach acid: infections lasted 7-14 days and volume of stool ranged from 3.5 to 10.5 liters a day.


Giardia lamblia

- Examination of 50 patients with Giardia:
  - 42% low stomach acid
  - 12% no stomach acid.
- Giardia requires a pH between 6.4 to 7.1 to thrive.

https://commons.wikimedia.org/wiki/File:Giardia_1.jpg

Stomach Acid and Digestion

- Low stomach acid is associated with:
  - incomplete breakdown of food
  - absorption of undigested food molecules
  - increased likelihood of allergic response.

https://commons.wikimedia.org/wiki/File/Stomach.png
Amino Acids & Low Stomach Acid

• “Pepsin is an enzyme that is required for the optimum initial digestion of protein...If acid levels are depressed, then so are pepsin levels. As a result, proteins don’t get broken down into their component amino acids and peptides (two or more linked amino acids). The resulting deficiency of many essential amino acids...may lead to chronic depression, anxiety, insomnia, and other disturbing or dangerous long-term disorders.”

• Antacid use is a risk factor for amino acid deficiencies which can lead to numerous problems including allergies and malfunction of the central nervous system.


Small Intestinal Bacterial Overgrowth

- Small numbers of bacteria are normally found in the small intestine.
- Hydrochloric acid kills the microbes found in food preventing invasion at the upper end of the small intestine.
- Vigorous muscle contractions normally move bacteria out of the small intestine before they can reproduce in large numbers or transit upwards. Constipation and slow transit time can disrupt this process.

Types of Enzymes

- Endogenous: Enzymes produced within the body.
- Exogenous: The enzymes in raw or fermented foods or supplements.

Degenerative Disease Process: Philpott

- Nutrient deficiency, toxin exposure, allergy =>
- Reduced pancreatic function =>
- Distorted acid/base balance =>
- Failure to digest protein
- Undigested protein leads to inflammatory response
- Undigested fats accumulate in the circulation


Case History

- Cheddar Cheese produced markedly sweating hands followed by tension which progressed to rigid catatonia.
- Supplemented with pancreatic enzymes and hydrochloric acid before meal.
- 5 minutes later she was given one pound of cheddar cheese.
- 30 minutes after the meal she was given ½ tsp sodium bicarbonate and potassium bicarbonate (2:3:1/3)
- The only symptom was minor sweating of the hands.


HCL, Enzymes & Allergic Response

Raisins without digestive aids:
- Blood sugar 400 mg%, tension, trembling, irritability, and unprovoked anger.
- With digestive aids: Blood sugar 160 mg%, no symptoms

Apple:
- Without aids: Blood sugar 200 mg%
- With aids: Blood sugar 80 mg%


https://commons.wikimedia.org/wiki/File:Stomach_1.gif
Amino Acid Deficiency

• “It is important to remember that when the pancreas is functioning poorly...there is always an accompanying amino-acid deficiency. An amino acid deficiency is a very serious problem because the central nervous system, as well as many other biochemical systems within the body, malfunctions when there is a short supply of these necessary nutrients—the very building blocks of life.”


NeoLifeShake

• All 22 amino acids
• Glycemic Response Control technology
• Combination of 5 g fiber and 18g of amino acids to suppress ghrelin and enhance leptin.
• Exclusive Protogard Process
• PDCAAS of 1.73

Degenerative Process

• “…pancreatic insufficiency is responsible for a lowered lipase activity. A lower level of this enzyme …may cause metabolic activity at the cellular level to react in a more sensitive fashion to allergic foods and chemicals. The degenerative process now begins, and if it continues for any protracted period, these multiple deficiencies feed upon one another and add to the additional metabolic stress that finally breaks up the entire biochemical balance needed for health.”

  Lipase is a fat digesting enzyme.


Support for the Lower Digestive Tract

Probiotic  Prebiotics

A Note on Fasting

• Water fasting causes a dramatic drop in the bacterial populations of the digestive tract—they have nothing to feed on.
• Fasting also give the digestive tract an opportunity to repair and strengthen itself.
"Constipation has the dual distinction of simultaneously being the most common and the most neglected affliction of modern times."

"...even the most prestigious medical works underestimate the importance of the malfunction."

Fiber, probiotics, digestive substances, energy providing nutrients, adequate water intake.


Older people complain of constipation 5 times more often than young people.

Keep Things Moving

A mild cleansing action to aid the body’s natural processes. Works gently overnight. Proprietary combination of 8 complementary herbs.

The Nucleopore Corporation

Oxidation

Free radicals are molecules which usually have one unpaired electron.
Free Radicals

- Initiation: A compound gains or loses an electron
- Propagation: Chain reaction with less reactive compounds with a longer half-life extending potential for cell damage
- Termination: Free radicals are neutralized
- Targets of Free Radicals:
  - Potentially any tissue
  - The organization of the cell membranes as continuous lipid bilayers heighten their vulnerability to attack. Once a free radical finds its way into the bilayer “it may become free to propagate across a virtually uninterrupted ‘lake’ of lipids.”


Free Radicals Within and From Outside

- Many toxins do their damage by their free radical generating capacity.
- Free radicals are generated in the body’s production of energy.
- Food allergens, bacteria, and viruses activate free radical production by the immune system.
- Free radicals can be ingested with food, water, and by breathing.

Free Radicals: Immune Activation

Phagocytic or Respiratory Burst

White blood cells release large quantities of free radicals in their efforts to destroy bacteria, cancer cells, allergens or other substances. Insufficient antioxidant intake can weaken the immune response.

Free Radicals: Air Pollution

Dietary Intake of Free Radicals

- Oxidized fats are powerful free radicals.
- Oxidized cholesterol is 500 times more atherogenic than nonoxidized cholesterol.
The Cell Wall
The bi-lipid layered cell wall is composed largely of quality fats. “The health of every cell in the body is the key to the health of the body itself.”

“...when the cultured cells you are studying are ailing, you look first to the cell’s environment, not to the cell itself for the cause... When I provided a healthy environment for my cells they thrived; when the environment was less than optimal the cells faltered. When I adjusted the environment, these ‘sick’ cells revitalized.” (p. 80)

The Magical Membrane
‘This chapter (3) puts forth my nominee for the true brain that controls cellular life—the membrane. I believe that when you understand how the chemical and physical structure of the cell’s membrane works, you’ll start calling it, as I do, the magical membrane. Or alternatively...I refer to it in my lectures as the magical mem-Brain.” (p. 75)

“...All cellular components are susceptible to free radical attack, but the membrane systems are the prime targets. The membrane lipid bilayer is preferentially susceptible to peroxidative damage, by virtue of its high content of fatty acids. The relative susceptibility of the various membranes in the cell to free radical attack is very likely related to their fatty acid composition, those with the highest content of polyunsaturated fatty acids, i.e., the greatest degree of unsaturation, being the most vulnerable. Another factor of importance in determining the relative susceptibility of a membrane to free radical attack is its complement of enzymatic electron transfer complexes which utilize heavy metal atoms as cofactors.”

The Magical Membrane
• “The true secret of life does not lie in the famed double helix. The true secret of life lies in understanding the elegantly simple biological mechanisms of the magical membrane...” (p. 75-76)
• “The membrane’s function of interacting ‘intelligently’ with the environment to produce behavior makes it the true brain of the cell... When you destroy its membrane, the cell dies just as you would if your brain were removed.” (p. 86)

2 Additional Potential Areas of Critical Damage
• Endoplasmic reticulum: site of protein synthesis and folding, detoxification, utilization of fats and carbohydrates. Damage associated with insulin resistance.

• Mitochondrial membrane systems: Energy production. Exercise intolerance, diabetes, hearing loss, neuropathy, dementia, aging. “Because mitochondria are dynamic organelles constantly undergoing fission and fusion events, they require a constant and well-regulated supply of phospholipids for membrane integrity.” Wikipedia
Mitochondria Susceptible to Free Radical Damage

Mitochondrial DNA has limited enzymes with which to repair itself. It is 2,000 times more susceptible to oxidative damage than nuclear DNA.


Phospholipids in Detoxification

"The elegance...lies in the lipid membrane that embraces the enzymes, manipulating them to their most optimal position to allow it all to occur."

"All thought, all sensory transmission, and all motion, involves the lipid membrane which carries the signals and information."

"The lipid membrane...is the heart of the health of the cell and is crucial in addressing the systemic health of the patient."

Kane, Patricia, et al., The Detoxx Book, Wayne, PA: WellSpring Clinic, 2007, 37, 10.

Renegade Fats

"Highly unsaturated lipids vibrate in the cell at significant frequencies. The double bonds of the omega 6 and omega 3 lipids are the singing backbone of life expressed through their high energy level. These double bonds are the vibratory song and carry a tune befitting every act and function in the exercise of life, providing all 100 trillion of our cells their flexible nature. When renegade fats are over represented in the cell membrane they result in an off key expression, and if strong enough, may spell cellular death and apoptosis. Healing the outer leaflet of the membrane...with phospholipid therapy, is our highest priority in addressing chronic illness."

Kane, Patricia, et al., The Detoxx Book, Wayne, PA: WellSpring Clinic, 2007, 18. (888) 320-8338

Nutrient Absorption and Detoxification

"By stabilizing lipid status with intravenous phospholipid exchange and oral EFA supplementation we have remarkable tools to unload the body burden of neurotoxins, in both pediatric and adult populations, without side effects. Oral use of phospholipids in a liver flush is also an effective intervention in addressing neurotoxic syndromes." Foster, John, M.D., et al, The Detoxx System
Phospholipids in Detoxification

- "Toxins have an affinity for fatty acids; they literally take up residence in the lipid environment and in so doing, weaken and disrupt. The probable result is...premature death of the cell.
- Detoxification of neurotoxins requires that the cell membrane is nourished with balanced fatty acids...and supportive phospholipids."


Membrane Building & Detoxifying Products

Supplementation with the lipid components ordinarily removed from grains and legumes.

Animal Work

TRE-EN-EN

Hospital  Athletes  Animals
Salmon Oil Plus

- Exclusive GNLD Molecular Differentiation Technology.
- Standardized for all 8 members of the omega-3 family.
- Tested for over 250 potential contaminants with a standard of ZERO.
- Clinically tested and shown to reduce the inflammatory index by 68% in 8 weeks.
- UHPO-3 Ultra-High Potency Concentrate allows for smaller capsule for easier swallowing and less burping.

Feeding Omega-3 Oils

1. Mice live twice as long as normal.
2. Half the normal levels of autoantibodies.
3. Lower than normal inflammation.
5. Blood cholesterol levels half of normal.

Importance of Purity

Feeding mice Atlantic salmon contaminated with pollutants (POP’s) resulted in insulin resistance and obesity. Uncontaminated oils did not create this problem.

The 8 Omega-3 Master Molecules

Nutrients Involved with the Inflammatory Response

EPA (Salmon Oil) both displaces AA and inhibits the Lipoxygenase pathway.

Ginger, flavonoids, zinc, selenium, and vitamin E appear to inhibit the lipoxygenase pathway.

Leukotrienes are hundreds to thousands of times more inflammatory than histamine.
“Neither alpha-linolenic acid nor alpha-linolenic acid plus gamma-linolenic acid significantly enhanced eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) synthesis.”

“This article is very important because so much flaxseed oil (which contains alpha-linolenic acid in high quantities) is used, with the assumption that it will be converted to the long-chain omega-3 fatty acids DHA and EPA.”


Quote from Clinical Pearls News, April 1999, p. 69.

Salmon Oil Superior to Flax

Salmon Oil Plus Human Clinical Trials

- 17% reduction in triglycerides in 8 weeks.
- 30% improvement in omega-3 to omega-6 balance in 8 weeks.
- 68% reduction in the inflammatory index.
- 9.5% reduction in arachidonic acid in cell membranes
- 3 Salmon Oil Plus a day for 8 weeks.

The Story of Dr. Stephen Levine

- Dr. Stephen Levine, Ph.D., was working in a research laboratory in Santa Cruz in 1976. He became chronically tired, depressed, irritable, with bouts of hypoglycemia.
- He suspected laboratory chemicals and foods
- Wife viewed as neurotic manifestations tied to job dissatisfaction.
- Left his laboratory job.
- Chronically ill for next 5 years.
- 1979 Brookhaven Medical Center diagnosed ecological illness which was irreversible. He had become sensitized in hundreds of chemicals interwoven into our modern industrial civilization. He was advised to avoid exposures to foreign chemicals (xenobiotics) at all costs.
The Story of Dr. Stephen Levine

- In October 1979 he discovered that a Pacific kelp rich in selenium relieved horrible flu-like muscle aches and pains he had experienced since he became ill 3 years earlier.
- By mid-December he had regained considerable tolerance to car exhaust, cigarette smoke, chlorine in tap water, hydrocarbons, glues, perfumes and other chemicals.
- Physicians began trials of selenium and found the mineral would often provide improvement over a period of about 60 days.
- Levine concluded that oxidative stress lay at the root of environmental illness. Oxidative stress could be triggered by physical trauma, chemical toxicity, emotional stress, or infection.
- One manifestation of this oxidative stress was damage to cell membranes leading to release of inflammatory mediators causing suppression of immune function and autoimmune activity.

Primary Antioxidant Defense

1. SOD (Superoxide Dismutase): [Converts superoxide to oxygen and hydrogen peroxide] Cu & Zn in cells, Mn in mitochondria
   a. Superoxide is used by white blood cells to kill pathogens (respiratory burst). Toxic. Failure due to lack of B3 dependent enzyme can result in immune deficiency.
   b. Byproduct of energy production in mitochondria (Complex I, III)
   c. Mice lacking MnSOD develop degeneration of nerves, heart, acidosis resulting from poor oxygen utilization during exercise (lactic acidosis)
   d. Mice lacking CuZnSOD: reduced lifespan, liver cancer, muscle atrophy, cataracts, anemia

Primary Antioxidant Systems

- Glutathione Peroxidase: Converts hydrogen peroxide to water and reduces oxidation of lipids. Enzyme requires selenium, sulfur, glutathione, cysteine, and other chemicals. Levine lacked this enzyme due to selenium deficiency. Note: selenium, sulfur, amino acids
- Catalase: Converts hydrogen peroxide to water and oxygen. Built from protein and iron. Cyanide inhibits catalase. Concentration in liver. Low levels of catalase have been associated with graying hair—hydrogen peroxide bleaches the hair from the inside out. Cyanide inhibits catalase, an enzyme which converts hydrogen peroxide to water and oxygen.

Carotenoids: Powerful Fat Soluble Antioxidants

- A carotenoid complex
- One capsule is equivalent to four 200 IU vitamin E capsules.

Secondary Antioxidant Defense

- Vitamin C Complex [polyphenols, flavonoids]
- Glutathione (amino acids cysteine, glutamate, glycine)
- Carotenoids
- Vitamin E Complex: 1 vitamin E molecule protects 1,000 lipid molecules
- Lipoic Acid
2 Key Carotenoid Concepts

- **Nutrient Specificity:** Nutrients often are highly specific in their modes and sites of action.
- **Competitive Absorption:** Large amounts of one compound can inhibit absorption of similar compounds.

### Carotenoid Complex

- First study showing increase of blood levels of carotenoids other than beta-carotene conducted with this supplement. (1)
- 37% enhancement in immune function in 28 days (lymphocyte proliferation)
- 20% increase in natural killer cells
- 5-fold increase in antioxidants in cholesterol
- 44% reduction in oxidative damage to the cells. (2)


### Specificity of Action

- Astaxanthin: More efficient than vitamin E at protecting mitochondria.
- Alpha-Carotene: Shuts down n-myc gene associated cancer cell growth at low levels of intake.
- Beta-Cryptoxanthin: Low levels (40% less) associated with inflammatory arthritis, supports lung function.
- Lycopene: 10 servings reduced prostate cancer risk 50%.
- Lutein protects rods, zeaxanthin the cones in the eye. Macular degeneration risk reduced 39%.

### Competitive Absorption

**HPLC**

High Performance Liquid Chromatography

Both the height and the number of blips are significant. High levels of one carotenoid or one member of the vitamin E family will inhibit absorption of other members of the family. Individual members of these families of nutrients occupy different tissues in the body and provide different kinds of protection.

One bottle of Carotenoid Complex capsule is equivalent to eating 250 pounds of raw fruits and vegetables.
More Antioxidant Support

- Pro-Vitality
- Tre-en-en
- Carotenoid Complex
- Salmon Oil Plus
- Vitamin Mineral

NOTE: The "Response" Phenomena