

Gulf War Syndrome

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Gulf War syndrome (GWS), affecting a number of men and women who served in the Persian Gulf War, represents a group of medical and psychological complaints, including fatigue, respiratory illness, muscular pain, spasms, skin rash, memory loss, dizziness, peripheral numbness, and sleep disturbances. A 1996 VA study (Kang et al. 1996) reported that Gulf War veterans were 50% more likely to die in a motor vehicle accident than military personnel not sent to the Gulf War. Robert W. Haley, University of Texas Southwestern Medical Center, Dallas, reported similar findings but added in an article published by the Associated Press that the Gulf War veteran also has a higher rate of depression and suicide. Haley correlated these findings medically with individuals who have sustained brain injuries (Haley 1997; 1998; Haley et al. 1997a; 1997b).

Between August 1990 and March 1991, the U.S. deployed more than 697,000 troops in Operation Desert Shield and Operation Desert Storm. The majority of the troops were stationed in Saudi Arabia, Kuwait, or aboard ships in the Red Sea. Of these, more than 100,000 (one in seven) have reported serious health concerns to the Department of Veterans Affairs or the Department of Defense. Unfortunately, some family members of those stricken gradually display signs and symptoms of the syndrome as well, suggesting an infectious explanation of the illness.

SPECULATIVE CAUSES OF GWS

When causative factors are obscure and not unilaterally accepted, as in GWS, speculation oftentimes overrides a precise explanation. This appears true in GWS. Suppositions are many in regard to the contributory sequence that terminated in the physical and psychological symptoms familiar to veterans diagnosed with GWS.

The postulations being most scrutinized are exposure to toxins in the environment (such as oil fires), chemical and biological weapons, low-level uranium exposure, an immune reaction to a drug administered to protect against attacks of Soman (a nerve gas), dust, and even the immunizations (specifically, the anthrax vaccine and polio booster) given to the troops prior to deployment. Any of these theories could explain a state of unwellness when imposed upon a vulnerable host.

Nutritionally oriented clinicians subscribe to the rationale, "If you can't eat it, don't smell it." This caveat was not possible to heed in the Gulf War environment. More than 500 oil well fires were burning in Kuwait during June 1991, emitting extremely high levels of particulate matter. Detections of sarin, a potentially fatal nerve gas, tabun, a neuroparalytic toxic agent, and sulfur mustard gas were reported during the period of January 19-21, 1991. Troops responsible for cleaning up Iraqi ammunition dumps may have been exposed to depleted uranium, a form of uranium used in munitions because of its density and metallurgical properties. Korenyi-Both et al. (1992) reported that the combination of Saudi dust and pigeon droppings ignited an acute hyperallergic reaction that has come to be known as Desert Storm pneumonitis or Al Eskan disease. There are those who question whether the very preventative measures--drugs and vaccinations--employed to protect the troops from chemical or biological warfare may be the agents provoking the illness. Confounding the inquest, manifestations of the syndrome are unpredictable. Just as cancer can occur long after exposure to the causative factor, the complications arising from GWS can be just as unpredictable.

EXTENDED HEALTH CONCERNS

- Antisqualene Antibodies
- Mycoplasmal Infections
- Sexual Impairments and Birth Defects

The illnesses apparent in the Gulf War veterans are not just nuisance complaints, but represent concern for vulnerability to catastrophic disease. Thousands of U.S. soldiers have died of infectious diseases, chemical exposure, and other causes resulting from Operation Desert Storm.

On April 6, 2000, the Associated Press reported that the VA announced a year-long study to determine whether there is a higher incidence of Lou Gehrig's disease--amyotrophic lateral sclerosis or ALS--among the veterans of the Gulf War. It appears that at least 28 Gulf War veterans have been diagnosed with this deadly disease. Researchers are interested in locating other veterans diagnosed with ALS or other motor neuron diseases who were actively serving duty between August 2, 1990, and July 31, 1991, regardless of location. Those who did not go to the gulf area will serve as part of the control group. Eligible veterans may call (877) 342-5257.

Antisqualene Antibodies

Dr. Bob Garry of Tulane University tested 400 veterans for antibodies to squalene and found that 95% of those individuals with GWS had high levels of the antibody (Asa et al. 2000). Though a participant in metabolic processes, squalene, found in shark liver oil, some vegetable oils, and the human liver, can also be incorporated into a vaccine to accelerate, enhance, or prolong a specific immune response. Mystifying the sleuthing process, information currently available states that squalene, though once considered an immunologic potentiator, was never used as an adjuvant in the vaccines administered to the Gulf War veterans. Because the antibody to squalene is commonly found in individuals plagued by GWS, applying the Antisqualene Antibody Assay to stricken veterans may prove a valuable tool in diagnosis. It has been hypothesized that GWS is a result of an autoimmune reaction, in which the immune system inappropriately turns on its own natural supply of squalene. The assay is available through Autoimmune Technologies, LLC, of New Orleans, LA.

Mycoplasmal Infections and GWS

Rare germs called mycoplasmas are often evidenced in individuals with GWS. Mycoplasmas are bacteria-like organisms that cause atypical pneumonia in confined groups, such as military personnel. They are small, free-living, self-replicating organisms that can cause a respiratory, flu-like illness that can progress to systemic chronic fatigue syndrome-like or fibromyalgia syndrome-like illness, sometimes advancing to multiple sclerosis-like, amyotrophic lateral sclerosis-like, and arthritis-like symptoms. Researchers found that slightly less than half of very ill Gulf War veterans with signs of chronic fatigue-immune deficiency syndrome (CFIDS) or fibromyalgia syndrome (FMS)--that is, fatigue, depression, joint pain, cognitive disturbances, burning muscles, faltering speech, headache, incontinence, alimentary disorders, sore throat, tinnitus, or loss of libido--involved mycoplasma infections. Although these microorganisms do not directly cause CFIDS, FMS, GWS, or rheumatoid arthritis (RA), mycoplasmas appear to encourage their progression and exacerbation.

Most microorganisms like mycoplasmas are not considered important human pathogens when they are found at superficial sites, such as the oral cavity or intestines, as symbiotic gut flora, but some species, such as *M. fermentans*, *M. penetrans*, *M. pneumoniae*, *M. genitalium*, *M. pirum*, and *M. hominis*, have the capability to penetrate blood circulation and colonize various tissues. The study was reported by Rawadi et al. (1996).

Sexual Impairments and Birth Defects

Whether Gulf War personnel have an increased incidence of infants born with birth defects compared to nondeployed personnel is unclear. Of the 75,414 infants born in military hospitals during the study period, seven presented with some of the ocular, aural, or cardiac impairments associated with a condition commonly referred to as Goldenhar syndrome. Only five of the seven babies, however, were born to Gulf War veterans (34,069 births), although the remaining two infants were born to nondeployed military personnel. Some affirm that birth defects are not alarmingly disproportionate among Gulf War veterans; others angrily argue that the incidence is much higher than among the nonmilitary population, with some incidences of infantile defect not being appropriately recorded. Sexual malperformance, such as impotence, has been reported among service personnel participating in the Gulf War.

WHY NOT EVERYONE?

■ Chronic Toxicity

Researchers observed illnesses resembling GWS in laboratory animals exposed to a mixture of cholinesterase inhibitor insecticides and pyridostigmine; soldiers in the Persian Gulf War have been exposed to both agents.

Before addressing the impact that such toxins could have upon exposed individuals, it is important that the autonomic nervous system be briefly explained to the reader. The autonomic nervous system, regulating involuntary functions, consists of two divisions, referred to as the sympathetic and the parasympathetic nervous system. Each division performs functions within the body that influence cardiac muscle, smooth muscle, and glandular activity.

Individuals are born with a sympathetic, parasympathetic, or balanced nervous system, referred to as a metabolic type. Our metabolic type identifies us individually and contributes to the personality that we display to society. Passivity, aggression, right

brain/left brain preeminence, sleep patterns, etc., are but a few of the characteristics metabolic dominance influences. But, diet, exercise, supplements, exposure to toxic materials, and stress can make more virulent the responsiveness of the already dominant division. The body is healthiest when neither of the two divisions holds supremacy, but rather when balance prevails.

Cholinesterase inhibitors can turn the volume up on the parasympathetic nervous system by allowing acetylcholine, a neurotransmitter, to accumulate at the cholinergic receptor, thus producing effects similar to excessive stimulation of cholinergic receptors throughout the central and peripheral nervous systems. An already parasympathetic dominant individual could, after sufficient exposure to cholinesterase inhibitors, display a heightened parasympathetic expression.

Dr. Nicholas Gonzalez (www.dr-gonzalez.com), a New York physician, specializing in cancer treatment, has many times insightfully explained the disease-promoting role of the autonomic nervous system, when the two divisions become unbalanced. Dr. Gonzalez explains that the protective closure around a cell and the nucleus that controls the exchange of materials between the cell and its environment is referred to as the membrane. The membrane protects the contents of the cell with the same fervor that a solicitous parent extends to a child. It is when the membrane loses its worthiness, a process enacted by excessive calcium loss, that the cell becomes flimsy and unprotected. If toxic materials gain entry into the nucleus, the genetic control center of the cell, damage to the cell's DNA can occur quite rapidly. Should this happen, serious destruction has befallen the host.

The membrane of the cell is different in the sympathetic and the parasympathetic individual. The sympathetic dominant individual tends toward a tighter membrane that stores waste accumulations quite well. It takes longer for toxic materials to migrate into the nucleus because the tightness of the nuclear membrane is embracing and, thereby, protective. But when the maximum load in the nuclear area has been reached, anomalies, such as tumors, may become apparent.

By contrast, the cellular and nuclear membrane, according to the work of Dr. Gonzalez, in a parasympathetic individual tends to be weak and leaky, allowing noxious materials ad libitum entry into cells. The entry of contaminants is met with slight opposition, as the cell membrane exercises sparse resistance against the invader. Noxious materials, as well as viruses, find little hindrance passing through the membrane and gaining entry into the cell.

This bit of neurophysiology may best explain the poisoning that appears to have occurred in several of the Gulf War veterans. Which of the theories, i.e., exposures to low-level uranium, oil fires, chemicals of warfare, etc., is accurate when defining the causative factor in GWS? It may not matter, because, in reality, any of the theories or all of the theories may be accurate. Any noxious exposure was too much for some of the veterans. Metabolic dominance may have made some more immediately vulnerable to the exposures; for others, the appearance of Gulf War illnesses may be longer in appearing. The effects of the exposure may take several twists before full understanding of the depth of the devastation is reached, but the cell membrane appears to be a principal player in all of the scenarios.

Chronic Toxicity

Dr. Jeffery Bland, Ph.D., of the Institute for Functional Medicine, reported that the first signs of chronic toxicity may appear as neuro- and immunotoxicity. Dr. Michael R. Lyon, M.D., of the Oceanside Functional Medicine Research Institute, Nanaimo, British Columbia, stated that the nervous and immune systems are highly sensitive to oxidative stress and xenobiotics, that is, drugs and organic poisons. He points out that both the nervous and immune systems have a powerful memory, which means they have tremendous capacity for recalling exposure to substances to which they have become sensitive. They become increasingly sensitized to these agents as their immune system builds antigenic memory.

Classic studies involving rats showed that exposure to a poison and a simultaneous whiff of camphor later produced serum sickness or autoimmune crisis when the animals were exposed to only a sniff of camphor. The immune system was so hypervigilant in protecting against the poison that even the scent of the camphor signaled an alert. Too many of us have, either by neglect or happenstance, been exposed to environmental pollutants that may be damaging either to the nervous or the immune system. Dr. Lyon warns that attention deficit disorder, FMS, and CFIDS are going to force society into looking at these disorders from a toxicological perspective.

Hair analysis, if properly conducted, can be a dependable assessment tool in determining toxicity from heavy metals. Detection of chemical toxicity can be made by urinary organic acid analysis and by measuring blood and fatty tissue for suspected chemicals. Concurrently, the liver should be tested in regard to serum bilirubin and enzyme levels.

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DETOXIFICATION . . . WHAT IS IT?

- Fasting
- Detoxifying Herbs
- Hepatics, Alteratives, Diuretics, Laxatives, and Diaphoretics
- Milk Thistle (*Silybum Marianum*) Complexed with Phosphatidylcholine
- Chelation Therapy: A Means of Extracting Heavy Metals
- Can What You Eat Make a Difference

The detoxification process is an elaborate mechanism conducted chiefly by the liver to eliminate both exogenous and endogenous toxins. The liver participates in the detoxification process, largely by the action of two sequential steps referred to as Phase I and Phase II systems. Phase I reactions involve blood filtration, bile excretion, and the interaction of enzymatic processes acting upon the toxin. Bile excretion is most efficient, in regard to the detoxification process, if adequate amounts of dietary fiber are simultaneously available to escort the toxin from the intestines.

Phase I detoxification involves a group of enzymes, referred to as the cytochrome P450 family. Some 50-100 enzymes make up the cytochrome P450 systems, with each enzyme working more efficiently at neutralizing certain classes of chemicals. Phase I enzymes can directly neutralize some chemicals, but most toxins are converted to an intermediate form of the toxin. The intermediate form is considered more toxic than the original and requires the action of Phase II detoxification to complete the cycle.

Ideally, Phase I and Phase II detoxification mechanisms work synergistically. If Phase I detoxification is highly active and Phase II detoxification is lethargic, the individual is referred to as a "pathological detoxifier," a condition which increases sensitivities to environmental poisons.

Phase II reactions include sulfation and glucuronidation, which are key to human detoxification, along with glutathione conjugation, methylation, amino acid conjugation, and acetylation. Phase II detoxification typically involves biochemical conjugation, in which various enzymes in the liver attach small chemical moieties to the toxin. The conjugation reaction neutralizes toxins and reactive intermediates left over from Phase I detoxification. Both Phase I and Phase II detoxification require assistance from a healthy supply of enzymes. Enzyme quantity can be influenced by dietary components. Green tea and products found in red wine grapes encourage glucuronidation and glutathione conjugation enzymes, respectively.

Glucuronidation, a significant pathway in the Phase II detoxification mechanism, is the combining of glucuronic acid with toxins, a process that requires the enzyme UDP, glucuronyl transferase (UDPGT). Foods rich in limonene, a monoterpene found in citrus peel, dill weed oil, and caraway oil, can increase UDPGT activity and encourage the glucuronidation mechanism.

Many commonly used substances--for example, aspirin, menthol, synthetic vanilla, acetaminophen, morphine, diazepam, digitalis, benzoates, and some hormones--are detoxified through the glucuronidation pathway. Beta-glucuronidase, regarded as a dangerous enzyme, interferes with the glucuronidation process, allowing toxic levels of drugs and contaminants to accumulate. Older individuals appear particularly susceptible to increased beta-glucuronidase formation because of long-term exposure to toxic agents.

A phytoextract, D-glucarate, has been shown to support the glucuronidation pathway by inhibiting the activity of beta-glucuronidase. D-glucarate may be obtained naturally by emphasizing apples, grapefruit, broccoli, and brussels sprouts in the diet and by supplementing with calcium-D-glucarate and vegetable concentrates. According to data released from the University of Texas M.D. Anderson Cancer Center, D-glucarate inhibited beta-glucuronidase by 57% in the blood, 44% in the liver, 39% in the intestines, and 37% in the lungs, thus protecting the action of the glucuronidation pathway (Dwivedi et al. 1990).

Murray et al. (1998) report that the glucuronidation pathway is also impaired in the 5% of the population with Gilbert's syndrome. Gilbert's syndrome is a benign hereditary condition characterized by hyperbilirubinemia (serum bilirubin level 1.2-3.0 mg/dL) and jaundice. The Gilbert's syndrome patient typically complains of loss of appetite, malaise, and fatigue, symptoms often identifiable with liver dysfunction.

If entry of noxious materials is not controlled, detoxification, a cleansing ritual, can no longer keep pace, and alternative measures to encourage detoxification should be employed. Many nutrients and therapies assist in detoxification but glutathione is particularly important since it contributes to both Phase I and Phase II detoxification mechanisms. According to Eric R. Braverman, M.D., glutathione lessens the toxicity of heavy metals, automobile exhaust, cigarette smoke, fungicides, herbicides, nitrates, solvents, plastics, detergents, insecticides, and drugs. Furthermore, repeated exposure to any of these toxins can deplete glutathione faster than it can be produced or absorbed. Vitamin C appears to be an excellent nutrient to increase glutathione stores by stimulating the

rate of glutathione synthesis. Glutathione supplementation is also available for individuals not wishing to rely upon vitamin C for glutathione enhancement. Glutathione in 250-mg capsules, taken on an empty stomach 1 or 2 times daily, is the recommended dosage.

Fasting

At one time, Paavo Airola, N.D., Ph.D. referred to fasting as the royal road to health and long life. Fasting is a popular method of detoxification because the body can begin extricating the noxious materials rather quickly, allowing the body to commence the healing process. Literally, fasting means to deprive oneself of food for a specific period, usually for therapeutic or religious purposes. Medical journals have presented articles that support fasting as a therapeutic means of ridding hazardous materials from the body (Imamura et al. 1984).

If there is a down side to fasting, apart from dietary abstinence, it would be the caution required as pollutants are released from internal caches. During a fast, the concentration of toxins in the urine can be 10 times higher than normal. After the toxic load is decreased, the body has greater latitude to concentrate upon the healing process.

A professional who understands the detoxification process best implements a fast. Many practitioners prefer juice fasting to water fasting, believing the juices expedite the process of detoxification and impose less stress upon the individual. (It is recommended that juices be diluted with distilled water.) Also, a professional will know how to deal with a Herxheimer's reaction, which alludes to symptoms initially appearing more intensified as toxins are freed. The nervous system is particularly vulnerable to the release of fat-soluble toxins.

Some individuals who fast report being energized, but this usually occurs after repeated short fasts have eliminated many of the toxins and the internal milieu is cleaner.

The initial fasting experience in a toxic individual most often produces a feeling of fatigue, as the body does battle with the poisons. For this reason, working individuals may wish to plan a short fast (with the aid of their healthcare professional) over a weekend when the workload is lighter. The body is extremely engaged as noxious materials are being extracted. Conversely, the digestion of foodstuffs requires a tremendous work effort; therefore, a sabbatical from food allows the body the energy for detoxification.

Starting a fast and breaking a fast require special guidance, so that the cleansing effort is not lost by inappropriate binge eating. Fasting is not for everyone; a hypoglycemic often finds it extremely difficult to fast, even for short periods of time. A guided fast may, however, prove a valid therapy for some individuals wishing to expedite the detoxification process.

Detoxifying Herbs

Many practitioners believe that the best approach to detoxification is a gradual, but ongoing process. There are a number of herbs that historically have had an impressive reputation as detoxifying and blood purifying agents. A popular term that an herbalist might use for agents that clean up the bloodstream is an "alterative," meaning the constituents of the blood are gradually being changed from a state of poor health to one of wellness. The herbs facilitate the filtration of toxins and wastes while killing poisons and balancing nutrients and plasma substances.

A number of herbs have a similar purpose in the blood purification and liver detoxification process. Often, herbalists combine herbs of similar likeness into a complex, believing the synergistic value of the herbs delivers greater efficacy than a single herbal. A list of these "clean-up herbs" and a brief description of their contribution to the detoxification mechanism follow.

Hepatics, Alteratives, Diuretics, Laxatives, and Diaphoretics

Dandelion root (*Taraxacum officinalis*), an excellent blood purifier, assists in many ways to boost the detoxification process. While dandelion root enhances the performance of the liver, dandelion leaves have a diuretic action, pulling toxins and excess water from the body.

Licorice (*Glycyrrhiza glabra*), though from a different herbal family than dandelion (licorice from Leguminosae and dandelion from Compositae), is also regarded as an alterative. Licorice protects the blood supply by defending the liver, the detoxification plant of the body. In fact, so strong is licorice's contribution toward detoxification that Mowrey (1986) reminded us that the Chinese have dubbed it the "The Great Detoxifier." Licorice is best used as part of a complex containing various other herbs and is usually well tolerated in this application. Licorice contains estrogenic properties and could elevate blood pressure or heighten adrenal expression, if administered in large amounts.

Pau D'Arco (*Tabebuia heptaphylla*) is an effective blood purifier, extracting toxins that lead to blood toxicity. Pau D'Arco also protects the liver while the liver is aggressively involved in neutralizing poisons.

Yellow dock (*Rumex crispus*) primarily affects liver function, enhancing the detoxification mechanism and increasing straining of contaminants and purification of the bloodstream. Ritchason (1995) reports that yellow dock is regarded as a favorite alterative among many individuals, sometimes using it against arsenic poisoning. Yellow dock attains tonic status by increasing energy and vitality throughout the body with particular emphasis upon the muscular, nervous, and digestive systems. Eclectics commonly used yellow dock when they perceived that blood-borne toxins instigated the appearance of skin diseases, for example, a rash.

Sarsaparilla root (*Smilax officinalis*) attacks and neutralizes microbial substances in the bloodstream through its antibiotic activity. By acting as a diuretic and diaphoretic (promotes perspiration), sarsaparilla encourages excretion of toxins and waste materials and acts as an antidote for various poisons. Heavy metallic contaminants in the blood can be extracted from the system with the judicious use of sarsaparilla. Sarsaparilla exerts strong power over fibers and tissues of the nervous system that may be particularly beneficial to the Gulf War veteran.

Stillingia root (*Stillingia sylvatica*) has the nature of an alterative and is beneficial in disease states that affect the skin, for example, psoriasis and eczema. Stillingia, though extremely beneficial in blood purification, is best used in small amounts, complexed with other herbs such as prickly ash (*Zanthoxylum americanum*). Prickly ash bark is a diaphoretic, assisting in the discharge of toxins.

Burdock root (*Arctium lappa*), according to Santillo (1984), is a traditional blood purifier, or alterative, with diuretic and diaphoretic activity. Burdock is considered an appropriate herb for eliminating long-term impurities from the bloodstream. It can neutralize most poisons, relieving kidney and lymphatic systems. Hepatic functions are influenced by burdock, barberry (*Berberis vulgaris*), and Oregon grape root (*Berberis aquifolium*), preparing the liver for more efficient detoxification.

Cascara Sagrada bark (*Ramnus purshiana*) is regarded as a reliable laxative herb, contributing to the elimination of toxic debris from the colon. It usually accomplishes this task without the miseries associated with laxatives. Buckthorn bark (*Rhamnus frangula*) is also considered a laxative, having an energetic, evacuative effect and stimulating bile production from the liver. Buckthorn is regarded as a bitter herb, capable of expelling impurities.

Ritchason (1995) regards echinacea (*Echinacea augustifolia*) as one of the premier alteratives, echinacea having been called the "King of Blood Purifiers." It appears to stimulate the elimination of waste products by stabilizing the relative percentage of neutrophils to other leukocytes in the blood. Historically, echinacea has been used to purify the blood after noxious exposures, for example, venomous wounds and blood poisoning, by improving lymphatic filtration and drainage. Echinacea often benefits a toxic headache with vertigo and a confused mental state when the condition is predisposed by toxemia.

Kelp and algin appear important adjuncts to any cleansing program since they bind radioactive barium, cadmium and zinc in the gastrointestinal tract, hindering absorption. Kelp appears to reduce the risk of environmental poisoning by acting as a nondigestible fiber, increasing fecal bulk while enhancing the immune response. A factor found in kelp, sodium alginate, binds with radioactive strontium-90 in the intestines and carries it out of the body. (Findings reported at the Gastrointestinal Research Laboratories of McGill University in Montreal.) (Note: Some herbalists regard Norwegian kelp freer of impurities and, by various standards, the preferred form to use.)

McCaleb et al. (2000) report that red clover (*Trifolium pratense*) has a long history of usage as a blood-cleansing herb that thins the blood, aids digestion, and stimulates detoxification through the liver and gall bladder. It has merit when used as a single herb, or if complexed with other purifying herbs. The user should be aware, however, that red clover possesses estrogenic activity, and since it thins the blood, it may be inappropriate for some supplemental regimes.

Cayenne (*Capsicum annum*) is added as a catalyst in many herbal complexes to enhance the effectiveness and delivery of other herbs. It also has a diaphoretic action, encouraging the expulsion of toxins through perspiration.

Many variations of these herbs are available through either health food stores or the supplier.

Milk Thistle (Silybum Marianum) Complexed with Phosphatidylcholine

The tradition involving milk thistle (*Silybum marianum*) as an herbal medicinal dates back over 2000 years, with Dioscorides using the extract to treat mushroom poisoning and snake bite (1st century CE). The modern use of milk thistle, according to Ogletree et al. (1997), began in 1949 when animal studies confirmed that it could protect the liver from the toxic effects of carbon tetrachloride. In 1968, an active ingredient was isolated and named silymarin. Milk thistle has been the subject of over 100 clinical trials, primarily for liver disease. More recently, milk thistle has emerged as a staple in emergency procedures throughout Europe to treat amanita mushroom poisoning and as a protectant against toxins found in acetaminophen.

Highly polluted areas, like the Gulf War arena, exacerbate the production and activity of free radicals, the harbinger of most degenerative disease. Ogletree et al. (1997) state that the hepatoprotective effects of milk thistle are accomplished via three main pathways: (1) antioxidant activity, (2) protection of the hepatocellular membrane, and (3) stimulation of hepatocytes.

A human study evaluated the effectiveness of milk thistle on occupational exposure to liver toxins, primarily solvents, paints, and glues. The study was placebo controlled, with 35 participants receiving 420 mg a day of milk thistle, while 20 subjects received a placebo. At the end of the treatment period (15-20 days), there was a meaningful decrease in liver enzymes (aspartate aminotransferase, alanine aminotransferase, gamma-glutamyl transpeptidase, alkaline phosphatase) and bilirubin in the milk thistle group. There were no improvements observed in liver function in the placebo group (Boari et al. 1981). Complexing silymarin with phosphatidylcholine (PC) enhances the bioavailability of the herb, while PC itself is highly regarded as a hepatoprotective agent.

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Gulf War Syndrome

Chelation Therapy: A Means of Extracting Heavy Metals

Chelation therapy refers to a treatment in which certain synthetic chemicals and body proteins bind metal molecules, extracting them from the system. Literally, chelation therapy is derived from the Greek word chele, which alludes to a claw-like action imposed upon unwanted materials accumulating in the body. Chelation is currently best associated with the clearance of plaque from the arteries, establishing normal blood flow to the vasculature.

Historically, chelation therapy has been used for other objectives apart from cardiovascular health. As early as 1941, Providence Hospital in Detroit used chelation, employing intravenously administered ethylenediaminetetraacetic acid (EDTA), a synthetic amino acid, to extract lead. EDTA, a nontoxic chelator, also clears mercury, cadmium, nickel, copper, calcium, and other metals from the body. Even physicians who are not proponents of chelation therapy admit that evidence in regard to extracting heavy metals appears convincing. Chelation therapy has been useful in treating schizophrenia and Lou Gehrig's disease as well.

For the 25% of the U.S. population who have varying levels of heavy metal poisoning, the dangers are manifold. Illustrative of this, molecularly, some metals closely resemble the chemical structure of enzymes, with a small amount of the metal chelated into the enzyme's structure (Walker 1990). If an excess of the metals replaces the normal mineral content of the enzyme, the enzyme can become chemically altered and nonfunctional, hindering metabolic activity. Because enzymes ignite detoxification, the process suffers when enzymes are in short supply. The Gulf War veteran who was exposed to unreasonable amounts of environmental metallic poisons could be shutting down enzymatic systems vital to detoxification processes.

The signs of heavy metal poisoning closely resemble the complaints of the service personnel of the Gulf War, for example, headache, fatigue, muscle aches and pains, tremors, anemia, mental confusion, mental illness, depression, tingling in the extremities, abnormal nerve reflexes, insomnia and/or drowsiness, dizziness, irritability, disorientation, decreased male fertility, spontaneous abortions in women, and poor circulation. Virtually every organ system responds adversely to heavy metal accumulations, including the respiratory, cardiovascular, muscular, integumentary (skin, hair, nails), nervous, endocrine, skeletal, urinary, and digestive systems.

Walker (1990) believes that chelation therapy is 3.5 times safer than taking an aspirin tablet for a headache. LD-50 refers to the pharmaceutical term "lethal dose 50," the dose of a substance that is fatal to 50% of test animals. Aspirin has a LD-50 at only 558 mg per kilogram in humans, while EDTA's LD-50 is 2000 mg/kg.

A crucial phase of chelation is re-establishing the beneficial minerals that were extracted, along with the heavy metals. This may be accomplished either orally or intravenously. It would be to the patient's advantage were the physicians using autonomic balancing as the premise for refusion of the minerals. The selection of appropriate minerals to normalize imbalances occurring in the autonomic nervous system appears an integral phase of the success or failure of chelation therapy.

An individual wishing to obtain chelation therapy may want to contact a physician who follows the standard chelation protocol of the American College of Advancement in Medicine. The number of sessions required to enact a change cannot be presupposed, but the recommended maximum dosage is currently about 3 grams of EDTA, dosage usually calculated by body weight, given by IV infusion 1-3 times weekly, as a drip for 3-4 hours. Initially, the dosage may be as small as 1/2-1 gram of EDTA.

Can What You Eat Make a Difference?

According to Dr. Steven Whiting of the Institute of Nutritional Science, supplemental fiber, as well as fibrous food choices, not only protects the digestive system from concentrated toxins, but it also serves as a cleansing factor for many poisons accumulating in the body. Certain foods, such as bran, whole grain wheat, oats, corn, cereals, lentils, beans, peas, peanuts, figs, dates, and apples, are natural chelators. Supplementing with psyllium seed husks, oat, and wheat bran (if not allergic to wheat), and acacia gum, plus emphasizing high-fiber food choices assists in binding noxious materials in the digestive tract and expelling them in fecal material.

OTHER TREATMENTS FOR GWS

- Mycoplasma Forecast
- Dioxychlor
- A Single Herbal that Appears Helpful
- Oxygenation Therapy
- Exercise Intolerance

Mycoplasma Forecast

Nicolson et al. (1998) have released the heartening news, gathered from their research at the Institute for Molecular Medicine, Huntington Beach, CA, that thousands of soldiers are being helped when mycoplasma infections are identified and killed.

The presence of mycoplasma infections in the blood of fractions of patients with CFIDS, FMS, GWS, or RA enable health care professionals to rule out psychological or psychiatric based illness as a causative factor in the above-mentioned conditions and instead direct their efforts toward correction of medical anomalies. Administering antibiotic therapy is sometimes a chosen treatment modality. Appropriate cyclic treatments with antibiotics or other medications that suppress chronic infections have resulted in improvement and even recovery in most of the individuals treated. If blood infections are diagnosed, patients receive continuous antibiotics for at least 6 months before beginning a 6-week cyclic treatment. The recommended treatments for mycoplasmal blood infections require long-term antibiotic therapy, usually multiple 6-week cycles of doxycycline (200-300 mg a day), ciprofloxacin (Cipro) (1500 mg a day), azithromycin (Zithromax) (500 mg a day), or clarithromycin (Biaxin) (750-1000 mg a day). (Note: Administering some antibiotics produces no favorable clinical response; in fact, penicillin results in patients becoming more symptomatic.)

Multiple antibiotic cycles are required because few patients recover after only a few cycles or even within the first year of therapy if the illness is chronic, possibly because of the intracellular locations of the infections and the slow-growing nature of the microorganisms. As with other treatments used to rid infiltrations of noxious materials or microorganisms, a Herxheimer's reaction usually occurs, meaning the patient feels poorer than before beginning the curative. This reaction occurs as die-off or release of toxic materials from damaged microorganisms is increased. As die-off decreases, stabilization occurs, and the patient slowly moves nearer recovery.

Confounding the treatment, some patients recover only to a certain point and then fail to continue to respond to the antibiotics, suggesting that other problems, such as viral infections, environmental exposures, and other toxic events, are working synergistically with the microorganism to produce a state of ill health.

A 3-year follow-up of antibiotic therapy by the SHASTA CFIDS Association of Northern California reported that a majority (about 80%) of the patients with confirmed mycoplasmal infections who participated in the antibiotic therapy recovered from 50-100% of their preillness health, within the 3 years.

Antibiotics are not without their dark side. Apart from an ugly list of side effects that commonly accompany antibiotic therapy, antibiotics can disrupt the friendly flora that resides symbiotically in the gut. Gut flora represents several pounds of highly sensitive material that is regarded as immune modulating. Disturbance of "friendly flora" can antagonize the immune and inflammatory process. Reinoculation of the gut with cultures of *Lactobacillus acidophilus*, *Lactobacillus rhamnosus*, *Bifidobacterium longum*, and *Bifidobacterium breve* is vital to recovery. Selection of a probiotic that is touted to be antibiotic resistant is recommended.

To be successful, each patient must comply with a complementary health approach that employs the best of orthodox and natural medicine. Gulf War veterans presenting with mycoplasmas typically display nutritional deficiencies and poor absorption that must be corrected. Mega vitamin/mineral therapy is warranted, and sublingual or liquid supplements should be considered. Vitamin C, which detoxifies most heavy metals (5-15 grams daily, in divided doses), vitamin E (600-1000 IU daily), CoQ10 (50-150 mg daily), bioflavonoids (200 mg 3 times a day), choline (1000 mg daily, in divided doses), inositol (750 mg daily), vitamin B5 (500-1500 mg daily), PABA (500-1000 mg daily), sublingual vitamin B12 (1000 mcg daily dose), and flaxseed or fish oils (1 tbsp daily), along with minerals, such as zinc (50 mg daily), calcium (1000 mg a day), and selenium (up to 300 mcg a day), may be used. Minerals should be taken apart from antibiotics because minerals can affect antibiotic absorption. Garlic (*Allium sativum*) is a potent detoxifier. Use 2 capsules (300 mg each) 3 times a day with meals. Use 500 mg of L-cysteine, L-tyrosine, L-glutamine, and L-carnitine daily on an empty stomach.

Interest has been keen in regard to patients wishing to be tested for mycoplasmas, though additional volunteers are welcomed into the clinical trials conducted by the VA. The Institute for Molecular Medicine can test patients for evidence of mycoplasmal infections and other infections of the types that worsen human diseases, such as chronic fatigue immune deficiency syndrome, fibromyalgia syndrome, Gulf War syndrome, and rheumatoid arthritis. Blood sample can be sent to:

Prof. Garth L. Nicolson
The Institute for Molecular Medicine
15162 Triton Lane
Huntington Beach, CA 92649-1401
Tel: 714-903-2900
Fax: 714-379-2082
E-mail: gnicimm@ix.netcom.com

Dioxychlor

Dr. Robert W. Bradford, president of Bradford Research Institute, states that Dioxychlor is the major oxidant of demonstrated effectiveness, capable of ridding the system of pathogenic organisms. An inorganic compound composed of chlorine and two atoms of nascent oxygen covalently bonded, Dioxychlor is currently being used to treat individuals suffering with GWS, Epstein-Barr virus, and cytomegalovirus. Nicolson (1998) reported the usefulness of this therapy.

Broad-spectrum antibiotics bring short-term relief of infections, but the positive effect of antibiotics may be countered by long-term negativity. The Bradford Institute has determined that environmental diseases are typically characterized by systemic Candida, numerous allergies, autoimmune disorders, and compromised antigen kill. Largely, these disorders are iatrogenic in nature, meaning they are caused by either diagnostic or treatment procedures. Chronic or haphazard administering of antibiotics participates in this decadent cascade.

Dioxychlor, a homeopathic substance displaying low toxicity, offers an alternative to this quandary. Dioxychlor appears to destroy mycoplasmas while reducing sensitivity reactions and improving the status of gravely ill patients, such as those suffering from ALS.

An oral dose of Dioxychlor is 5-20 drops in 2 oz of water (4 tbsp), 1-3 times daily, based on patient tolerance. Should "die off" of foreign materials intensify symptoms, reduce the dosage. Dioxychlor can also be administered by slow drip with the assistance of a qualified physician.

A Single Herbal that Appears Helpful in Gulf War Syndrome Complaints

Duke (1997), botanist and humanitarian, illustrates that yellow sweet clover (*Melilotus officinalis*) contains herbal activity that may prove beneficial in regard to symptoms apparent in those stricken with GWS, for example, headache, myalgia, spasms, mycoplasmosis, ischemia, rheumatism, nervousness, sores, and cardiopathy.

Yellow sweet clover contains 0.9-2% coumarin, which may be the substance that elicits the benefit. Coumarin should, however, be used cautiously, for high doses can cause symptoms, such as headache, stupor, thinning of blood, and elevated liver enzymes, which appear transient upon discontinuance.

Individuals wishing to purchase yellow sweet clover may do so by contacting the following two suppliers:

Dragon River Herbals
P.O. Box 74
Ojo Caliente, NM 87549
Tel: (800) 813-2118
Mark's Drugs Roselle
384 E. Irving Park Rd.
Roselle, Illinois 60172
Tel: (630) 529-3400

Use 1/2 tsp (30 drops), taken 2-3 times a day, for 7-10 days. It is advisable to observe a 3-5-day respite from yellow sweet clover before repeating the herbal therapy.

Oxygenation Therapy

Oxidative therapy can be useful in suppressing a variety of anaerobic infections when administered at 1.5 ATM for 60 minutes. Hyperbaric oxygen therapy (HBO) refers to a monoplace chamber, in which only one patient is entirely enclosed in a pressure chamber, breathing oxygen at a pressure greater than atmospheric pressure. HBO is regarded as a therapeutic modality because significant physiological mechanisms are activated as a result. HBO delivers 10-15 times the oxygen to tissues as normal breathing. Popularly, HBO is used in the formation of new capillaries around a wound area and to treat anemia, ischemia, and some poisonings.

The flooding of the body with oxygen, as in hyperbaric therapy, tends to remove other gases, such as carbon monoxide and acute cyanide poisoning. HBO inhibits the growth of a number of anaerobic, as well as aerobic, organisms by enhancing phagocytic activity. This effect complements the improved action of host disease-fighting factors and is useful in disorders involving immunosuppression. Studies have demonstrated a prolonged postantibiotic effect when hyperbaric oxygen is combined with therapeutic dosages of antibiotics.

Gulf War Syndrome

Exercise Intolerance

Deeper understanding of the energy processes involved in human physiology and the role of the mitochondria, the powerhouse of the cell, may help in managing chronic disease processes. According to Bland (2000), an intermittent or sporadic form of mitochondrial myopathy, in which exercise intolerance is the predominant symptom, has been observed in individuals suffering from FMS, GWS, and encephalomyopathies.

The nucleus and the mitochondria each possess genetic information contained in DNA, a trait not shared with other organelles. Mitochondria can be damaged in such a way that communication with fellow mitochondria or other cellular organelles becomes faulty. Bland lists factors suspected as contributory events in malfunctioning mitochondria. Among them are the following:

1. Oxidative stress is associated with low oxygen tension or ischemia, which contributes to mitochondrial oxidation and can result in injury to mitochondrial DNA. According to Bruce Kristal, Ph.D., of the department of biochemistry at Cornell University Medical College, about 90% of oxygen supply is used by the mitochondria for oxidative phosphorylation, a process that produces ATP, an energy molecule. Electron leakage, perhaps less than 1-4%, occurs during oxidative phosphorylation and becomes a harbinger for free radicals. Free radicals perform a cyclic dance, as one radical may be neutralized only to produce another. An aggressive complex of antioxidants increases protection against oxidative stress. Consider traditional antioxidants, such as vitamin C, vitamin E, vitamin A, selenium, garlic, glutathione, green tea, grape seed extract, and lipoic acid.
2. Glucose intolerance or increased concentrations of glucose reportedly potentiate injury to mitochondrial DNA. Individuals suffering dysinsulinism and dysglycemia, with increased glycosylated hemoglobin levels, may have a greater propensity for mitochondrial DNA damage.
3. Sleep debt appears associated with impaired metabolic and endocrine performance, which may have physiopathologic consequences over time.
4. Dietary factors, such as calorie restriction in animals, have lessened the incidence of mitochondrial injury and mutation.
5. Environmental injury imposed by persistent or exaggerated contact with noxious agents may overwhelm the ability of the natural antioxidant systems to accommodate the exposure, and cellular damage results. The susceptibility of mitochondrial DNA to environmental mutagens appears even greater than the vulnerability of the nucleus, according to Johns (1995).
6. Medications, such as an antiretroviral nucleoside analogue like AZT, specific antibiotics, nucleoside-analogue reverse-transcriptase inhibitors, and the fibrates drugs, that is, antihyperlipoproteinemic drugs, appear to increase mitochondrial oxidative injury.
7. Chronic inflammation is associated with increased release of cell messengers, for example, tumor necrosis factor alpha, or interleukin-1 and interleukin-6, which may have effects on the mitochondria.

Exercise intolerance harkens back to the work of Dr. Nicholas Gonzalez. Exercise may intensify parasympathetic expression and further tame the sympathetic nervous system by "burning off" epinephrine and norepinephrine hormones released by the adrenal medulla. Recall that cholinesterase inhibitor insecticides, to which the Gulf War veterans were exposed, may amplify parasympathetic expression, a metabolic type that may have been dominant from birth in individuals more vulnerable to GWS. It is possible that exercise tolerance will increase, if choices are made to balance the autonomic nervous system.

Elite athletes have benefited from large doses (20 grams) of creatine supplements when compromised ATP production was suspected. The benefits observed in muscular performance among athletes may extend to individuals suffering the pain and fatigue of myalgia. Use 5 grams of creatine, 4 times a day for 5 days. Thereafter, use 1 gram of creatine, following exercise. Though creatine is considered remarkably safe, individuals with kidney impairment may find it advisable to avoid creatine supplements.

Dioxychlor increases oxygen supply throughout the body and may be of benefit in preserving mitochondrial integrity.

Exercise Conclusion

Air travel, excessive exercise, and a lack of sleep worsen symptoms of GWS. Flying lowers oxygen tension and can stimulate borderline anaerobes. Exercise, though essential in moderation, should not be aggressive, for a relapse due to overexertion can occur.

Dry saunas help rid the system of chemicals. Saunas may be considered 3 times a week, followed by 15-20 minutes of dry sauna and a tepid shower. Repeat saunas no more than 2 times a day. Work up a sweat, eliminating chemicals, without goading the body into stressful activity. Always replace body fluids during and after each session.

Should individuals choose to incorporate walking into their rehabilitation program, select the exercise arena carefully. Roadside exercise, because of contaminants, negates the value of the activity. Become good environmental stewards, screening the entry of

pollutants and allergens into an already challenged biochemistry. For recovery, after light exercise and to decrease muscle soreness, use a Jacuzzi or hot tub, adding 2 cups of Epsom salt, after a sufficient cool down period. The final caution in regard to exercise is to keep it simple, without taxing or exhausting the system.

SUMMARY

1. Implementation of detoxification techniques to stimulate extraction of noxious materials from the system is highly recommended. Fasting, if employed as a detox mechanism, should be performed under the supervision of a qualified professional, who will fully structure the fast and assist in ridding poisons from the system.
2. Herbs that are often complexed to assist in blood purification and detoxification include dandelion root, yellow dock root, sarsaparilla root, echinacea, licorice root, stillingia root, burdock root, buckthorn, barberry, Cascara Sagrada bark, prickly ash bark, Pau D'Arco, red clover, kelp, Oregon grape, and cayenne.

The following dosages represent general guidelines only for individual herbs. Drug interactions and contraindications regarding long-term use and specific medical conditions must first be evaluated. An herbal detoxification program should be considered only under the supervision of an experienced healthcare provider.

- Dandelion root (*Taraxacum officinale*): A typical dosage of dandelion root is 2-8 grams 3 times daily of dried root; 250 mg 3-4 times daily of a 5:1 extract; or 5-10 mL 3 times daily of a 1:5 tincture in 45% alcohol. The leaves may be eaten in salad or cooked.
 - Licorice (*Glycyrrhiza glabra*): For supportive treatment of ulcer pain along with conventional medical care, the standard dose of deglycyrrhized licorice (DGL) is two to four 380-mg tablets of DGL taken before meals and at bedtime. A typical dose of whole licorice is 5-15 grams daily. However, doses this high are not recommended for longer than a few weeks. For long-term consumption, about 0.3 grams of licorice root daily can safely be taken by most adults.
 - Pau D'Arco or Lapacho (*Tabebuia impestiginosa*, *T. avellanadae*) (also known as Pau d'Arco and Taheebo): Pau D'arco contains many components that don't dissolve in water, so making an herbal tea is difficult. As a capsulized powdered bark, the typical dose is 300-500 mg 3 times daily. The inner bark of the lapacho tree is believed to be the most effective part of the plant.
 - Yellow dock (*Rumex crispus*): Typical doses of yellow dock root are 2-4 grams of the dried root, 2-4 mL of the liquid extract, or 1-2 mL of the tincture.
 - Sarsaparilla root (*Sarsaparillae radix*--sarsaparilla root derived from *Smilax* species): Dried root, 2-4 grams 2-3 times daily as a decoction; liquid extract (1:1, 50% ethanol), 2-4 mL 2-3 times daily.
 - Stillingia root (*Stillingia sylvatica*): Tincture (Fresh root, 1:2, Recent Dry root, 1:5, 50% alcohol) 10-30 drops, preferably in small frequent doses.
 - Burdock root (*Arctium lappa*): A typical dosage of burdock is 1-2 grams of powdered dry root 3 times a day.
 - Barberry (*Berberis vulgaris*): Powdered bark, 1/4 tsp several times daily. Fluid extract (1:1, 1:5), 20-40 drops daily. Solid extract, 5-10 grains.
 - Oregon grape root (*Mahonia aquifolium*) (also known as Mountain grape): Available in homeopathic formulations.
 - Cascara Sagrada bark (*Rhamnus purshiana*): Cut bark, powder or dry extracts for teas, decoction, cold maceration, or elixir. One 450-mg capsule daily or 2 grams of finely cut drug strained in hot water as a tea.
Buckthorn bark (*Rhamnus frangula*): Cut bark, powder or dried extracts for teas, decoction, cold maceration, or elixir. The daily dosage is 2-5 grams corresponding to 20-30 mg hydroxyanthracene derivatives, calculated as glycofrangulin A. A tea may be made of 4 grams of cut drug strained in hot water.
 - Echinacea (*Echinacea augustifolia*): The typical dosage of echinacea powdered extract is 300 mg 3 times a day. Alcohol tincture (1:5) is usually taken at a dosage of 3-4 mL 3 times daily, echinacea juice at a dosage of 2-3 mL 3 times daily, and whole dried root at 1-2 grams 3 times daily. Long-term use of echinacea is not recommended.
 - Kelp: There is no appropriate therapeutic dosage of kelp because it is not yet known whether kelp is truly therapeutic for any conditions. However, because of its high iodine content, it is important not to overdo your use of kelp. The iodine content in 17 different kelp supplements studied by one group of researchers varied from 45 to 57,000 mcg a tablet or capsule (Food Addit. Contam. 1988; 5: 103-109). The recommended daily intake for iodine is 150 mcg a day for people over the age 4, and taking a great deal more than this can cause thyroid problems.
 - Algin: Algin is any hydrophilic, colloidal substance found in or obtained from various kelps. Algin prevents living tissue from absorbing radioactive materials and encourages the action of dietary fiber, by supplying nutrients and normalizing bowel functions. Dosage not available.
 - Cayenne (*Capsicum frutescens*, *Capsicum annum*): Two 500-mg capsules daily may be taken.
3. Silibinin, 500 mg along with 1800 mg of phosphatidylcholine is particularly valuable as a hepatoprotective.
 4. It is extremely important to reinoculate the gut after antibiotic therapy. Select a probiotic touted to survive through antibiotic therapy and that contains *Lactobacillus acidophilus*, *Lactobacillus rhamnosus*, *Bifidobacterium longum*, and *Bifidobacterium breve*. *L. acidophilus* has a wide variance of live-culture activity, ranging from 20 million/cap to 4 billion/cap to 10 billion/gram. During the course of antibiotic therapy, *L. acidophilus* should be taken about 2 hours after the medication. The antibiotic will destroy the beneficial cultures if taken together; only some of the activity will be obliterated if taken separately from the antibiotic. After the course of antibiotic therapy is completed, probiotic therapy should be doubled or tripled for 2 weeks,

depending upon the quantity of the cultures present in the formulation.

5. Chelation therapy may be valuable to the Gulf War veteran. In chelation, heavy metals and contaminants are pulled from the system by intravenous administration of ethylenediaminetetraacetic acid (EDTA). It is best administered by a physician following the Chelation Protocol, subscribed to by the American College of Advancement in Medicine.
6. Selecting foodstuffs with high fiber content and supplementing with additional fiber, such as psyllium, acacia, apple pectin, and oat and wheat bran, assist in ridding poisons from the body. Fiber complexes, containing a variety of soluble and insoluble materials, can be added (1 heaping tsp) to a full glass of liquid and used 1-3 times a day. The smaller dose should be used until the system adjusts to the fiber. Should gas or bloating occur, reduce the dose size until tolerance is achieved.
7. "If you cannot eat it, don't smell it." Chronic exposure to noxious materials may overwhelm the body's natural antioxidant system, and a generation of endogenous toxins may allow cellular damage to occur. For many individuals, the process of detoxification is maximally amplified just cleaning up from everyday pollutants. For the Gulf War veteran, whose detoxification mechanism has been inordinately stressed, it reflects good judgment to avoid exposure to pollutants and chemicals that further frazzle this essential process. Avoid yard and garden sprays, household cleansers, emissions from gas and diesel engines, industrial pollutants appearing in water and the atmosphere, freshly dry-cleaned garments (air before wearing), paint, varnishes, stains, creosote and wood emissions from a fireplace, dust, insulation, insecticides, and foods exposed to sprays of uncertain safety. The list is endless in our society; prudent persons work toward improving their health status by continuously monitoring their exposure to hazardous substances.
8. Antibiotic therapy has proven to be of advantage in reducing the population of mycoplasmas. Administering antibiotic therapy requires prescriptions and monitoring by a qualified medical professional. A regime representing natural medicine should also be administered. Consider vitamin C (5-15 grams daily, in divided doses), vitamin E (400-1000 IU daily), CoQ10 (100-300 mg daily), bioflavonoids (200 mg 3 times a day), choline (1000 mg daily, in divided doses), inositol (750 mg daily), vitamin B5 (500-1500 mg a day), PABA (500-1000 mg daily), vitamin B12 (a 1000 mcg sublingual daily dose), and fish oil (2-3 grams daily), along with minerals such as zinc (50 mg daily), calcium (1000 mg a day), and selenium (up to 300 mcg a day). Minerals should be taken apart from antibiotics because minerals can affect antibiotic absorption. Garlic (*Allium sativum*) is a potent detoxifier. Use 2 300-mg capsules 3 times a day with meals. Use L-cysteine, L-tyrosine, L-glutamine, and L-carnitine (500 mg each, daily) on an empty stomach.
9. Yellow sweet clover, *Melilotus officinalis*, has analgesic, anti-inflammatory, digestive, diuretic, hepatoprotective, immunostimulant, myorelaxant, proteolytic, sedative, spasmolytic, and mycoplasmotic activity (see the section entitled A Single Herb that Appears Helpful in Gulf War Syndrome Complaints for the names of suppliers and dosing instructions).
10. A hyperbaric oxygen chamber kills both anaerobic and aerobic bacteria while improving immune function and displacing noxious gases. HBO is well seeded as a primary therapy in the treatment of medical disorders such as carbon monoxide poisoning and gas gangrene. HBO therapy is increasingly being used as an adjunctive process in the management of a variety of refractory disorders such as GWS.
11. Dioxychlor may assist in the control of sensitivities observed in GWS and also in the ridding of mycoplasmas. By increasing oxygenation, Dioxychlor may help preserve mitochondrial integrity. An oral dose of 5-20 drops dissolved in 2 oz of water, 1-3 times a day, may be appropriate. Should symptoms intensify, the dosage should be reduced until the body "catches up" with the die-off. Dioxychlor can be administered intravenously with the assistance of a qualified physician.
12. Administering an aggressive complex of antioxidants increases protection against oxidative stress. Consider a combination of traditional antioxidants such as vitamin C, vitamin E, vitamin A, selenium, garlic, glutathione, green tea, grape seed extract, zinc, N-acetyl-cysteine, and lipoic acid. An approximate dosage is 3 capsules daily, depending upon the strength of the antioxidants complexed.
13. Creatine may be of benefit if impaired ATP production is suspected. Use 5 grams of creatine per day for one month. Thereafter, use 1 gram of creatine following exercise. People with impaired kidney function should discuss creatine use with their doctor.
14. Working with a physician trained in autonomic balancing appears vital to full resolution of GWS.
15. Exercise should be approached cautiously, for activity will further encourage parasympathetic nervous system expression, which may already be abrasively dominant. Perspiration will, however, promote toxin excretion. A sauna may provide the better means of encouraging expulsion of contaminants through pores. Even in this environment, caution should be taken. Replace fluids, as internal stores are lost.

FOR MORE INFORMATION

Call the VA Gulf War Veterans Information Helpline at (800) PGW-VETS. The Special Assistant for Gulf War Illnesses can be reached at (800)497-6261.

PRODUCT AVAILABILITY

Life Extension Mix, HepatoPro (contains phosphatidylcholine), dandelion, pao d'arco, sarsaparilla, cascara sagrada, echinacea, kelp, cayenne, silymarin, Silibinin Plus (silibinin is the most active extract of silymarin), Life Flora (probiotic), Fiber Food, Pure Gar w/EDTA, green tea extract, grape-seed extract, N-acetyl-cysteine (NAC), alpha-lipoic acid, creatine, vitamin C, vitamin E, liquid emulsified vitamin A, vitamin B5, CoQ10, choline bitartrate powder, inositol, PABA, methylcobalamin, Super GLA/DHA, flaxseed oil, Udo's Choice Oil, calcium citrate, zinc, selenium, glutathione, L-cysteine, L-tyrosine, L-glutamine, and L-carnitine are available by telephoning (800) 544-4440, or order online.

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