

## ***Immune System & Infectious Diseases*** **Integrative Immune System Restorative Therapies**

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### **INTRODUCTION**

An intricately complex set of cells and organs comprise the human body's immune system, which is responsible for both preventing and fending off serious illnesses ranging from mild infections to infectious diseases. With the preceding chapter sharing an orientation to the anatomy and physiology of the immune system, this chapter focuses on integrative restorative therapies that may be of benefit in modulating specific immune responses, namely:

- Cell-mediated immunity (CMI) (TH1)
- Interleukin-6 (IL-6) pathway
- Humoral immunity (the antibody response - TH2)

### **CELL-MEDIATED IMMUNITY (CMI) (TH1)**

When a CD4 cell signals a Cell-Mediated Immune (CMI) response known as T Cell Helper 1 (TH1), it may signal a CD8 cytotoxic lymphocyte (CTL) to destroy a virus-infected cell or a cancer cell. CMI responses destroy infections inside the cells or destroy the infected cell, including cancer cells. Infections inside the cells are more effectively neutralized with a CMI response than with an antibody response. These include all the herpes family of viruses, cytomegalovirus, Epstein barr virus, HIV, cancer, and most other chronic persistent intracellular infections (inside the cells).

Many kinds of infections stimulate chemical messengers and immune reactions that are not effective against the inherent infection. *Candida albicans* promote IL-6, a TH2 cytokine that will not promote an effective response against fungal infections. On the other hand, the Rhinovirus that causes the common cold will promote an IL-2 increase, a TH1 cytokine that is helpful in fighting cancer and intracellular infections, but not the common cold. Thus, people who get a good cold at least once a year are less likely to ever get cancer, and people who are prone to get cancer never catch a cold or the flu.

TH1 cytokines that support CMI and mucosal immunity include Interleukin 12 (IL-12), gamma interferon (IFN-gamma), and Immunoglobulin type A (IgA). Friendly intestinal flora (*acidophilus* and bifido bacteria) support mucosal immunity by producing butyrate and other short chain fatty acids that rebuild the intestines. Diets high in fiber support the growth of friendly flora. Researchers have found that *B Longum* is one strain of friendly flora that increases mucosal IgA levels, while *L. Plantarum* increases IL-12 and IFN-gamma levels. Cell-Mediated Immunity (CMI) target infections inside the cells that involves a group of white blood cells known as CD8 Cytotoxic Lymphocytes (CTLs), and also the Natural Killer (NK) cells. The CD8 CTLs are under the influence of CD4 cells of the TH1 type.

Persons with weak CMI are susceptible to cancer and a wide range of infections inside the cells (mycoplasmas, herpes, HHV-6, HIV, hepatitis, CMV, EBV etc.). Persons with strong CMI have natural immunity from cancer and can reduce infections inside cells to a level where they are free of symptoms. Occasionally, persons with exceptionally good CMI eradicate some types of viruses completely. Cytokines that support CMI are IL-12, IL-2 and IFN-gamma. IL-12 and IFN-gamma also support mucosal immunity. These cytokines are known as the TH1- type. (TH refers to T Helper (CD4) cells. TH1 means T cell Helper Type 1, while TH2 means T cell Helper Type 2. The "Type" refers to whether they produce TH1 or TH2 type cytokines).

CD4 Helper cells work with all types of white blood cells in the immune system and can be either of the TH1 type or the TH2 type. The immune response to a challenge can be either TH1 or TH2 or both. When both kinds of responses become active, the TH1 response usually follows the TH2 (antibody) response. Some research points to the intracellular levels of Glutathione as a controlling factor in determining whether the immune response is TH2 or TH1. When Glutathione levels are low, the immune response is of the antibody type (TH2). When levels of Glutathione in the immune cells are high, the response is TH1 (CMI). Apart from this, the Natural Killer cells work independently of any influence from the CD4 Helper cells.

In restoring mucosal immunity, CMI and Natural Killer cell function is critical in an immune-based therapy for Cancer, CFIDS, Candidiasis and AIDS. Just as you cannot restore CMI, unless you first restore mucosal immunity, rebuilding the mucus membranes of the intestinal tract is the foundation of any program to successfully restore a normal and balanced immune system.

### ***Integrative Approaches that Support TH1***

**Low-dose Hydrocortisone** (10 to 20 mg daily) – a natural Adrenal hormone that lowers IL-6 and TNF – improves cellular immunity and Natural Killer cell function.

**L-Glutathione** – Researchers have found that high or low Glutathione levels inside immune cells are a switch to determine the preferential immune response – TH1 or TH2. Sufficient Glutathione inside immune cells strongly promotes a TH1 cytokine response that is the most effective immune response against cancer and most chronic intracellular infections. It stimulates antigen presentation and CD8 CTL's, macrophage and neutrophil activity. Glutathione reduces tumor necrosis factor (TNF), a main cause of wasting syndrome. As an antioxidant, Glutathione also neutralizes free radicals.

**Selenium** strongly supports Glutathione levels. Food sources include Brazil nuts, fish and sea vegetables. Best supplements: high-selenium mustard greens and high-selenium. Preventative amounts - 400 mcg daily. Therapeutic amounts: 800 to 1200 mcg or more daily.

**Whey protein and L-cysteine** from cold processed whey proteins, aged Garlic extract (Kyolic), raw or sprouted seeds and nuts, raw onions and garlic increase glutathione. Horseradish contains significant amounts of Glutathione peroxidase. Smaller amounts are in winter squash and avocados. Silymarin also help increase Glutathione levels. Riboflavin (B2) recycles oxidized Glutathione back to its reduced form.

**Omega-3 fatty acids** (DHA & EPA) found in cold-water fish, salmon, sardine and cod liver oil (improves DTH, lowers triglycerides, TNF and IL-6) - helps prevent heart disease and cancer. Flaxseed also contains some omega-3 fatty acids. Dietary supplement: Seacure

**Olive Oil** – increases IL-2 [Cytokine. 1995 Aug;7(6):548-53.] Monounsaturated fats are found in olive, macadamia, avocado and hazelnut oils and to a lesser extent in peanut oil. (reduces TNF and increases IgA - supports mucosal immunity). Adult therapeutic dose: 4 tablespoons daily.

**Vitamin A** – increases transport of IGA - supports mucosal immunity. Cod liver oil one to three teaspoons daily.

**Vitamin K** – reduces interleukin 6 (IL-6) and prostaglandin E2. (Source – parsley)

**Silica** - reduces IgG and improves NK function. (Food sources: Horsetail herb and/or Oatmeal).

**Vegetarian digestive enzymes** - improves digestion and assimilation of proteins and other nutrients, reduces circulating immune complexes that cause antibody and autoantibody formation as well as increases albumin levels. Protein digestive enzymes are found naturally in fresh ginger root, raw pineapple and kiwi fruit. . Additional factors that support digestion are:

- **Cayenne** - 1 or 2 capsules taken before meals stimulates hunger and digestive enzymes. (lowers IL-6, supports digestion of nutrients – heals ulcers)
- **Lemon juice or apple cider vinegar** - taken with meals stimulates hydrochloric acid for protein digestion. (support digestion of nutrients for mucosal membrane integrity).
- **Magnesium** - needed by pancreas to produce pancreatin, necessary for protein digestion.

### **Friendly intestinal flora**

- *Lactobacillus Plantarum* and *L casei* - potent inducers of IL-12 and IFN-gamma. Supports mucosal immunity. Reduces IgE and food allergies.
- *Bifidobacterium Longum* - increases IgA - supports mucosal immunity - reduces candida albicans - improves lactose tolerance.

- **Acidophilus** - promotes resistance to colonization of candida albicans.
- **Fiber/pectin/probiotic** blend
- **Slippery elm** tea or powder – helps rebuild the intestines, or try Ojibwa tea.

**Chlorella- broken cell wall or Spirulina** - use liquid, granules or capsules. Increases IL-12, GM-CSF and activates macrophages.

**L-Thyroxine (T4)** – a thyroid hormone that is a potent inducer of IFN-gamma<sup>(5)</sup>

**Garlic**, raw or aged extract - promotes NK function and IL-2.

**DHEA** - increases IL-2, IFN-gamma and decreases IL-6 and IL-10.

**Acupuncture** (points ST36, LI11 and RN6) increase IL-2, IFN-gamma and NK function.

**UVA light** - promotes IL-12, increases vitamin D levels.

- **Vitamin D** – the sunshine vitamin. Research shows this vitamin has powerful anti-inflammatory effects on TH2 type immune responses and helps balance TH1/TH2 immune reactions. Vitamin D and sunshine that causes the body to produce vitamin D can reduce viral loads for HIV, HBC, HCV and other viruses and can improve immunity against cancer.

**Vitamin E** (natural) - increases IL-2, NK function and IFN-gamma. Reduces NF-kappa B. Use only natural vitamin E with its various tocopherol forms for best results.

**Transfer factor** - protein immuno-modulators extracted from colostrum from immunologically stimulated animals that promotes DTH and specific immunity to certain antigens (viruses etc).

**Colostrum** - contains IgA - promotes mucosal immunity and immunity to specific antigens to which the animal was exposed.

**Naltrexone** – low dose 3 to 4 mg once daily for adults before bedtime promotes NK function and resistance to candida albicans. Reduces IL-6 levels, promotes deep restful sleep.

**IP6** - found in brown rice and corn - promotes NK function.

**Lentinian, Shiitake, Maitake and certain other mushrooms** - promote TH1 cytokines and NK function.

**Thymic Protein A** - increases platelets, IL-2, WBC and T cell counts.

**Beta 1, 3 glucan** - found in the common yeast and in oats and oat sprouts/rye sprouts - stimulates macrophage and neutrophil function.

**Noni**, Tahitian - 2 tablespoons twice daily - promotes NK function and immunity against cancer.

**Neem** - promotes IFN-gamma and increases CD8s - also, a powerful antiviral, antifungal and antibacterial herb.

**Exercise** - walking, gardening, dancing, sports, increases endorphin levels - improves NK function - removes toxins from body.

**Water** - Drink 8 to 12 glasses daily - removes toxins - reduces stress on adrenals, liver and kidneys.

**Positive attitude, prayer, classical music.** - ability to forgive, compassionate, willingness to help others. Reduces stress on the adrenal glands.

## **HUMORAL IMMUNITY (THE ANTIBODY RESPONSE - TH2)**

The immune response that attacks infections outside of the cells is called “Humoral Immunity.” It is an antibody response known as T Cell Helper 2 (TH2) and involves interactions between B cells and CD4 helper cells in the lymph nodes. Dendritic cells and macrophages are sentry immune cells that pick up viruses and other foreign antigens and present them to the CD4 cells in the lymph nodes. The CD4 cells decide if and what type of immune response will be undertaken. If an antibody response is needed, the CD4 cells signal certain B cells to produce antibodies that tag viruses and bacteria for destruction by other immune cells. Once the infection is eliminated, certain cells retain “memory” about the invader and can mount a quick antibody reaction, if the invader returns. These white blood cells are called “memory cells.” Persons who have these memory immune cells are said to be “immunized” against that particular infection. Vaccines that protect us against certain viruses create memory immune cells for those particular infections rely on effective and functional B cells to produce neutralizing antibodies. Once antibodies are attached to a particular virus, fungus or bacteria, other white blood cells look for those antibodies and destroy them.

Persons with poor mucosal immunity usually have an overgrowth of yeast and *Candida Albicans* in the intestines. They will often develop allergies to chemicals and environmental factors. Leaky gut syndrome (LGS) is an underlying cause of excess antibody production, creating an overactive humoral immunity. Health conditions associated with a failure of mucosal immunity and an excess of TH2 cytokine production, include: autism, food allergies, candidiasis, chronic fatigue syndrome, ulcers, crohns, multiple chemical sensitivities, Lyme, hepatitis, high blood pressure, AIDS, and cancer. LGS is not considered to be the sole factor, but a contributing factor, in most of these conditions.

The humoral (B cells) try to quickly wipe out the invading enemy. The inflammatory responses include fevers and the massive production of new B cells. Some B cells evolve into Plasma cells that produce the antibodies. The B cells are like foot soldiers that tag enemies for future destruction. Once the virus is tagged with an antibody, the CD4 cells signal other immune cells (macrophages, monocytes and neutrophils) to come in and devour them. In AIDS, CFIDS, HHV-6 infection, inflammatory immune responses result in swollen lymph nodes and unfortunately, an ineffective immune response to the infection. The antibody response alone fails to neutralize the infection.

Humoral immunity involves certain chemical messengers (cytokines), and a group of white blood cells called B cells which then mature into Plasma cells and produce antibodies. CD4 cells of the TH2 type control the B cells. Antibodies bind with viruses and other pathogens that live outside of the cells and tag them for destruction by other types of white blood cells. Persons with strong humoral immunity rarely get the common cold or the flu. Humoral immunity targets infections outside of the cells. Cytokines that support humoral immunity are Interleukin 4, 5, 6 and 10, and are known as TH2 type cytokines.

Dr William C Douglass MD states in his book on “Hydrogen Peroxide – Medical Miracle” <sup>(3)</sup> states that sixty percent of the white blood cells consist of neutrophils that produce hydrogen peroxide as a first line of defense to destroy “every type of invading organism – parasites, viruses, bacteria and yeast.” Macrophages are another type of white blood cell that act like Pac Men and eat intruders they find in the blood stream. For antibody responses to be effective in eliminating an infection, other types of white blood cells must be functional to eliminate the targeted infection. Functionality of white blood cells depends on a body that is clean and not overwhelmed with toxins nor is deficient in key nutrients like selenium and L cysteine that support healthy L-glutathione levels. Essentially, you are not only what is in your genes, but also what you eat, what you drink, what you breathe, what you think and what you feel. Consequentially, your own self- image and beliefs control your choices.

Getting a good night sleep is important to keep the immune system in balance and prevent an overactive humoral immunity. Persons with chronic insomnia will have elevated IL-6 levels the following day. IL-6 is an exclusive TH2 cytokine, whereas IL-10 has cross-regulatory roles that involve TH1 cytokines as well. IL-6 levels are predominantly elevated in persons with overactive humoral (TH2) immune systems. When humoral immunity is over-active, Cell Mediated Immunity (CMI) is underactive and suppressed – the teeter-totter effect.

## **INTERLEUKIN-6 (IL-6) PATHWAY**

### ***Vegetable Oils***

Chiba Univ. Hayashi N et al in Japan measured the effects of intravenous Omega 3 from fish oil (DHA/EPA) versus Omega 6 (poly unsaturated fatty acids) or PUFAs from vegetable oils on delayed-type hypersensitivity reactions in burned rats. They concluded that the Omega 6 from vegetable oils increased proinflammatory cytokine levels (IL-6, TNF etc) while the Omega 3's from fish oil prevented immunosuppression in burned rats receiving TPN.

The pro cancer effects of high fat diets are widely reported and the fats themselves are almost universally the wrong kind of fats (processed vegetable oils, margarine, hydrogenated fats etc). Compare the high cancer and heart disease rate of the western use of "vegetable oils" to the "Mediterranean diet" that uses olive oil and the Eskimos who eat high fat diets from fish that have little or no heart disease or cancer. The results speak for themselves.

Note: It is evident that under stress conditions, the consumption of these vegetable oils (canola, soybean, corn, sunflower, safflower etc) promote inflammatory cytokines (IL-6, TNF etc) and would weaken the immune response against cancer, HIV, HHV-6 etc). The safe oils to use would be palm oil and olive oil, the latter containing 90% monounsaturated fatty acids.

### ***Glucose & Sugars***

Researchers Yu WK et al <sup>(64)</sup> in China found that increases in glucose levels in the blood raised macrophage production of IL-6, TNF and insulin. These conditions are more pronounced in persons with impaired glucose tolerance or have type 1 or 2 diabetes, sepsis or hyperglycemia. What does this say about the stress effects of consuming corn syrup and white sugar found in soda and thousands of processed foods? These simple sugars clearly promote IL-6, TH2 dominance and immune imbalance. Cancer cells use sugar and corn syrup for their source of energy and to promote the growth and spread of cancer cells.

### ***Integrative Approach to Normalize IL-6 & TNF***

**Avoid a diet high in sugar and Omega 6 fatty acids.** Sugar increases IL-6 and tnf, promotes the growth of cancer and yeast and Omega 6 fatty acids (most vegetable oils) promote il-6 and inflammatory immune responses

**Use herbs for steroid precursors (licorice root or thunder of god vine) and plant sterols or low-dose hydrocortisone** (prescription may be required) – 5 to 10 mg taken early 8 or 9am and at 1 or 2 pm only, not in the evening. Also consider using low-dose thyroid – 1/2 grain once or twice daily as prescribed – helps the liver process cortisone into cortisol and detoxify the body. Avoid using cortisol long term without using thyroid at the same time.

**Low-dose DHEA** – 25 mg daily for men and 10 mg daily for women.

**Fish oil – DHA and EPA or Flax oil** - high in omega 3 (Research indicates that an adult effective dose in disease conditions like cancer, AIDS, Lupus, MS etc is 2000 mg daily) – Sardine and/or Salmon oil or DHA/EPA capsules. Fish oil lowers tumor necrosis factor as well as IL-6. Critically needed for all cancer, CFIDS and HIV patients. Red salmon oil capsules are highly effective. Flaxseed oil as a rich source of omega 3 fatty acids at a 1000 mg twice daily may yield results similar to that of fish oil.

**Avoid vegetable oils high in Omega 6 PUFAS** that stimulate the secretion of inflammatory TH2 cytokines. These oils include canola, soybean, corn oil, sunflower and safflower oil primarily. Peanut oil that has 50% monounsaturated fatty acids and is less problematic but the best choices are the oils very high in monounsaturated fatty acids like olive oil – all types even the ultra-light have 90% monounsaturated fatty acids as are some special strains of safflower and sunflower oil.

**Hypoallergenic diet** reduces stress on the digestive tract and thus IL-6 levels. (Avoid milk, ice cream, soy flour, and gluten from wheat if you are gluten intolerant etc). Note: You can try using cultured milk products (yogurt, kefir) and cultured soy products (Tofu, Miso). Consider using fiber and probiotics together daily.

**Complex carbohydrates** (with no added fat or protein) normalize IL-6 and other inflammatory cytokines. Whole grains, fruits and vegetables.

Cox-2 inhibitors, NF-Kappa B inhibitors and anti-oxidants [**Turmeric, Holy Basil, Skullcap, Green tea, Hu Zhang aka Solomon's Seal (high in Resveratrol), Rosemary, Ginger, Red grapes, Oregano, Hops, raw potatoes** - high in **catalase** – breaks down H<sub>2</sub>O<sub>2</sub> into O<sub>2</sub> and H<sub>2</sub>O.

**Licorice root and Grapefruit.** Both grapefruit and licorice interfere with an enzyme (11-beta-OHSD) that oxidizes cortisol into cortisone, thus elevating cortisol levels. Grapefruit and licorice should be used in the morning and afternoon and not late evening. Too much licorice will raise blood pressure. Suggestion: Find an herbal tea with licorice root as the 2nd, 3rd or 4th ingredient on the label.

**Magnesium** – use **magnesium hydroxide** (milk of magnesia) for fastest results. Use **magnesium oxide** as a second choice. Avoid all the other magnesium products (citrate, chelates etc) unless they are solely of natural and plant derived origin.

**Vitamin E** – use “mixed tocopherols” only for best results– for adults 400 IU daily.

**Royal Jelly** – fresh only 1000 mg to 2000 mg daily.

**Bitter Melon.** 1000 mg to 2000 mg daily.

## FREE RADICAL SCAVENGERS

The following are a list of symptoms and conditions that are caused by excess free radicals in the body:

1. Damage to cell membranes leading to cell destruction (aldehyde release from lipids)
2. Damage to the DNA of cells, causing pre-cancerous conditions in some persons.
3. Chronic fatigue.
4. Sleep disorders and disturbed sleep patterns.
5. Inflammation of the large intestines, leading to malabsorption of nutrients.
6. Aging of the skin, with wrinkles and loss of elasticity, due to destruction of collagen.
7. Inflammatory reactions that produce histamines.
8. Increased inflammatory prostaglandins.
9. Susceptibility to bruise easily, indicating weak capillaries and a weakening of the arteries.
10. Neurological damage in some persons.

Increasing glutathione levels boosts the body's defense against free radicals and oxidative stress. Other nutrients that are anti-oxidants and free radical scavengers include D'Glucaric acid, proanthocyanidins, Carotenoids, Vitamin A, C, E, Selenium and Manganese; other naturally occurring flavinoids (i.e. Citrus rinds) that protect cell membranes from free radicals.

There are ample amounts of clinical studies that show the protective effects of Beta-Carotene and Vitamin A in the prevention of cancer. Foods high in beta-carotene have shown an ability to help normalize white blood cell and T cells counts.

Oligomeric Proanthocyanidin Complexes (OPCs) are antioxidant compounds that are easily assimilated when taken orally, even in persons with severe malabsorption problems and are known to cross the blood-brain barrier. Potent foods sources of OPCs include bilberries, elderberries, blueberries, and cranberries.

### *Natural sources of antioxidants*

**D'Glucarate** is found in – Apples, Oranges, Grapefruit, Cherries, Broccoli, Apricots

**Glutathione** - cold processed whey proteins, yogurt, cottage cheese, L-cysteine, NAC, riboflavin, natural B vitamins, methyl donors, glutamine, natural selenium sources, Brazil nuts, garlic, onions, milk thistle and seafood.

**Carotenoids** –rinds of lemons and oranges or lemon/olive oil drink, garlic and onions, carrots, yams, squash, sweet potatoes, pumpkin, dark green vegetables, red and concord grapes and many other whole unprocessed fruits and vegetable. Note: The darker the color of the fruit or vegetable, the more antioxidants it contains.

**Vitamin A** - cod liver oil - 1 or 2 tablespoons daily. If it tastes stale or rancid, do not use. Choose cod liver oil from a store that keeps it refrigerated.

**Vitamin C** - Food sources: Acerola cherries, rose hips, oranges, lemons, limes, berries, bean sprouts, most fruits and green leafy vegetables. Note: Most vitamin C sold today is synthesized from corn: persons with allergies to corn may want to avoid this form of vitamin C.

**Vitamin E**, natural - 400 IU daily – wheat germ and wheat germ oil.

**Selenium** –400 to 800 mcg daily - Food source - Brazil nuts, Brewer's yeast tablets.

**Cold-processed whey proteins.** Promotes deep restful sleep, glutathione, increases human growth hormone and DHEA levels, lean muscle mass and reduces stress on the adrenals. Use only late in the evening or before bedtime – 5 to 10 grams once a day. Whey protein is a perfect match with a glass of tart cherry juice (a source of natural melatonin) when taken before bedtime.

**Manganese** - needed to produce SOD (see below). Pineapple, oat bran, whole grains.

**Alpha Lipoic Acid (ALA).** Natural source – raw potatoes.

**Proanthocyanidins and phenols** - found in grape seed extract, bilberries, elderberries, blueberries, and cranberries. Elderberries, like cranberries, are a powerhouse of antioxidants. Cranberries are very high in the antioxidant phenols.

**Foods including:** spinach, kale, broccoli, carrots, squash, sweet potatoes, raw white potatoes, pumpkin, citrus rinds, onions, garlic, blue green algae, chlorella, and spirulina. Yellow onions are high in quercetin and garlic contains many antioxidants.

**Cranberries** –In an article published in the Journal of Agric Food Chem, 2002 Oct 9th, by Joe Vinson et al at the University of Scranton, Scranton, PA, researchers tested 19 common fruits in the American diet gram for gram for phenol content and found cranberries to be the highest, followed by red grapes. On the basis of antioxidant phenol content, raw cranberry is best, with pure cranberry juice found in health food stores having the highest content of antioxidants of a prepared drink. This is followed by cranberry sauce, while cranberry cocktails have the least. Mixing pure cranberry juice with pure red grape juice or apple juice on a 50/50 basis makes an enjoyable drink. Research has shown that cranberries reduce the oxidation of LDL and decrease total cholesterol levels. Drinking 8 ounces of pure cranberry juice daily should have profound benefits on raising antioxidant levels in the blood.

Cranberries contain several types of antioxidants besides phenols. These includes 3 types of quercetin, 7 flavonol glycosides and anthocyanidins. Vinson reported that the flavonol glycosides showed equal or greater free radical scavenging ability than vitamin E. Apples were also reported to contain phenol antioxidants. In terms of total antioxidants, cranberries even rated higher than broccoli, the vegetable with one of the highest antioxidant rating and well established anticancer properties.

Researchers <sup>(74)</sup> have also found that cranberry juice concentrate completely prevented the growth of a number of bacteria and fungus in an in-vitro experiment including candida albicans, klebsiella pneumonie, e-coli, staphylococcus aureus, pseudomonas aeruginosa, and salmonella enteritidis. However, antibacterial activity was found with dilutions of 1:32 parts cranberry juice. While no treatment protocols have been proposed, one or two ounces of pure cranberry juice, taken straight or diluted, with an equal amount of water or added to apple juice, taken every 4 hours, should be sufficient to

demonstrate some antifungal and antibacterial effects. From folk legends, cranberry juice has been known to prevent and clear urinary tract infections. However, if we can believe the latest research, cranberry juice used in a sufficient amount, and used consistently, may inactivate numerous kinds of infections elsewhere in the body besides the urinary tract.

### ***Super Oxide Dismutase (SOD)***

Super Oxide radicals, considered the most damaging of all free radicals, are converted into usable oxygen by SOD (Super Oxide Dismutase). Excess iron in the body increases production of the damaging Super Oxide radical.

Manganese is a trace mineral that is used in the production of SOD. SOD is found abundantly in Spirulina, Chlorella, broccoli, and most fresh raw green plants. SOD and catalase are enzymes that are also produced in the body. Cooking destroys all enzymes including SOD and catalase. Parsley, watercress, cilantro, spinach, or other dark greens supply you with S.O.D. Oh, what value there is in a daily salad. Presently, there is inadequate information as to whether these same vegetables also contain catalase, an enzyme that is known to exist abundantly in raw potatoes but likely found in other raw vegetables.

## **INTEGRATIVE IMMUNE RESTORATIVE THERAPIES**

### ***Glutathione***

#### ***The immune response requires antigen presentation***

An effective immune response in most viral infections begins with restoring the ability of the individual cell to process and present foreign antigens on the cell's surface. Certain subsets of white blood cells (i.e CD8 CTL's, macrophages, natural killer) respond to the presentation of a foreign protein (antigen) on the cell's surface, and, in a series of events that follow, move to either destroy the infectious agent (virus, fungus, mycoplasma, bacteria etc.) on or near the surface of the cell's membrane, or to destroy the infected cell. In other words, before the white blood cells can attack and eliminate an infection from the host, the white blood cells must see, identify and locate which cells are infected with viruses, fungus, bacteria etc. Only the presentation of antigen on the cell's membrane enables the immune system to see the foreign invader and locate the source of the infection (the infected cell). You could call this process microsurgery.

Unless antigen presentation takes place in every single infected cell, the complete elimination of an infection from the host by an immune response will not be possible and a chronic infection will persist at some level of activity. If complete elimination of the infection is not possible, but the level of the pathogen (i.e virus) activity is low enough, the patient will have no symptoms and will feel normal and functionally healthy. The key to complete viral eradication depends on healthy cells that can process and present antigen.

Two factors that adversely affect antigen processing and presentation are low ATP (adenosine triphosphate) and decreased levels of the anti-oxidant - L-Glutathione. Scientific studies also indicate that a lack of gamma interferon (IFN gamma) impairs the presentation of MHC class I molecules. IFN gamma is a TH1 type cytokine that, along with Interleukin II and Interleukin 12, increases CD8 cytotoxic lymphocyte activity, and especially when TH2 cytokines, like Interleukin 6 and 10, are down regulated. While the antibody response is effective against the common cold and flu (infections outside of the cells), it is not effective in conditions of chronic intracellular infections that occur in HIV, CFIDS, candidiasis and cancer where a TH1 or cell mediated immune response is needed.

Glutathione levels affect antigen presentation. An article titled "Defective Antigen Processing Correlates With a Low Level of Intracellular Glutathione," (by S. Short, BJ Merkel, R Caffrey and KL McCoy of the Department of Microbiology and Immunology, Virginia Commonwealth University, Richmond, VA and published in Eur J Immunol 1996 Dec; 26(12):3015-20), the authors report on the results of an experiment with Chinese hamster ovary cells that exhibit a defect in processing Antigen with disulfide bonds. They state: "Low intracellular glutathione levels in antigen-presenting cells, correlated with defective processing of AG with disulfide bonds, indicating that this thiol may be a critical factor in regulating Ag (antigen) processing." Glutathione is important for the immune system for three reasons: (1) Cells use Glutathione to remove heavy metals and other toxins; (2) Glutathione is a powerful antioxidant.



(3) Intracellular Glutathione helps individual cells process antigen. The processing and presenting of viral antigen on the cell surface stimulates a Th1 CD8 cytotoxic lymphocyte response to kill virus-infected cells.

In an article published in *Cell Immunol.* 1991 Nov.; 138 (1) 229-37 H. Gmunder and W Droge state that "Depletion of intracellular GSH (Glutathione) decreases the proportion of CD8+ cells (i.e. increases the CD4/CD8 ratio) and inhibits cytotoxic T lymphocyte (CTL) activity." He adds: "The results of these studies suggest that the decreased intracellular GSH levels in HIV-1 seropositive persons are probably not (directly) responsible for the selective depletion of the CD4+ T cell subset but may be responsible for a cellular dysfunction of the CD8+ subset and for the ultimate failure of the CTL to control the viral infection in these patients." In other words, Gmunder is saying that low levels of Glutathione in the cells not only decreases the total CD8 counts, but decrease the functioning of the CD8 Cytotoxic T cells, that is, their ability to control the viral infections by killing the virus-infected cells. Research also shows that increasing Glutathione levels reduces Tumor Necrosis Factor (TNF)(1). High TNF levels have been linked to wasting syndrome and increased viral replication.

According to Regina Brigelius-Flohe of Potsdam, Germany, the family of glutathione peroxidases consists of 4 distinct selenoproteins. They are cGPx, GI-GPx, pGPx and PHGPx. All 4 types of Glutathione are called selenoproteins because they incorporate selenium into their molecular structure. Selenium is also involved in several other proteins in people and has various functions other than as an antioxidant. About 30 types of selenium-bound proteins have been detected in mammals, and may well exist in humans as well.

### ***L-Glutathione wards infections***

This section discusses the research and experiences of health care professionals on the most important anti-inflammatory foods and nutrients known to science. Nutrients so vital that they affect the prevention and treatment of some of the most prevalent illnesses of civilization from chronic viral infections to arthritis, cancer, lupus, multiple sclerosis, hypertension to cardiovascular disease and much more.

No other anti-oxidant known to man has a more important role in human health than L-glutathione. Increased glutathione levels are needed for white blood cells to function properly, to reduce viral loads for HIV, HBV, HCV, CMV and other infectious agents. Tuberculosis is the most prevalent infection in the world. No new drugs to treat tuberculosis have come onto the market in the past 40 years, according to Connell ND et al of the Dept of Medicine at UWDN New Jersey Medical School. Connell reports that glutathione has immune enhancing effects that help the body's immune system fight tuberculosis and MAC infections. He states: "*Immuno-adjunctive therapy appears to be promising in improving outcome of clinical control of refractory mycobacterial infections, including multi-drug resistant-tuberculosis and Mycobacterium avium complex infection. The tripeptide, glutathione protects all cells against oxidizing agents, free radicals, and reactive oxygen intermediates, either directly or through enzymatic action of glutathione peroxidases and glutathione-transferases.*" The author discusses recent patents on discoveries to control MAC and TB infections <sup>(6)</sup>

### ***Role of glutathione in autism & immune response***

Researchers Vojdani A et al from Los Angeles studied the Natural Killer Cell activity from autistic children. They tested 1027 samples from ten clinics. They measured two subgroups of NK cells CD16+ and CD56+. They found that 45% of autistic children had low natural killer cell activity. They cultured lymphocytes of patients with low or high NK cell activity with or without glutathione, IL-2 and IL-15. They stated "*The induction of NK cell activity by IL-2, IL-15 and glutathione was more pronounced in a subgroup with very low NK cell activity. We conclude that that 45% of a subgroup of children with autism suffers from low NK cell activity, and that low intracellular levels of glutathione, IL-2 and IL-15 may be responsible.*" <sup>(7)</sup>

### ***Glutathione & cancer prevention***

#### **Whey proteins**

Parodi PW from Melbourne Australia wrote in 2007 in *Curr Pharm Des* <sup>(8)</sup> that whey proteins in animal studies are superior to other dietary proteins for preventing the development of tumors. He said that this is due to the presence of high amounts of "*cystine/cysteine and gamma-glutamylcyst(e)ine dipeptides, which are efficient substrates for the synthesis of glutathione.*" They also report that a minor

component of whey protein "lactoferrin" inhibits intestinal tumors and scavenges iron. Parodi also reports that cows diets supplemented with selenium increased the selenoprotein content of the milk and that the selenoproteins inhibited colon tumors.

### Upregulation by Glutamine

Researchers at the Veterans Healthcare System in Little Rock, AR studied the effects of the amino acid L-glutamine on rats to measure its effects on glutathione levels and NK cell activity. They found that oral glutamine increased glutathione production and up-regulated Natural Killer Cell activity in the rat model. They also found that oral glutamine supplementation reduced the formation of tumors by 50% in rats fed a cancer producing diet.<sup>(9)</sup>

### *Natural Approaches to Boost Glutathione Levels*

#### B Vitamins

Hoey L et al (2009), report on 14 studies where erythrocyte glutathione reductase activity is a biomarker of riboflavin levels and 5 studies of basal glutathione reductase activity linked to riboflavin levels.<sup>(10)</sup> Riboflavin is the B vitamin that helps to recycle "oxidized" glutathione back to its active or reduced form. The researchers reported that homocystine levels were not a reliable biomarker of riboflavin status in the general population. Yogurt was found to be a source of B vitamins from active probiotics cultures that improved the Vitamin B1 and B2 status of young women<sup>11</sup>.

#### L Cysteine and L Glycine

Texas researchers (2011) supplemented 8 elderly persons and 8 younger persons with the amino acids L Cysteine and L Glycine that are precursors to the production of glutathione. The result was that the antioxidant status of the elderly persons improved significantly.<sup>(12)</sup> Sekhar RV et al reported that: "Precursor supplementation in elderly subjects led to a 94.6% higher glutathione concentration, a 78.8% higher fractional synthesis rate, a 230.9% higher absolute synthesis rate, and significantly lower plasma oxidative stress and F(2)-isoprostanes." The significance of this study is that supplementation with glutathione precursors lowered oxidative stress. Since oxidative stress in the elderly is a known factor in diseases of the aging, supplements that improve glutathione status may prevent or delay the onset of cardiovascular disease, loss of eyesight, hearing, and brain function in an aging population. N- Acetyl-Cysteine or NAC is a form of Cysteine that is also highly effective in increasing glutathione levels.

#### Sulfur based amino acids in garlic

Lee Y et al from Korea conducted in vitro experiments with water extracts of garlic containing a number of sulfur based amino acids. They were able to destroy gastric cancer cells with the garlic extracts. The effectiveness was related to the dose with higher doses have a more pronounced result.<sup>(13)</sup>

Breast Cancer: Studies have found that extracts of garlic reduce the development of breast cancer in animals and suppress the growth of human breast cancer in laboratory experiments. In an article by Tsubura A et al published in Anticancer Agents Med Chem March 2011, Tsubura stated that "Mechanisms of action include the activation of metabolizing enzymes that detoxify carcinogens, the suppression of DNA adduct formation, the inhibition of the production of reactive oxygen species, the regulation of cell-cycle arrest and the induction of apoptosis" of the cancer cells.<sup>(14)</sup>

#### *Onions, leeks, and chives*

Studying published research in 19 case- control studies and 2 cohort studies from 1966 to Sept 1 2010, Zhou Y et al from china report that onions, leeks, chives, and other allium vegetables consumed in an amount of about 20 grams per day (less than one ounce) "reduced the risk for gastric cancer (odds ratio, 0.54; 95% confidence interval, 0.43-0.65). Specific analyses for onion, garlic, leek, Chinese chive, scallion, garlic stalk, and Welsh onion yielded similar results, except for onion leaf."<sup>(15)</sup>

#### *Aged Garlic*

Aged garlic increases glutathione levels and thereby may protect against oxidative stress and kidney (renal) failure. Deniz M and other researchers in Turkey studied the effects of an aged liquid garlic extract on various measures of oxidative stress in rats who were having kidney failure called CRF for chronic renal failure. After 3 weeks, they found that rats given aged garlic extract had alleviated CRF-induced oxidative changes in the injured tissues, while CRF-induced elevations in the blood levels of the

pro-inflammatory cytokines and LDH were reduced. In conclusion, CRF-induced oxidative tissue injury occurs via the activation of pro-inflammatory mediators and by neutrophil infiltration into tissues and that the protective effects of garlic on CRF-induced injury can be attributed to its ability to inhibit neutrophil infiltration and pro-inflammatory mediators.”<sup>(16)</sup> Another study reported that aged garlic extract protected the livers of rats against damage from alcohol consumption.<sup>(17)</sup>

#### ***Garlic and milk thistle***

Researchers in Egypt tested the effects of garlic extract and silymarin alone and combined in an experiment on male albino rats using two chemicals toxic to the liver - N-nitrosodiethylamine (NDEA) and carbon tetrachloride (CCl<sub>4</sub>). The experiment used both NDEA and CCL(4) and either garlic extract or silymarin or both. They tested for “Serum aspartate transaminase (AST), alanine transaminase (ALT), alkaline phosphatase (ALP), hepatic lipid peroxidation (LPO), superoxide dismutase (SOD), reduced glutathione (GSH), glutathione-S-transferase (GST) and glutathione reductase (GSR).”

Results: They found that NDEA caused a significant elevation in serum AST, ALT and ALP. NDEA also increased oxidative stress by an increase in the LPO and a decrease in SOD, and GSH-dependent enzymes. They stated: “Although administration of garlic or silymarin significantly reduced the liver toxicity, combined administration was more effective in preventing the development of hepatotoxicity.”<sup>(18)</sup> They found that using both garlic and silymarin at the same time had a synergistic effect in protecting the liver.

#### **Melatonin: lowers blood pressure in persons with metabolic syndrome - improves lipid profiles**

Poland: researchers treated 30 patients with metabolic syndrome with 5 mg melatonin 2 hours before bedtime for 2 months. They tested for systolic and diastolic blood pressure, levels of glucose, serum lipids, C-reactive protein, fibrinogen, activities of antioxidative enzymes: catalase (CAT), glutathione peroxidase (GSH-Px), superoxide dismutase (SOD), thiobarbituric acid reactive substrates (TBARS). After 2 months they found both systolic and diastolic blood pressure were reduced. Also reduced were low-density cholesterol and lipid peroxides.<sup>(19)</sup>

In an experiment done on rats in India, it was found that melatonin protected the heart against oxidative stress caused by methyl mercury and that melatonin improved the antioxidant defenses.<sup>(20)</sup>

#### **Alpha Lipoic Acid: protects from oxidative stress in spinal cord injury**

Turkey: Researchers Toklu HZ et al report in the Journal of Spinal Cord Injury<sup>(21)</sup> that oxidative stress is a secondary insult after the trauma of a spinal cord injury. Spinal cord injury (SCI) was induced in rats and in one group they were given 50 mg ALA per kg of body weight in a single injection. After 7 days the rats were sacrificed and tests found that ALA significantly reduced the oxidative stress and DNA damage caused by the spinal cord injury. The researchers concluded that:

“The present study suggests that LA (lipoic acid) reduces SCI-induced oxidative stress and exerts neuroprotection by inhibiting lipid peroxidation, glutathione depletion, and DNA fragmentation.”

#### **Curcumin**

##### ***Protects spinal neurons in injury model***

Spinal column injury, usually the result of an accident, can be debilitating and even crippling. Researchers in Ankara, Turkey, studied the effect of curcumin, (a polyphenol extracted from the spice, turmeric,) on 40 rats in an experimental spinal cord induced injury test. Curcumin was chosen because the yellow polyphenol found in turmeric has well known anti-oxidative, anti-cancer, and anti-inflammatory properties. In the experiment, they compared the effects of curcumin to methylprednisolone, a drug with known anti-inflammatory properties.

At the end of the experiment, they measured spinal cord tissue samples. For oxidative stress, they measured levels of malondialdehyde (MDA). They measured the anti-oxidants glutathione peroxidase (GSH-Px), superoxide dismutase (SOD) activity, and catalase (CAT) activity.

Their finds and conclusion is “Curcumin treatment improved neurologic outcome, which was supported by decreased level of tissue MDA and increased levels of tissue GSH-Px, SOD, and CAT activity. Light microscopy results also showed preservation of tissue structure in the treatment group. This study showed the neuroprotective effects of curcumin on experimental SCI model. By increasing tissue levels of GSH-Px, SOD, and CAT, curcumin seems to reduce the effects of injury to the spinal cord, which may be beneficial for neuronal survival.”<sup>(22)</sup>

### ***May help protect against Alzheimer's Disease and dementia***

Oxidative stress is reported in multiple medical journals to be not only a factor in premature aging, but, in the death of nerve cells called neurons. Researchers Ray b et al reporting the Journal of Alzheimer's Disease on factors that lead to nerve inflammation and Alzheimers (AZ). These factors include deposits of amyloid AB plaques with the brain that cause a separation in the nerve links. This interferes with nerve signaling and blood capillary delivery of nutrients and oxygen to the cells and this eventually leads to nerve death.

An experiment was done on mice using injections of curcumin of a product called NanoCurc. The results: "Biochemical study of NanoCurc™-treated athymic mice revealed decreased levels of H2O2 as well as caspase 3 and caspase 7 activities in the brain, accompanied by increased glutathione (GSH) concentrations. Increased free to oxidized glutathione (GSH:GSSH) ratio in athymic mice brain versus controls also indicated a favorable redox intracellular environment. Taken together, these results suggest that NanoCurc™ represents an optimized formulation worthy of assessing the therapeutic value of curcumin in AD." (23)

### **Alpha Lipoic Acid, DHA, and other nutrients for preventing Alzheimers**

In experiments on mice, researchers Suchy J et al found that a combination of "alpha-lipoic acid, acetyl-L-carnitine, glycerophosphocoline, docosahexaenoic acid, and phosphatidylserine reduces oxidative damage to murine brain and improves cognitive performance." (24) According to the scientists, these anti-oxidants and anti-inflammatory nutrients reduced reactive oxygen species (ROS) by 57%. They found that these supplements prevented marked cognitive decline in mice that was observed on a control diet. This research adds to the body of knowledge that anti-oxidants and anti-inflammatory nutrients can help to prevent or delay the onset of memory loss, Dementia, and Alzheimers.

In Italy, Pomponi M, found that DHA a fatty acid found in fish oil when used with daily aspirin may help to prevent Alzheimers. They state that "DHA (and NPD1?) and aspirin induce brain-derived neurotrophic factor (BDNF) protein expression and this protein has a crucial role in neuronal survival.." They state that alpha linoleic acid found in flax oil may not be converted into DHA. DHA is needed to produce NPDI, a substance that protects nerve endings in the brain (25). Since DHA is found in Salmon oil, Cod liver oil and other fish oils and other marine life in abundance, the use of marine oils assures that adequate DHA is available to the body to protect the brain and the nerve endings. It is little wonder that over time fish has become known as brain food. The eating of fish, boiled, broiled, or baked would be a good habit for long-term better health.

### ***Natural Approaches that Boost Glutathione Levels***

- Riboflavin (Vitamin B2) – synthetic – 100 mg 2X - recycles glutathione back to its reduced form.
- **Raw B Complex** (Garden of Life) – a natural source of B vitamins from probiotics.
- L-Glutamine – use as directed on label 500 to 1000 mg daily
- L-Glycine – use as directed – 500 to 1000 mg daily
- **Whey protein** -10 to 20 grams daily. Use cold processed or undenatured for best results or use yogurt cultured cottage cheese.
- **Yogurt with active cultures.** 6 to 8 ozs twice daily
- **NAC** or L-Cysteine – 500 mg twice daily
- **Garlic – aged** – in capsules 6 twice daily or fresh cloves one 3X on whole grain crackers
- **Onions and Leeks** – Baked or raw onions – leek soup
- **Melatonin - natural** (sour cherry juice concentrate – 2 tbsps before bedtime or 6 ounces of regular tart cherry juice) – synthetic melatonin – try a timed released formula – starting with 1 mg and work up to one 5 mg timed release tablet per night if needed.
- **Selenium – natural (Brazil nuts** – eat 4 to 8 daily) Each Brazil nut has about 100 mcg of natural selenium. Plant based OTC products include "phytosel" (from hydroponically grown Indian Mustard Greens - distributed by Ojibwatea.com), Sel-broc, and yeast grown selenium are also available in tablets or capsules.
- **Alpha Lipoic Acid** – synthetic forms are all that is available in stores. 100 mg twice daily for adults. Note the R form lowers blood sugar and may cause hypoglycemia in some persons. Whole potatoes contain small amounts of alpha lipoic acid.

- **Curcumin (derived from Turmeric)** (500 mg 2X)
- **Milk thistle (silymarin)** 500 mg twice daily for adults

### *Diseases exacerbated by low Glutathione levels*

- Alcohol and chemical induced liver injury
- Alzheimers and Dementia
- Autism
- Autoimmune diseases
- HIV/AIDS
- Hepatitis B and C
- Tuberculosis
- Cancer – all types
- Leukemia
- Hypertension and heart disease
- Rheumatism
- Metabolic syndrome
- Lupus
- Multiple Sclerosis
- Spinal and nerve injury
- Immune reactions shifts to Th2 when glutathione is deficient

### *Vitamin D*

#### *Anti-inflammatory properties of the sunshine vitamin*

Vitamin D is emerging in numerous studies as important in preventing, delaying, or treating multiple conditions affecting human health. Vitamin D (3) is made in the skin from exposure to natural sunshine or from tanning booths. According to Wu-Wong JR of the University of Illinois, vitamin D3 is “modified in the liver to form 25(OH) D, and then further hydroxylated in the kidney to form the active hormone, 1,25-dihydroxyvitamin D (3) (calcitriol).” Calcitriol, in turn, binds to Vitamin D Receptor (VDR) that regulates signaling pathways in various cells and tissues that affect hypertension, vascular calcification, kidney function, metabolic, and immunological function.

Scientific research indicates that inadequate sunshine and resulting Vitamin D deficiency is linked to osteoporosis, irritable bowel syndrome <sup>(26)</sup>, leukemia <sup>(27)</sup>, hypertension <sup>(28)</sup>, heart disease <sup>(29)</sup>, cancer <sup>(30)</sup>, hepatitis progression (HBV and HCV) <sup>(31)</sup>, hiv viral load and related infections <sup>(32)</sup>, psoriasis <sup>(33)</sup>, multiple sclerosis <sup>(34)</sup>, lack of DNA repair in the cells <sup>(35)</sup>, asthma <sup>(36)</sup>, influenza and respiratory infections <sup>(37)</sup>, obesity <sup>(28)</sup>, type 2 diabetes <sup>(39)</sup>, respiratory infections <sup>(40)</sup>, kidney disease <sup>41, 42)</sup> and dementia and cognitive impairment. <sup>(43)</sup>

In recent years, a consensus has developed among physicians that vitamin D’s role in human metabolism goes far beyond the absorption and utilization of calcium and other minerals for stronger bones and teeth. Increasingly, researchers are finding that vitamin D has a role in modulating immune responses. After health authorities have spent years telling people to avoid too much sun so not to develop skin cancer, the resulting vitamin d deficiency that has occurred as a result of many people limiting their exposure to the sun has resulted in a worse set of health problems than the increased risk of skin cancer.

What improving “innate immune system” includes is Natural Killer Cell function. Natural Killer Cells are known to scavenge and destroy cancer cells in the body. It is somewhat ironic that sunshine that has been associated with increases in some forms of skin cancer is now associated with decreases.

At the Medical University in Vienna, Austria, Thiem U and Borchhardt K found that vitamin D “affects proliferation, differentiation, and function of a large number of different cell types including cells of the immune system. Vitamin D receptor agonists were found to exert immunosuppressive effects on the adaptive immune system, thus being able to mediate immunologic tolerance. However, they promote the innate immune system and thereby improve the ability of the host to combat invading pathogens.”

## *Dosing*

A study published in the American Journal of Nutrition in 2007 by Hathcock Jn et al claims that 50 micrograms or 2000 i.u. of Vitamin D3 is too restrictive and suggest an upper safe limit of 10,000 i.u. Specifically, Hathcock stated that "We present a risk assessment based on relevant, well-designed human clinical trials of vitamin D. Collectively, the absence of toxicity in trials conducted in healthy adults that used vitamin D dose  $\geq$  250 microg/d (10,000 IU vitamin D3) supports the confident selection of this value as the UL." <sup>(41)</sup> Currently, over the counter Vitamin D products have as much as 5000 i.u. per capsule. It is probably best to have a doctor monitor the effects of Vitamin D if 5000 i.u. or more are taken daily.

An article published in "Medical Hypothesis" by Maserjohn C is that high doses of vitamin D are not toxic if taken with vitamin A and vitamin K. He specifically cites research that both vitamin A and Vitamin K protect against adverse effects from high doses of Vitamin D. He states that vitamin A protects against the toxicity of vitamin D by decreasing the expression of vitamin K-dependent proteins and thereby exerting a vitamin K-sparing effect. If animal experiments can confirm this hypothesis, the models which the maximum safe dose is determined would need to be revised. Physicians and other health care practitioners would be able to treat patients with doses of vitamin D that possess greater therapeutic value than those currently being used while avoiding the risk of adverse effects by administering vitamin D together with vitamins A and K." <sup>42</sup> Note: Cod Liver oil contains both vitamins A and D and parsley is a natural source of vitamin K.

## *Omega 3 Fatty acids*

Anti-inflammatory nutrients and foods tend to bring the immune system back into balance and improve cell-mediated immunity (TH1) while normalizing the activity of humoral immunity (TH2). A consensus among researchers is developing that a diet high in omega 3 fatty acids such as fish and flaxseed, combined with vegetables, fruits and whole grains is the ultimate anti-inflammatory diet.

## *Fish Oil*

### Reduces IL-6, cancer patients gain weight

Barber MD et al reporting in Nutr Cancer. 2001;40(2):118-24 from Edinburgh, UK that nutritional supplements with fish oil given to pancreatic cancer patients who were losing weight that resulted in weight gain. In this study, 20 patients who were wasting away were asked to consume daily a 600-calorie nutritional supplement that contained 2 grams (2000 mg) of EPA (eicosapentaenoic acid) derived from fish oil. After 3 weeks of consumption of the fish oil-enriched supplement, they reported "a significant fall in production of IL-6, a rise in serum insulin concentration and a fall in the proportion of patients excreting proteolysis inducing factor." These blood parameter changes were associated with a median weight gain of 1 kg per patient. They stated: "Various mediators of catabolism in cachexia are modulated by administration of a fish oil-enriched nutritional supplement in pancreatic cancer patients. This may account for the reversal of weight loss in patients consuming this supplement."

### Anti-cancer effects

In an article titled "The Traditional Diet of Greece and Cancer" Simopoulos AP <sup>(45)</sup> writes that the diet on the island of Crete represents the traditional "Mediterranean diet" prior to 1960. Analysis of the diet shows a number of protective substances including selenium, glutathione, high fiber and antioxidants and Resveratrol from red wine and polyphenols from olive oil and a balanced ratio of omega 6 and omega 3 fatty acids. The Omega 3 (DHA and EPA) fatty acids from fish "exert protective effects against some common cancers, especially cancer of the breast, colon and prostate." The Omega 3 fatty acids suppress "Cox-2, IL-1 and IL-6 gene expression." Other Cox-2 inhibitors (pharmaceutical or botanical) also inhibit IL-6.

Note: Cox 2 inhibitors are widely marketed for treatment of arthritis. Recently Vioxx, a pharmaceutical cox-2 inhibitor was pulled from the market after causing heart disease in several thousand users.

Treble T et al <sup>(46)</sup> reports that tumor necrosis factor and IL-6 decreased with dietary fish oil supplementation in healthy men in a dose dependent manner.

### Dosing for IL-6 Reduction

In an article published in the Br J Nutr by Wallace FA. Miles and Calder titled "Comparison of the effects of linseed oil and different doses of fish oil on mononuclear cell function in healthy human subjects" the authors report on 3 types of Omega 3 fatty acids and their effects. In Linseed oil also known as flaxseed oil that is high in alpha-linolenic acid, they reported an increase in EPA but not DHA in plasma phospholipids. With fish oil (DHA and EPA) they reported a decrease in IL-6 in a daily dose between .44 and .94 grams daily. That would be 440 to 940 mg daily in healthy adults. It is important to remember that this dose was in a population of healthy adults, not a group of seriously immune compromised patients.

In the study with patients with pancreatic cancer, 2000 mg of EPA was used daily. However, both DHA and EPA have similar anti-inflammatory effects and reduce IL-6, (Note: The "Max DHA" product from Jarrow Formulas will provide 2088 mg of DHA/EPA at about 6 capsules daily or 3 twice a day).

It takes about 3600 mg of sardine oil to yield around 2088 mg of a mixture of DHA/EPA and other Omega 3 fatty acids. Six capsules of Jarrow Formula DHA/EPA will yield that exact amount. Based on published research, that level of supplementation should reduce IL-6 plasma concentrations within a few weeks and bring a noticeable improvements.

### Flaxseed

The anti-inflammatory effects of cold pressed flaxseed oil are well known. Cold pressed flaxseed oil has been used in treatments for cancer, heart disease, and other health conditions since the 1950's (e.g. The Gerson therapy for cancer and other diseases). Once flaxseeds are ground, unless vacuum sealed or sealed in nitrogen gas, the oil becomes stale (rancid) and the flaxseed loses some of its health giving properties. The best research in animal experiments on the health benefits of flaxseed are from flaxseed powder or oil. Consuming it in the RAW state is preferred. Flaxseed oil must never be used for frying because it is so highly unsaturated it forms new compounds with plastic like properties that make it hard to digest and even toxic to the body.

Some researchers have reported benefits when flaxseed powder was added to muffins. Muffins are usually cooked at temperatures that do not exceed the boiling temperature of water. Adding flaxseed powder to pancake mix should also be OK. Products processed at high temperatures that should be avoided include crackers and cold breakfast cereals including whole grain cereals. The only oils suitable for high temperature cooking are saturated ones like palm oil or coconut oil or monounsaturated oils like olive or macadamia nut. However, stovetop cereals like oatmeal or rice cereal are safe to eat, as they are not cooked over the boiling temperature of water.

Flax seed and flax oil may be helpful in the following conditions:

- **Atherosclerosis** – prevents and reverses (in rabbits)
- **Cardioprotective effects** come from the alpha linolenic acid in flax oil - a type of Omega 3 fatty acid. Anti-inflammation; reduces triglycerides; anti-thrombotic; anti-arrhythmic; inhibits nuclear factor kappa B activity; down regulates fatty acid synthesis; upregulates fatty acid oxidation.
- **Flaxseed proteins** - Udenigwe CC and Aluko RE report on the antioxidant and ACE inhibitor found in flaxseed protein. Flax helps to normalize blood pressure, prevent or treat liver disease and oxidative stress.
- **Flaxseed powder** provides cardio protective benefits for 3 reasons. Flaxseed contains onega-3 fatty acids, dietary fiber and phytoestrogen lignans. Studies report that flaxseed consumed daily can reduce total cholesterol, LDL cholesterol, improves vascular relaxation and inhibits ventricular fibrillation.
- **Flax seed** also **inhibits the cancer promoting effects** of soy by modulating estrogen receptors.
- **Higher bone density** and treatment of **renal (kidney) injury** was reported in experiments on rats.
- **Flaxseed has anti-oxidant restoration and enzyme liver protection** benefits. Flaxseed meal at 5% of diet restored catalase, SOD and peroxidase by 39%, 181% and 123%. respectively.
- **Anti-Tumor effects** of a lignan (SD) found in flaxseed in experiments on rats reduced tumor formation by 46%.

- French and Canadian researchers in separate studies found that flaxseed compounds **suppress breast cancer cell growth**.

Researchers at the University of Picardie Jules Verne in Amiens, France isolated two lignans from flaxseeds and tested their effects on breast cell cancer lines MCF-7 and MDA-MB-231. The lignans isolated were secoisolariciresinol diglucoside (SDG) and anhydrosecoisolariciresinol, the latter decreased cell growth at 50 and 100 microM (9). Canadian researchers found that SDG, a lignan in flax seeds, reduced tumor cell proliferation growth, and the flax oil also inhibited growth (52).

This and other studies suggest that the anticancer properties of flax come from both the extracted oil and the lignans in the seeds. The results of various studies suggest that there would be an added benefit from using both flaxseed oil and flaxseed powder. Since the oil is in whole freshly ground flaxseed powder, using 2 tablespoon of flaxseed powder in vegetable or fruit juice 2 or 3 times a day for adults seems like an essential component of an anti-cancer program. For prevention: 1 TBSP daily of ground flaxseed powder: For treatment of an existing condition: 2 TBSPS twice or three times daily in juice.

Note: in the original Max Gerson Cancer treatments, 1 TBSP flaxseed oil was mixed with nonfat yogurt and consumed 3 times a day along with more than 12 glasses of freshly pressed juices, usually apple and carrot alternated with green juices. (Gerson.org)

### Flax Lignans

The lignan SDG (secoisolariciresinol diglucoside) in flaxseed is converted into secoisolariciresinol after ingestion and then further transformed by intestinal flora into enterodiol and enterolactone. These enterolignans can help in the prevention and treatment of hormone dependent diseases – including several types of cancer (prostate, breast, colon), heart disease, osteoporosis, obesity and menopausal symptoms. Surprisingly, in a study in China, these lignans were produced from defatted flaxseed.<sup>(53)</sup>

Canadian scientist Adolphe, Whiting et al reported in the BR J Nutr April 2010 that: *“A growing body of evidence suggests that SDG metabolites may provide health benefits due to their weak estrogenic or anti-oestrogenic effects, antioxidant activity, ability to induce phase 2 proteins and/or inhibit the activity of certain enzymes, or by mechanisms yet unidentified. Human and animal studies identify the benefits of SDG consumption. SDG metabolites may protect against CVD and the metabolic syndrome by reducing lipid and glucose concentrations, lowering blood pressure, and decreasing oxidative stress and inflammation. Flax lignans may also reduce cancer risk by preventing pre-cancerous cellular changes and by reducing angiogenesis and metastasis.”*<sup>(60)</sup>

While researchers have found anti-cancer properties in both the flax oil (FO) and in the flax powder, a recent study in Toronto, Canada found the flaxseed oil makes Tamoxifen (TAM) more effective in inducing apoptosis in breast cancer cells. They reported that: *“All treatments reduced the growth of TAM-treated tumors by reducing cell proliferation, expression of genes, and proteins involved in the ER- and growth factor-mediated signaling pathways with FO having the greatest effect in increasing apoptosis compared with TAM treatment alone. SDG and FO reduced the growth of TAM-treated tumors but FO was more effective.”*<sup>(56)</sup>

Several other published articles in medical journals report that flaxseed either prevents or reduces the formation of tumors in prostate, colon, and small intestines.

### Selecting and Storing Omega-3 Fatty Acids

Fish oil should always be sealed in a dark capsule that prevents entrance of light or sealed in a can (canned sardines are good choice). Also avoid cod liver oil that is bottled in a clear bottle that allows light in and sits on a store shelf. Avoid all fish oil capsules that are “clear.” The capsules must be brown or black in color to prevent the entrance of light and prevent rancidity from forming while on the shelf.

The research I have read thus far suggests that the Omega 3 fatty acids from fish oil are more effective than the alpha linolenic acid from flax seed oil for their suppression of inflammatory cytokines. This does not mean that there are fewer benefits from using fresh flaxseed oil, except that there are more documented benefits from using high quality fish oils. The quality of these oils is critical for obtaining their benefits. If either is rancid, (oxidized), the effects will be the opposite of what is expected.

Avoid flax or fish oils subjected to high temperatures. Never use flax oil or fish oil that has been long exposed to either light or oxygen (example – a nutritional bar that sits on a store shelf with either flax oil or deodorized sardine oil added should be considered rancid and avoided). Never buy processed



crackers with flaxseed added as the temperature they are cooked at creates plastic like properties in the flaxseed that is toxic to the body. Flaxseed whole or ground should never be cooked above the boiling temperature of water (212 F). It may be safely added to stovetop cooked breakfast cereals, muffins or pancakes.

Do not buy bread or crackers if you can see flaxseed in the finished product as the temperature of the outer crust may have reached a level that is not safe for flaxseed. The only sure way to safely consume flaxseed meal or oil is raw and it has incredible benefits in that state. It should be always stored in a refrigerator or freezer until used. Never use flaxseed oil for cooking or use margarine with flax oil added for cooking. For cooking use monounsaturated oils like light olive oil for baking goods or extra virgin olive oil for frying meats and fish and sautéing vegetables.

## ***Selenium***

Selenium is a trace element that is well known for its antioxidant properties. It has a physical structure similar to sulfur. In plants, it has an affinity to bind to sulfur-based proteins like methionine or cysteine. Selenium is a key component and controlling factor in the body's main antioxidant and immune stimulant - L glutathione.

Brazil Nuts have the highest concentration of natural organic protein-bound selenium of any food on the planet. (about 100 mcg per nut). Other sources are brewers yeast, fatty fish (salmon, tuna, sardines), oysters, clams, wheat germ, mushrooms, and whole grains. Selenocysteine and L-selenomethionine are two forms found in Brazil nuts, fish, yeast and other natural sources. Riboflavin, or Vitamin B2, is reported to help recycle oxidized glutathione back to its reduced form. Vitamin E is reported to help with the assimilation and utilization of selenium.

Selenium is necessary for the following functions in the human body:

1. Reduces mutations among viruses and other pathogens.
2. Increases glutathione peroxidase levels, the main antioxidant that our cells use to protect us from free radicals.
3. Helps prevent most types of cancer including prostate cancer.
4. Is used to produce an enzyme that helps the thyroid convert the hormone T4 to T3. (may help normalize body temperature)
5. Low levels have been associated with depression and schizophrenia.
6. Reduces the toxic effects of mercury and cadmium in the body.
7. Protects the liver
8. Improves cell-mediated immune responses by helping with antigen processing inside cells.
9. Helps cellular respiration.
10. Works synergistically with vitamin E in preventing cancer.
11. At therapeutic doses, reduces HIV and hepatitis viral replication and helps shrink cancers.
12. Levels of selenium have been found to be subnormal for all types of cancer tested.

A substantial amount of published scientific research has linked selenium deficiency to increased HBV, HCV, HIV and herpes replication, weight loss, and heart disease. Supplementation with selenium has been reported to increase interleukin 2 levels, increase T cell counts, reduce tumor necrosis factor, reduce the risk of cancer, reduce beta 2 microglobulin levels (measures rate of cell destruction), reduce depression, and decrease the risk of death from HIV infection. Selenium increases thyroid hormone production and converts T4 into T3.

In their book titled *Rare Earths: Forbidden Cures* (published in 1994), Drs. Ma Lan and Wallach submit that a long (and extensively referenced) list of illnesses may be linked to selenium deficiency. These include:

- Adrenoleucodystrophy (ALD)
- Age spots and Liver spots
- Alzheimer's (associated with high vegetable oil consumption or polyunsaturated fatty acids)
- Anemia (RBC fragility)
- Cancer
- Cardiomyopathy

- Cystic Fibrosis (congenital)
- Fatigue
- Heart palpitations
- High infant mortality
- HIV progression
- Infertility
- Irregular heart beat
- Liver cirrhosis
- Lou Gehrig's disease (ALS)
- Low birth weight
- Multiple Sclerosis (linked to mercury poisoning)
- Muscular Dystrophy
- Myalgia
- Pancreatic atrophy
- Pancreatitis
- Parkinson's Disease (associated with mercury poisoning)
- P Muscular weakness
- Scoliosis
- Sickle Cell anemia
- Sudden Infant Death Syndrome (SIDS)

The authors state that "high intakes of vegetable oils including salad dressing, margarine and cooking oils concurrent with a selenium deficiency is the quickest route to a heart attack and cancer.... The clinical diseases associated with selenium deficiency are diverse and to the uninformed allopathic physician shrouded in mystery. Selenium deficiency is one of the more costly mineral deficiency complexes affecting embryos, the newborn, toddlers, teens and adults."

### *Role in HIV*

Selenium and glutathione levels decline as AIDS progresses, according to Look MP et al in the 1997 European Journal of Clinical Nutrition. In stage I of HIV infection, selenium levels in the blood were an average of 82 mcg per liter. Even in Stage I, the selenium levels are below the minimum of 85 mcg/l, considered the least amount needed to maintain health. In Stage II, the selenium levels dropped to an average of 68 mcg and in Stage III, selenium levels dropped to 51 mcg/liter. Researchers found that selenium levels correlated positively with CD4 counts, and inversely with levels of tumor necrosis factor receptors type II. They found that in persons with both HIV and HCV, the selenium levels were the most depressed. Hence, this latter group is in urgent need of selenium supplementation.

In a study published in *The Lancet*, it was found in Finland that when selenium levels were less than 45 mcg per liter of blood, there was an increased risk for strokes and heart attacks. In another study in men, the risk factor was 3.7 times higher for strokes and heart attacks in men whose selenium levels were less than 45 mcg/l.

Baeten JM et al, from the Univ. of Washington in Seattle, report of a study done in Kenya with 318 HIV positive women, to assess the relationship between selenium deficiency and HIV-1 shedding in the vaginal tract. HIV+ women can infect HIV negative men, if HIV viruses are shed in the vaginal tract. The study classified a deficiency of selenium as blood levels less than 85 mcg of selenium per liter. 11% of the women in the study were observed to have less than 85 mcg/l. The researchers found that selenium deficiency was associated with HIV-1 shedding in the vagina that was three-fold higher than women whose selenium blood levels were greater than 85 mcg/l. The implications are that, in sex without condoms, women who are deficient in selenium are 3 times more likely to pass the infection on to a man than women who are not deficient in selenium.

### *Role in Cancer*

Writing in the eMedicine Journal.<sup>(68)</sup> Stanley Brosman MD from the Department of Urology at the University of California Los Angeles Medical School along with Mark Moyad MD report that they have found that the risk of developing prostate cancer in the United States is 204 times greater here than in China. In a population of 200,000 men, one person will develop prostate cancer in China annually, while

in the US the number would be 204 each year. The physicians looked for dietary factors that contribute to this difference. They found a higher risk for prostate cancer among persons who eat red meat, are on diets high in fat and/or are obese. The researchers found a relationship in the protective effects of selenium peroxidases that repaired oxidized phospholipids and the prevention of oxidation of lipids by vitamin E; hence, a synergistic relationship between vitamin E and selenium.

A study by Clark et al demonstrated a 50% decrease in cancer mortality in men who took 200 mcg daily of selenium, versus a control group taking a placebo. Another study on the effects of 200 mcg of selenium found no effects on skin cancer, but found a reduction in breast cancer.

In his book *Natural Compounds in Cancer Therapy* John Boik presents an extensive scientific analysis of natural therapies for cancer. With regard to the action of selenium in preventing or treating cancer, Boik reports that: "Selenium induces apoptosis at the cellular level, inhibits PKC, inhibits NF-KB/AP-1 activity, improves cell to cell communication, inhibits angiogenesis, inhibits histamine, inhibits tumor necrosis factor, inhibits VEGF effects, inhibits insulin resistance, inhibits invasion and metastasis, inhibits collagenase effects and supports the immune system."

At the average equivalent of 3700 mcg daily, Boik cites scientific studies that, in animals, selenium inhibited metastasis of melanoma cells, Ehrlich ascites cells in mice, several different cancer cell lines, brain cancer, some types of leukemia, breast cancer and lung cancer. Other researchers have found selenium inhibits prostate cancer.

In support of the position that sodium selenite, the inorganic form, should not be used as a dietary supplement, Boik states that the sodium selenite has been "reported to cause DNA strand breaks in cancer cells in vitro, probably via free radicals and/or SAM deficiency, and to induce p53 dependent apoptosis. In contrast, methylselenocysteine and organic related forms act through a different means: they appear to induce apoptosis, independent of DNA damage and p53 activity."

Boik also states: "Of the organic forms, methylselenocysteine, and selenomethionine are among those causing the least adverse effects at high doses, since they can be converted directly to methylselenol without methyl donors. Methylselenol is of prime importance to us, since this form seems to be responsible for selenium's anticancer effects in vivo."

Note: If you weigh 180 lbs, eating 3 Brazil nuts 3 times daily would give you 450 to 900 mcg of selenium and a therapeutic dose that could be increased under a physician's supervision and monitoring of blood levels. The selenium content of Brazil nuts is not standardized and depends on the selenium content of the soil where the nuts are grown.

Note on blood levels: Reduce selenium intake if blood levels go above 600 mcg per liter. Based on current available information, an immediate target goal is to raise selenium blood levels to 200 mcg per liter and then to increase the level up to 600 mcg/liter. This should give you the best therapeutic effects in treating Candidiasis, hepatitis, herpes, hiv, lyme disease, cancer, Lou Gehrigs, chronic fatigue syndrome and other similar conditions.

## ***Vitamin E***

### ***May inhibit IL-6***

Fischer CP et al report <sup>(61)</sup> that 400 i.u. of vitamin E daily inhibited the release of interleukin-6 from contracting human skeletal muscle after 3 hours of knee-extensor exercise. Lipid peroxidation levels did not increase in the group treated with the vitamin E. This was a small controlled study involving 7 volunteers.

Godbout JP et al report in experiments in mice that vitamin E inhibits peroxide formation and interleukin-6 secretion. <sup>(62)</sup> Other researchers report that vitamin C when used in doses above 500 mg daily may increase oxidative stress. <sup>(62)</sup>

## ***Royal Jelly***

### ***May inhibit IL-6 and TNF***

Kohn K et al report <sup>(63)</sup> that when supernatants of Royal Jelly, the food of the Queen Bee, were added to a culture of mouse peritoneal macrophages that were stimulated with lipopolysaccharide, the production of proinflammatory cytokines such as TNF-alpha and IL-6 were efficiently inhibited in a dose-dependent manner without having cytotoxic effects on the macrophages. Macrophages are a type of white blood cell that fights infections in the body. The factors that had this effect in Royal Jelly were not

identified and the dose was not mentioned in the abstract. Based on other research, a dose of 1000 to 2000 mg daily should be a good starting point.

My own opinion is that the least processed Royal Jelly is likely to have the most benefits (i.e. fresh Royal Jelly rather than freeze dried). Royal Jelly should to be kept under refrigeration or sealed in opaque (light resistant) capsules.

### ***Bitter Melon***

Bitter Melon (*Momordica charantia*) is grown in the Philippines and available in Asian market stores. It is also available in capsules and is sold in health food stores. Researchers have found it help to normalize blood glucose levels and may help to control type II diabetes. It also reduces oxidative stress. In June 2011 in the *Journal of Neuroinflammation*, Nerurkar PV et al studied the effects of Bitter Melon (BM) on female mice fed a high fat diet (HFD) for 16 weeks. The results: “[Bitter Melon] ameliorated HFD-associated changes in BBB permeability as evident by reduced leakage of Evans blue dye. HFD-induced glial cells activation and expression of neuroinflammatory markers such as NF-κB1, IL-16, IL-22 as well as IL-17R were normalized in the brains of mice supplemented with BM. Similarly, HFD-induced brain oxidative stress was significantly reduced by BM supplementation with a concomitant reduction in FoxO, normalization of Sirt1 protein expression and up-regulation of Sirt3 mRNA expression. Furthermore, plasma antioxidant enzymes and pro-inflammatory cytokines were also normalized in mice fed HFD with BM as compared to HFD-fed mice.”<sup>(65)</sup> The researchers concluded that Bitter Melon would help to improve obesity-associated inflammation of the nerves.

### ***Astragalus***

*Astragalus propinquus* (*Astragalus membranaceus*) is an immune modulating herb that is known as “huáng qí” in Chinese. It is used to activate, restore and balance the immune system in Traditional Chinese Medicine (TCM). TCM has been used in China for more than 2000 years and is based on principles of yin and yang (female or male, cold or hot, damp or dry, downward or upward part of the body). *Astragalus* is one of several thousand herbs used in TCM. It activates white blood cell function. The roots of *radix astragali* contain a saponin that increases telomerase activity and lengthens the telomeres on DNA chromosomes.<sup>(79, 80)</sup> This research suggests *Astragalus* can have an important role in helping to increase the function of the immune system as age advances.

### ***Hormones & Prescriptives***

**Hydrocortisone** a hormone produced by the adrenal glands, powerful anti-inflammatory properties and reduces il-6 and tnf. The B vitamin **riboflavin** helps to recycle oxidized glutathione back to its active or reduced form. **Licorice root** tea helps to increase cortisol levels. Hydrocortisone is processed by the kidneys and excreted in the urine in the morning. **Vitamin C** supports adrenal function as does **stress reduction** and **adequate nightly sleep**. Hydrocortisone is also available in tablet form or as a topical ointment.

**Prednisone, prednisolone** and several other synthetic anti-inflammatory steroids are man-made versions of natural hydrocortisone. These drugs are available and can be used but are stronger than hydrocortisone. The clinical experiences of Dr Plechner DVM on animals shows that these drugs can stop and reverse cancer when used along with thyroid medication and an hypoallergenic diet. (See the chapters on adrenal and thyroid in this book.)

### **Thymic protein**

Located in the upper part of the chest, behind the breastbone, and just above the heart in the mid-sternum, the thymus gland is the master gland of the immune system and it shrinks as we age. The Thymus gland matures CD4 cells produced in the bone marrow and exerts hormonal influences within the thymus gland itself and elsewhere in the body. Some practitioners use a sublingual form of thymic proteins absorbed in the mouth. In cancer patients, this has helped to maintain normal white blood cell counts and other lymphocyte values, even while the patients are on chemotherapy.

## *Aspirin*

Aspirin is salicylic acid and it was first derived from willow bark. As a blood thinner, aspirin's anti-inflammatory effects are in reducing IL-6 and TNF. An aspirin tablet once a day helps to prevent heart attacks, some types of cancer, and increases CD4 counts in HIV+ persons. Excess dosing may cause bleeding.

## *Glucaric Acid*

In their book titled *D'Glucarate Against Cancer*,<sup>(73)</sup> Thomas Slaga and Judi Quilici-Timmcke M.S. share research that demonstrates that Glucaric acid found in numerous fruits and vegetables, and now available in supplemental form, is a major detoxifier of toxins and carcinogens in the body, and prevents and stops cancer growth. Glucaric acid is also produced in small amounts in the body. An enzyme called Glucuronosyl transferase binds the toxins to glucaric acid, and are excreted from the body through the bile or the kidneys.

In a reverse process, an enzyme called Beta-glucuronidase can separate the toxin from the glucaric acid and release it into the body. This is especially dangerous, and often happens in cancer, hepatitis, and liver necrosis. Slaga also reports that when beta-glucuronidase is elevated, it increases the number of estrogen receptors. Lack of glucaric acid and increased beta-glucuronidase has been found in breast, ovarian, lung, colon, liver, bladder, and prostate cancer.

Eat a serving of a food high in glucaric acid about every 4 hours throughout the day. Food sources of glucaric acid include:

- Whole Apple – about 300 mg
- Oranges and grapefruit – 300 to 400 mg
- Broccoli – raw about 500 mg per cup
- Cherries – about 200 mg per cup.

Example: one half grapefruit and one orange for breakfast and 3 apples all day provide about 1500 mg of glucaric acid.

Slaga reports that based on scientific studies, an effective dosage of glucaric acid would be 2000 or more mg daily. Glucaric acid is found in some fruits and vegetables. Calcium D'Glucarate is available as a dietary supplement. Persons under a toxic overload should try to consume 1500 to 2000 mg of glucaric acid daily. Because it is processed quickly out of the body, it is best to consume a food with glucaric acid once every 3 or 4 hours throughout the day. Apples low in sugar, like Granny Smith or Winesap, are highly recommended. Dietary Supplement: D'Glucarate – 2 capsules twice daily or one every 4 hours.

## *Methyl Donor Compounds*

A "methyl" group is -CH<sub>3</sub> or one part carbon attached to 3 parts hydrogen. Methyl donors reduce blood levels of homocysteine, a toxic byproduct of cysteine amino-acid metabolism linked to arteriosclerosis and osteoporosis.

Methyl donors play a critical role in detoxification pathways. Italian researchers, Armenante F et al reported in 1999 that reducing DNA methylation correlates with **interleukin-6 (IL-6)** gene hypomethylation and increases the level of its expression. The researchers found in experiments on a breast cancer cell line that when they suppressed methylation, it increased (IL-6) gene expression in the cancer cells. In other words, a lack of methyl donors leads to hypomethylation and causes the IL-6 gene to become more active thus producing more IL-6. IL-6 is a cytokine that stimulates the B cells and the TH2 arm of the immune system. IL-6 and TNF-a are known to be over active in cancer, AIDS, CFIDS, candidiasis and numerous other conditions and plays a significant role in the progression of these conditions.

Sources of methyl donors include **Betaine (also known as trimethylglycine, TMG)** from Red Beets or Betaine from Blackstrap Molasses, **Choline** from lecithin, bee pollen, brewers yeast, wheat germ and other sources, **SAME**, dimethylglycine (**DMG**), **MSM** (Methyl Sulfonyl Methionine), Methylcobalamin (**Methyl B12**) and **Folic acid**.

The B vitamin "Choline," (tetramethylglycine) has 4 methyl groups attached to it. When one methyl group (CH<sub>3</sub>) is donated, it becomes trimethylglycine (TMG). TMG is referred to as lipotropic and reduces fatty liver and protects against chemical damage and alcohol damage to the liver.

When TMG donates one methyl group, it then becomes DMG (dimethylglycine). Researchers

have found that 25 to 35 mg of DMG per KG of body weight significantly reduced ulcer size, number and ulcer index in pyloric-ligation, ibuprofen and stress induced ulcers in rats. There was a corresponding reduction in free radicals indicating the antioxidant activity provided cytoprotection of the gastric mucosa.

In Japan, Yamashiki et al tested the cytokine effects from using Methyl B12 as this form of the vitamin has attracted the attention of physicians in treating rheumatism. They found that *“as compared to controls, IL-6 productions induced by PHA and ConA on Day 4 of the culture was suppressed by an average of 60-70% when methyl B12 was added to the medium.”*

## **Zinc**

Zinc is used by the thymus to promote the growth of T cells. . Zinc stimulates the thymus gland to produce the hormone, thymulin, a key immune cell regulator of white blood cells.

In one controlled study, the use of zinc sulfate caused the output of thymus hormone to return to normal in aged persons <sup>(76)</sup>. In another experiment, too much zinc depressed immune function when 150 mgs of elemental zinc taken daily was used <sup>(77)</sup>. However, the same amount of zinc taken as zinc sulfate caused T-lymphocytes to proliferate and persistent infections were cured in another study (4). A deficiency of zinc intake has been associated with depression of the immune system. Prostate health requires adequate zinc intake. Zinc is used along with Vitamin B-6 and Magnesium to produce gamma linolenic acid (GLA) that is used by the body to produce PGE1, an anti-inflammatory prostaglandin. <sup>(75)</sup>

Food sources of zinc include: pumpkin seeds, garlic, spinach, sunflower seeds, brewer's yeast, wheat germ and bran, brown rice, other whole grains, seafood and especially herring.

## **CONCLUDING REMARKS**

The immune response is marked by inflammation. In that aging may be considered as a consequence of inflammation, the notion that aging-related decline may be effectively offset by curbing the chronic inflammatory response becomes quite intriguing. Anti-inflammatory nutrients, dietary supplements, and lifestyle choices may not only be effective therapeutics for immune system modulation but may emerge to the forefront as remedies to chronic diseases from arthritis to Alzheimer's Disease, type-2 diabetes and metabolic syndrome to atherosclerosis.

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## **FURTHER INFORMATION**

Visit the author's websites for further information: [www.lebeaubooks.com](http://www.lebeaubooks.com) and [www.keepehopealive.org](http://www.keepehopealive.org)

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## **ABOUT THE AUTHOR**

Mr. Conrad LeBeau is a self- educated investigative reporter and activist:

- 1981 to 1986 – designed lawsuits against Wall St bankers to stop farm foreclosures. Held several stop foreclosure seminars in the Midwest.
- 1987- Started Vital Health Products and Vital Health Publications and wrote a book on the uses of Hydrogen Peroxide- a book that has been revised 13 times and has sold over 150,000 copies.
- 1994 – Founded Keep Hope Alive as a non-profit educational organization. Contributed to the numerous publications including Progressive Health News, Positive Health News, an out of print book called "How to Reverse Immune Dysfunction" and is editor of the current "Journal of Immunity" – a quarterly publication that is published both in print and online at [keepehopealive.org](http://keepehopealive.org).

Mr. LeBeau is a self- educated investigative reporter. He has distributed copies of the "Journal of Immunity" on the subject of the adverse health effects of Cell Phone Towers to every member of Congress.

Mr. LeBeau's current books in print include the "Immune Restoration Handbook" and "Natural Remedies for Intestinal Health", "Insomnia, Fatigue and Cell Phone Towers," and "Hydrogen Peroxide, Aloe Vera Plus Other Home Remedies."

