

AIDS

and the

Immune System

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AIDS is a disease of the immune system. It begins there, and it should be treated by therapies which also begin there--treatments and therapies which strengthen and restore the immune system.

The advent of the **Acquired Immune Deficiency Syndrome, AIDS**, in the early 1980's, shattered the widely accepted belief that infectious disease was a conquered foe. The *retroviruses, viruses which can change their construction to survive destruction*, (which include the AIDS virus) are known to cause cancer in many animal species.

One well-studied animal retrovirus is the feline leukemia virus (FeLV), which causes cancer of the white blood cells (leukemia) or immune suppression in the cat. The first reported AIDS cases in the United States were homosexuals and IV drug users. However, heterosexual transmission of AIDS was first noted in Africa and Latin American countries, particularly the Caribbean. In addition to sexual contact and exposure to infected blood (by transfusion or IV drug use), a

third method of AIDS transmission is from mother to child. In fact, members of the fastest-growing group of AIDS patients are not adults but children. Most of these children acquired AIDS from their mothers in the perinatal period (before, during, or soon after birth).

The AIDS virus attacks a number of immune-system cells and other body tissues such as: (1) helper T-cells; (2) white blood cells of the monocyte/macrophage system; (3) B-cells; (4) glial cells of the brain; and, (5) chromaffin cells of the gastrointestinal tract—duodenum, colon, and rectum. This attack on the cells of the gastrointestinal tract may cause some of the weight loss and emaciation associated with AIDS infection—known in Africa as Slim Disease.

Seen in all AIDS victims, the decrease in numbers of helper T-cells is a primary manifestation of the disease. The AIDS virus kills helper T-cells by means of viral replication inside the infected cell. HIV replication and cell death increases when the infected helper T-cells become activated (by taking part in an immune response to HIV or other viral-infected cells). "Thus the very process that should defeat HIV - an immune response - has the diabolical effect of increasing the proliferation of the virus."¹ This decrease in the helper T-cell population results in certain bacterial infections (tuberculosis), as well as severe viral, fungal, and parasitic diseases.

Unlike the helper T-cell, the HIV-infected

white blood cells (monocytes) serves as a reservoir for persistent HIV infection. In persistent HIV infection, new viruses are produced without killing the white blood cells (monocytes). These infected white blood cells also serve as a vehicle by which the AIDS virus crosses the blood-brain barrier to infect the brain and central nervous system. While the white blood cells (macrophages) of AIDS victims exhibit normal reproduction, their antigen-presenting function and interaction with helper T-cells are impaired.

Besides an increase in infectious diseases, various cancers and neurological complications are associated with AIDS infection. In AIDS infection, B-cell over-activity may give rise to lymphomas early in the course of the disease. Kaposi's sarcoma, affecting the skin and linings of internal organs, also arises early in AIDS. Early neurological complications in AIDS can include subtle alterations in memory and judgment. Later changes include a syndrome in which individuals can neither communicate nor walk well.

The Walter Reed classification system for AIDS has helped in understanding the progression of the disease. With careful patient monitoring and staging of AIDS, it was observed that after three years:

10 percent of those in stage 2,
29 percent of those in stage 3,
71 percent of those in stage 4, and
100 percent of those in stage 5

progressed to stage 6 or died. "These findings underscore the grim reality that . . . most (and perhaps all) people who are infected with HIV will eventually develop end-stage disease and will die prematurely."²

Why does the disease progress so slowly? One theory is that the body's active immune system keeps AIDS in check. This theory is supported by the observation that soon after HIV invasion, the body mounts a vigorous immune attack involving both the humoral and cellular components of the immune system. It is also thought that the immune system limits HIV multiplication for a long time, but that the virus slowly gains ground. Eventually the decrease in helper T-cells is so great that the immune system can no longer function effectively enough to hold the AIDS virus in check. With time, there is a gradual rise in HIV numbers in the blood. Through

each successive stage of AIDS, an increasing quantity of the AIDS virus is isolated from the blood. Therefore, the longer individuals are infected with HIV, the greater the number of viruses produced and the more infectious that person becomes.

In general, the process of HIV infection may be separated into three basic stages: (1) the early or acute phase, lasting weeks; (2) the middle or chronic phase, lasting years; and (3) the final or crisis phase, lasting months to years, which is called the AIDS-related complex or AIDS. Almost all patients across the entire clinical spectrum of AIDS have circulating HIV present in their blood that can be isolated by current methods of virus cultivation.³

It is only rational to suggest that since AIDS is an immune deficiency (secondary to HIV infection), the potent, natural stimulators of the immune system could augment the body's immune response to prevent both the development and the progression of the disease. For example, some of the longest AIDS survivors credit exercise--a stimulator of immune function--as a factor in prolonging their survival.⁴

Factors Weakening the Immune System

Today, there are more assaults on the body's immune system than ever before. Some of these assailants come in the form of: increased pollution and/or environmental toxins, drugs, X-radiation, malnutrition, and increased stress. All weaken the immune system.

Pollution

Over the past three decades, there has been a progressive increase in the incidence of cancer, asthma, recurrent ear infections in children, and

food/chemical sensitivities. There is concern that increasing environmental pollution is weakening the immune system which will result in increased susceptibility to disease.

Segments of the "healthy" population most vulnerable to the effects of pollutants are the young and the elderly. Heavy metals such as lead, cadmium, mercury, copper, zinc, and nickel are known pollutants. Several of these metals adversely affect immune function. The current lead content of human bones has been found to be 1,400 times greater than the lead levels in bones from an ancient civilization. In children, low dose lead exposure has significant long-term effects on many central nervous system functions such as lower IQ scores and poorer hand-eye coordination.⁵

Most Americans have daily exposure to chemicals that are suspected to be hazardous to their health. Of the 48,000 or more chemicals registered with the Environmental Protection Agency (EPA), almost no health research has been done on 38,000 of them; and only 500 have been studied for their cancer-causing potential, effect on reproduction, or ability to cause changes in genetic material. Virtually nothing is known about how combined exposure to multiple pollutants affects the health. Nor do scientists understand the synergistic action of chemical pollutants--the ways they combine or break down to form different, possibly more potent, agents within the body. The National Academy of Sciences states that food contaminated with pesticides (insecticides and herbicides) could cause an estimated 20,000 cases of cancer per year.⁶

Stress

For some time it has been known that stressful conditions suppress the immune responses in both human beings and experimental animals. Stress, whether physical or psychological, stimulates the body's "fight-or-flight" response. The brain's emotional centers send a message to the hypothalamus, which signals the pituitary gland. Directives are sent from the pituitary to other parts of the body--prepare for an attack! The heart rate speeds up; the fats, cholesterol, and sugar in the blood stream increase; and the stomach secretes more acid. Unfortunately, as adrenal activity increases, thymus activity decreases. In addition, the adrenal steroid hormones suppress immune activity even further.

Stress is also associated with changes in the thyroid hormones, growth hormones, and sex steroids--all of which affect immune function. Stress causes more rapid shrinkage of the thymus gland (and decreased T-cell activity) than by aging alone.⁷ The body's vitamins and trace metals (such as A, B complex, C, and zinc) are decreased by stress which results in deficiencies that can impair immune function.

Some of the physical stressors include: cold or body chilling, exercising to exhaustion, pain, and very loud noise. Capable of causing even greater damage to the immune system, psychological stressors--loss of a job or serious illness in oneself or a family member--are a common cause of depression. Thought to be a generalized reaction to stress, depression is associated with increased risk of infectious diseases, cancer, and autoimmune disorders. One of the most stressful of life's events, the death of a spouse, has been associated with immune system suppression and increased mortality in the grieving survivor.⁸

Solomon had inspired insight into the effects of depression on immune function as well as the origin of the immune cells when he wrote, "A merry heart doeth good like a medicine: but a broken spirit drieth the bones."⁹ "Pleasant words are--health to the bones."¹⁰

Malnutrition

Under-nutrition. Protein-energy deficiency is the most frequent cause of impaired immunity on a worldwide scale. However even small deficiencies of some essential nutrients can result in poor immune system performance.

Over-nutrition. Obesity and adult-onset diabetes mellitus are examples of chronic over-nutrition that impair the immune response. Obesity and/or a high-fat, low-fiber diet increases the risk of developing cancer in the breast, colon, prostate, pancreas, uterus, and ovaries. Animal studies have shown that the amount of calories in the diet may be more important than the amount of dietary fat as a risk for cancer development. Restricting food intake by as little as ten percent had significant anti-cancer benefits.¹¹

Drugs/Radiation/Surgery

Drugs, radiation, laser treatments,¹² and surgical operations are known to suppress immune functions. In addition, X-radiation and anticancer drugs have serious long-term compli-

cations.

Drugs such as aspirin, antihistamines, nasal decongestants, adrenal hormone preparations (cortisol creams), and female hormone preparations (progesterone and estrogen), all suppress or impair the immune response.¹³ Antihistamines and aspirin inhibit histamine release by the basophils and mastcells. Though uncomfortable for the patient, histamine's activities such as dilating most small blood vessels and stimulating body secretions (bronchial mucous, saliva, and tears) are necessary defense functions. Besides affecting blood vessel and smooth muscle, histamine is a significant regulator of the T-cells and macrophages. Unfortunately, antihistamines interfere with the histamine's regulatory functions, dry out the mucous membranes, and impair the mucosal secretory IgA defense system.

In spite of the most sterile conditions, surgical operations carry a 5-20 percent infection rate--thought to be the result of a temporary impairment of the immune system. If there are no complications, the immune system returns to normal functioning approximately seven days after surgery. In one study, the decreased postoperative blood lymphocyte numbers, especially helper T-cells, were less pronounced in surgical patients treated with thymostimulin--a thymic hormone.¹⁴

Strengthening the Immune System

A new approach to the treatment of an immune disorder involving the kidneys has been advocated. Instead of using immunosuppressive agents (steroids and cytotoxic drugs--the usual treatment for some immune diseases), stimulation of the immune system has been recommended.¹⁵ It is encouraging to see more rational treatment being advocated for immunological diseases.

About a hundred years ago a few health educators recognized and advocated eight factors in health maintenance which are the most effective stimulators of the immune system available. These eight factors--pure air, sunlight, abstemiousness, rest, exercise, proper diet, the use of water, trust in divine power--are the true remedies.¹⁶

Editor's note: These natural remedies have been used with profound effect by several health educators. There are at least seven cases

I know of where AIDS have been successfully treated and fully reversed. All seven have been medically tested and fully documented.

Factors Strengthening the Immune System

AIDS is a disease that terrifies many, but proper care of the immune system can safeguard against contracting it. The best way to strengthen and/or restore the immune system is--not the use of medication (either drugs or herbs), therapies, or counseling, though some of these have value, sometimes. The best protection against AIDS is simply to live a balanced natural lifestyle.

In this second part we will focus on eight lifestyle factors which strengthen the immune system. When all eight are employed together in a balanced manner, there is no need to fear any of the diseases that threaten us. A healthy body can meet and conquer all of them.

Pure Air

In association with sunshine and exercise, pure air is essential for the top-functioning of every cell in the body--including the immune system. So vital is air that it is equated with life itself. "And the LORD God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul."¹⁷

Negatively charged air, produced by sunlight passing through the atmosphere, inhibits cancer growth, stimulates adrenal hormones that protect the body against stress, and exerts a

beneficial effect on patients with allergic disease such as asthma and hay fever.²

In the United States, an estimated three billion pounds of poisons are released into the air each year. These emissions include an estimated 320 toxicants, sixty being known carcinogens. Asthmatics are particularly sensitive to sulfur dioxide, a product of coal burning and primary ingredient of acid rain.

Prolonged exposure to extremely low levels of certain chemicals can cause irreversible health problems. For example, chronic exposure to tiny amounts of ozone, a component of smog, can cause serious lung damage. An estimated 2,000 Americans die each year from cancer attributed to polluted air.³ The effects of these chemical assaults are far-reaching. Air in the Arctic Circle has disturbing amounts of chemicals such as DDT and PCBs.⁴ If air over unpopulated areas is increasingly contaminated with toxic substances, how much more is city air becoming a significant contributor to poor health and disease.

For each of the laws governing physical health there is a corresponding law governing the spiritual health. An intimate relationship exists between the health of the body and the health of the soul. The Apostle John declares, "Beloved, I wish above all things that thou mayest prosper and be in health, even as thy soul prospereth."⁵ "Fresh air will prove far more beneficial to sick persons than medicine, and is far more essential to them than their food."⁶ "Exercise in the open air will bring about the restoration of the body, mind and soul" for "pure air has in it health and life. . . it has an invigorating effect on the whole system."⁷

Just as pure air is essential for the life of the body, so prayer has been called the breath of the soul. "It is the secret of spiritual power. No other means of grace can be substituted, and the health of the soul be preserved. Prayer . . . strengthens the sinew and muscle of the religious experience."⁸

WATER

Next to pure air, the body's second most critical ingredient is water. Acting as a detoxifying agent, water literally flushes toxins out of the body. Ironically, water can contain pollutants such as pesticides, industrial wastes, fertilizers (nitrates, nitrites), and disease-causing microbes. One environmental epidemiologic study in Ne-

braska has linked ground water contamination with nitrates to increased rates of cancer (non-Hodgkin's lymphoma).⁹

Very soft water may leach lead out of the pipes and add it to the body's lead level. Chlorine reacts with organic materials present in even highly filtered water to produce halogenated organic compounds that are thought to be carcinogenic.¹⁰

Water is necessary for the immune system's inflammatory response—edema is caused by fluid moving from the blood vessels into the tissues. Healthy mucous membranes also need water for optimal immune functioning. Dehydration was thought to be a significant factor in the low IgA levels found in the saliva of athletes.¹¹

During a lack of water (dehydration), blood flow slows down, and lymph fluid thickens; thus the immune system's troop-transportation highway is impaired, and the body fights infection less efficiently. Blood clots and vessel-wall damage can result from dehydration.

The interaction between cancer cells and blood platelets is an important step in promoting the spread (metastasis) of the cancer by helping the cancer cell to attach to the blood vessel wall and to migrate into the tissues. Blood-thinning drugs (anti-coagulants) inhibit the spread of cancer.¹² Acting as a natural "blood thinner," optimal water intake may help to prevent not only clot formation and infection but also the spread of cancer.

The analogy between physical and spiritual laws continue. Water "drunk freely. . . helps to supply the necessities of the system, and assists nature to resist disease."¹³ In order to resist spiritual disease, Jesus said: "whosoever drinketh of the water that I shall give him shall never thirst; but the water that I shall give him shall be in him a well of water springing up into everlasting life."¹⁴

Sunlight

Sunlight enhances the immune functions in the following ways: (1) increasing lymphocyte numbers and stimulating B- and T-cell functions; (2) stimulating the phagocytic cells; (3) lowering blood cholesterol; (4) increasing tolerance to stress; and (5) inhibiting skin and other body cancers.¹⁵

The ultraviolet rays, sunlight's germ-killing portion, not only kills microbes invading the

skin but fights internal infections as well. Sunlight promotes elimination of pollutants such as toxic metals from the body and also helps the body to withstand the physical stress imposed by exposure to pollutants.

Light entering the eye affects the pineal gland located in the brain. Melatonin, a hormone produced by the pineal gland, influences: (1) hormone production of the pituitary, adrenals, thyroid, and sex organs; (2) sleep induction; (3) mood/behavior; and, (4) the body's defense against cancer. Produced during the dark hours, melatonin secretion is inhibited by bright light—not ordinary indoor light.

The light-dark cycle is a potent synchronizer of the body's "biologic clock," or circadian rhythm. Disturbances in circadian rhythm disrupt melatonin production. Low levels of melatonin are seen with stress and psychological disorders, such as depression and anxiety attacks—all of which are associated with an increase in infections, cancer, and autoimmune disease.¹⁶ Studies have shown that bright, morning-light exposure improves depression. The antidepressant effect of bright, morning light is accompanied by a shift to an earlier onset of nighttime melatonin production.¹⁷

Too much sunlight is known to promote skin cancer through sunburn and a high fat diet. Skin cancers (melanoma and squamous cell cancer) are increasing in epidemic proportions—a rate of about three percent per year. By age twenty, most Americans have received eighty percent of their lifetime exposure to skin-damaging ultraviolet rays. Chronic inflammation from sustained sun exposure/sunburn may contribute to skin cancer development through substances produced by neutrophils. For example, hydroxyl radicals, the most damaging products of neutrophil oxidative metabolism, may react directly with the cell's genetic material or activate cancer-causing chemicals to induce malignant tumor development at sites of chronic inflammation.¹⁸ To prevent skin cancer, one should avoid sunburn, and consume a diet low in cholesterol/polyunsaturated fats and high in antioxidants (vitamins A, E, C and selenium).

Along with fresh air, sunshine has "life-giving power."¹⁹ How much better it is for the sick to be out in the open air, to lie in the sun or in the shade of the trees. In keeping with the analogy between physical and spiritual health, there is

one source of sunlight which carries no risk of over-exposure—the Sun of Righteousness with healing in His beams. "As we . . . open the heart to the sunlight of the Saviour's presence, we shall have health and His blessing."²⁰

Exercise

Exercise is a major contributor to both physical and mental health. Stress, one of the archenemies of the immune system, is neutralized by exercise. The bloodstream's efficiency in moving immune forces to the site of infection/disease is promoted by exercise. Exercise enhances immune function in the following ways: (1) by stimulating the production of the opioid peptides (endorphins and enkephalins); (2) by increasing interleukin-1 and interferon; (3) by causing a transitory increase in blood granulocytes and lymphocytes; and (4) by creating a temporary rise in body temperature through active skeletal muscle metabolism and by interleukin-1 production. In moderate amounts, exercise protected against cancer development in mice.²¹

Forced exercise during cold temperatures increased severity of a viral illness in mice. This gives sobering thought to anyone who attempts vigorous exercise during a systemic illness.²² Other studies would suggest that the safest exercise is varied and moderate, and that over strenuous activity does not counteract the effects of an imprudent (high-fat/low fiber) diet.²³ "Brisk, yet not violent exercise in the open air . . . will promote the circulation."²⁴

There is no exercise that benefits the entire body as much as walking. Walking benefits the digestive system, and it is "the surest safeguard against colds, coughs, congestions of the brain and lungs, inflammation of the liver, the kidneys, and the lungs and a hundred other diseases."²⁵

Jesus is our example in both physical and spiritual health. We are to walk as He walked.²⁶ In walking for our spiritual health, we are directed to walk in the law of the Lord²⁷ and after His commandments.²⁸ Enhanced spiritual well-being occurs with daily walking in the light,²⁹ walking by faith,³⁰ walking in the spirit,³¹ walking in good works,³² and walking in love.³³

Speaking of spiritual exercise, Paul describes a race we are to run with all the vigor that we possess—to strive for the "incorruptible" crown of eternal life. "Know ye not that they which run in

a race run all, but one receiveth the prize? So run, that you may obtain."³⁴

REST

One of the most underestimated immune stimulators is proper rest. The body requires both phases of sleep, rapid eye movement (REM) sleep and non-rapid eye movement (NREM) sleep. In REM sleep, the brain's housekeeping activities assume primary importance. REM sleep deprivation causes irritability and significant psychological changes. Both emotional states have detrimental effects on immune function. Non-REM sleep is essential for the immune system's peak performance in sweeping out foreign invaders. Individuals deprived of NREM sleep become sluggish and depressed.

A good night's sleep is orchestrated by interactions between the hypothalamus, the pituitary, and the pineal gland. The cytokine, interleukin-1, is also a promoter of sleep. Growth hormone, secreted by the pituitary, aids in repair or replacement of the bone and other body cells, including those of the immune system. It is produced primarily during the early hours of deep, pre-midnight sleep when the NREM sleep period is dominant. As previously mentioned, melatonin is released from the pineal gland during the dark hours. Disturbances of this rhythm are associated with sleeping problems, anxiety attacks, and depression—all of which suppress the immune system's functioning.³⁵

Throughout industrialized countries, increasing numbers of people work on rotating shifts. Disruptions in natural body rhythms result in disturbed sleep and eating patterns which adversely affect immune functions. It is not surprising that sustained shift work correlates with serious illness.

Continuing the analogy between the physical and spiritual laws, the concept of rest needs to be broadened from simply physical rest or sleep to include spiritual rest-peace-freedom from the unsubdued self, guilt, and fear. Jesus says, "Come unto me, all ye that labour and are heavy laden, and I will give you rest. Take my yoke upon you, and learn of me . . . and ye shall find rest unto your souls."³⁶

Those who are mentally overtired are admonished to rest, enjoy freedom from care, and come in close contact with things of nature to regain their health. "Roaming through the fields

and the woods, picking the flowers, listening to the songs of the birds, will do far more than any other agency toward their recovery."³⁷

Nutrition

It is well recognized that a two-way interaction exists between nutritional status and the immune system. The body's nutritional state affects its immune function; conversely, infectious disease has a detrimental effect on the body's nutritional state.³⁸

VITAMINS

Chemical compounds, essential in small amounts for normal body function, are called vitamins. They are also essential for the efficient functioning of the immune system.

Vitamin A has been known to have an "anti-infective" effect for over 50 years. Beta-carotene (provitamin A) traps free radicals and is protective against cancer—particularly lung, colon, stomach, and cervix.

Adding vitamin E to the diet enhances immune system function and, like vitamin A, protects against cancer by blocking free radicals—toxic agents produced by the body's normal metabolism and breakdown of pollutants. Free radicals change the cells' genetic material, which predisposes to cancer.

Vitamin C deficiency increases susceptibility to infectious diseases. Like vitamins A and E, dietary Vitamin C has a protective role against cancer.³⁹

Vitamin D is best known for its role in the body's absorption and utilization of calcium. Children with rickets (vitamin D deficiency) have impaired phagocytic activity. The hormonal form of vitamin D is a regulator of the immune system. For example, vitamin D induces monocyte development, inhibits lymphocyte proliferation and production of interleukin-2, and suppresses antibody production.⁴⁰ Vitamin D's immunoregulatory functions can be separated structurally from its effect on calcium metabolism.⁴¹

The B vitamins, particularly vitamin B₆ (pyridoxine), are needed for good immune response. Folate and vitamin B₁₂ are also necessary for immune competence.

TRACE METALS

Metals that are essential in minute amounts for proper body functioning are known as trace

elements or metals. Slight or marginal deficiencies of trace metals occur more frequently in developed countries, such as the United States, than previously thought. Some trace metals can be carcinogenic while others can prevent cancer development and even destroy cancer cells.⁴²

Zinc is necessary for normal skin and mucous membrane development, the sense of taste, the regulation of behavior, and proper endocrine and immune system functions. There is no body storage for zinc—it must be obtained daily from the diet. Disease or conditions in which there are low zinc levels or increased zinc requirements include: gastrointestinal and kidney disorders, diabetes mellitus, cancer, sickle cell anemia, Downs syndrome, obesity, alcoholism, trauma, burns, and infections.

People at risk for developing zinc deficiency from improper diet are pregnant teenagers, institutionalized/hospitalized patients, and the frail elderly. Some immune impairments caused by zinc deficiency include: (1) thymus atrophy or shrinkage; (2) depression of the NK cells' ability to fight cancer; (3) inhibition of activated macrophages, neutrophils, platelets, and mast cells; (4) reduction of T-cell numbers and functions; and (5) impairment of B-cell functions. Even the long-lived memory cells can be damaged—a fact that is substantiated by the observation that malnourished patients respond poorly to antigens against which they have already been vaccinated.

In mice, slight or marginal zinc deficiency during pregnancy resulted in persistent, decreased antibody response in the offspring even when adequate zinc is provided at birth.⁴³ The United States has the highest proportion of low birth weight infants of any Western nation. Some of these infants have defective immune function which could be caused by zinc or other nutritional deficiencies before birth.

Copper excess and deficiency adversely affects phagocytic cell numbers and activity. Care needs to be taken that the correct proportions of copper and zinc levels are maintained since an excess of one is associated with a deficiency of the other.

Magnesium is essential for several immune functions such as antibody synthesis,

adherence of immune cells to their target cells, antigen-induced adherence of helper T-cells to B-cells, and protection against acute allergic reactions.⁴⁴ Acute attacks of asthma are accompanied by a drop in serum and red blood cell magnesium levels. Intravenous magnesium improves lung function in asthmatics both during and between asthma attacks. As with zinc, magnesium intake by elderly people is often below recommended daily allowance levels. In rats, cancer (malignant lymphoma) is increased when magnesium is deficient.

Selenium, an essential trace element that can be toxic in high concentrations, is essential for proper immune functioning and has significant anti-cancer activity.

Iron is one of the most important factors that influence bacterial invasion of the body. Animals with high iron levels were found to develop infections more easily, as a result of bacterial infection, there is a decrease in serum iron. The gastrointestinal tract stops absorbing iron, and interleukin-1 stimulates the liver to increase production of the iron-binding proteins (transferrin, haptoglobin). These proteins absorb iron molecules and thus make iron unavailable of bacterial growth. As iron is also needed for red cell production, anemia is commonly the result of severe or chronic infections. Increased or high body iron stores have also been associated with an increased risk of cancer.⁴⁵

VITAMIN/MINERAL-DEPLETING AGENTS

In addition to stress, agents which deplete the body of essential vitamins and minerals necessary for proper immune function include: excess sugar, oxidized or rancid fats/oils, pollutants, alcohol, smoking, caffeine, and drugs (antibiotics, corticosteroids, aspirin, diuretics, anti-convulsants, lipid-lowering drugs, thyroid, estrogen, and oral contraceptives).

LIPIDS/FATS

It is recommended to decrease dietary intake of saturated fats and cholesterol in order to prevent heart disease. However, polyunsaturated fatty acids also have detrimental effects on the immune system and enhance cancer development. Current recommendations for the prevention of both cancer and heart disease include the

lowering of polyunsaturated fatty acid intake in addition to lowering saturated fats and cholesterol. Polyunsaturated fatty acids readily oxidize to form a variety of potential mutagens, cancer promoters, and carcinogens.

High fat diets have long been associated with increased cancer risk. Fat may participate in both the initiation and promotion of cancer. Breast cancer is more frequent in women on diets high in both saturated fats (whole milk and high-fat cheese) and in animal protein (meats).⁴⁶ A low fat, high protein vegetable diet not only prevents breast cancer, but increases the survival of women who already have breast cancer.⁴⁷

Dietary fat excess and deficiency both affect immune function. For example, diets either high in polyunsaturated fatty acids or deficient in essential fatty acids depress B-cell activities. Diets high in cholesterol decrease T-cell, neutrophil, and macrophage functions. In humans, high blood cholesterol levels are associated with increased infections.

While many lipids get poor marks for cancer prevention, the omega-3 fatty acids stand out as an exception. Omega-3 fatty acids enhance the immune response against cancer: (1) by retarding cancer cell growth; (2) by reducing macrophage production of certain prostaglandins and increasing macrophage secretion of arginase—an enzyme with cancer-killing potential; and (3) by diverting the arachidonic acid pathway into forming leukotrienes (agents in the inflammatory response) instead of prostaglandins.⁴⁸

GLUCOSE

High blood sugar levels can adversely affect granulocytes, antibody and cell-mediated immunity. In addition, the pancreatic hormone insulin is an important regulator of body and immune cell functions. In diabetes mellitus, immunological defects are superimposed upon defects in blood sugar metabolism. The following immunological defects are noted: (1) There are normal granulocyte numbers, but virtually all components of the phagocytic process are impaired; (2) Changes occur in the antibodies or immunoglobulins (excessive glycosylation) which is thought to impair their function; (3) The T-cells produce less interleukin-2; and (4) The numbers of T-cells decrease with disease duration.⁴⁹

AMINO ACIDS

The building blocks of protein molecules are the amino acids. Researchers have observed that even minor changes in amino acids composing a diet can affect the immune response without changing the diet's nutritional value.⁵⁰

FLAVONOID COMPOUNDS

Flavonoids occur in a variety of fruits and vegetables such as the outer leaves of lettuce, apple skin, citrus, potato, tomato, peas, stone fruits—apricot and cherry, and berry fruits: blackberry and currant.

Long known for their anti-inflammatory and anti-allergic properties, flavonoids have also been investigated for their anti-oxidant,⁵¹ anti-clotting,⁵² and anti-cancer⁵³ effects. Flavonoids exhibit significant anti-cancer activity by inhibiting the invasion of malignant tumor cells into the normal surrounding tissues. While flavonoids enhance lymphocyte proliferation and function, they suppress phagocytosis, mast cell activation, and the release of damaging oxidants by neutrophils.⁵⁴

GARLIC

The immune system is enhanced by the following effects of garlic: (1) decreasing the blood lipids; (2) alleviating allergic symptoms and protecting the body against damaging effects of pollution and radiation; (3) preventing malignancy and inhibiting cancer cell growth; (4) fighting infections; and (5) helping the body cope with the effects of stress.⁵⁵

SPIRITUAL NUTRITION

The spiritual diet is as important as physical nutrition. Jesus said: "I am the living bread which came down from heaven: if any man eat of this bread, he shall live forever: and the bread that I will give is my flesh, which I will give for the life of the world."⁵⁶ "As our physical life is sustained by food, so our spiritual life is sustained by the Word of God. . . . As we must eat for ourselves in order to receive nourishment, we must receive the Word for ourselves. . . . The Word of God is the bread of life. . . . It gives immortal vigor to the soul, perfecting the experience, and bringing joys that will abide forever."⁵⁷

Abstemiousness/Temperance

Alcohol, tobacco, and caffeine increase blood

lipid levels, are associated with increased cancer risk, and have other damaging effects on the immune system.

ALCOHOL

Immune system functions are impaired by alcohol-induced malnutrition, liver damage, and elevated lipids. In addition, alcohol directly injures all major components of the immune system: the phagocytic cells, the B- and T-cells, and the natural killer cells.

Because alcohol suppresses all major branches of the immune system, alcoholics should be considered immunosuppressed.⁵⁸ Alcoholics are at increased risk for tuberculosis, viral hepatitis, AIDS virus infection, and cancer.

The following statement gives cause for solemn thought: "Often intemperance begins in the home. By the use of rich unhealthful food the digestive organs are weakened, and a desire is created for food that is still more stimulating. . . . Wrong habits of eating and drinking destroy the health and prepare the way for drunkenness."⁵⁹

TOBACCO

Smoking alters T-cell activity and decreases both neutrophil and natural killer cell function. Nicotine affects the central nervous system, resulting in the interruption of proper rest and activating neurohumoral pathways. These adverse effects result in increased blood levels of catecholamines, vasopressin, growth hormone, ACTH, cortisol, prolactin, neurophysin T, and beta-endorphin, most of which influence immune function.⁶⁰

In association with other chemicals from inhaled smoke, nicotine impairs lung macrophage-function and paralyzes the cilia in the bronchial airways. This results in lung infections (bronchitis) and lung damage (emphysema). It is now known that the neutrophils play a significant role in the development of emphysema.⁶¹

Besides nicotine, vast numbers of pollutants in tobacco smoke including carcinogens and cocarcinogens, put smokers at increased risk for lung cancer and other malignancies. Tobacco specific nitrosamines (TSN), formed from nicotine in tobacco smoke and during the curing process, are potent cancer-causing agents. TSN concentrations are greater in chewing tobacco/snuff than cigarette smoke and are the chief cause of oral cancer in chewers. Blood coagulates

more easily in smokers than non-smokers. This adversely affects the travel of immune cells to sites of infection and may also promote the development and spread of cancer.

Immune impairment does not stop with the smoker. There are passive smokers—those who live or work with smokers, those who travel in smoke-filled vehicles, those who party and frequently associate with smokers, and, of course, the fetus of a smoking mother. Passive smokers are at increased risk: (1) for impaired pulmonary function; (2) for asthma and other allergic manifestations in those with allergies and/or sensitivities to tobacco smoke; (3) for respiratory tract infections and middle ear effusions—especially in young children; and (4) for lung cancer as well as other malignancies. It is estimated that in the United States between 2,500 and 8,400 of the approximately 12,200 lung cancer deaths per year in non-smokers are due to passive smoking.⁶²

"Tobacco is a slow, insidious, but most malignant poison Often it affects the nerves in a more powerful manner than does intoxicating drink. It is more subtle, and its effects are difficult to eradicate from the system."⁶³

CAFFEINE

Even more widely used than alcohol or nicotine, caffeine is found in coffee, tea, sodas, chocolate, and in a variety of foods and drugs. Caffeine is a diuretic which can cause dehydration and thus impair the mucosal immune function. As a central nervous system stimulant, caffeine interferes with immune functioning by disrupting quality sleep and increasing blood levels of epinephrine.

Caffeine decreases the blood flow to the brain and affects the mood by promoting anxiety, depression, and panic disorders.⁶⁴ Writing with inspired insight, Ellen G. White portrayed the effects of coffee and tea on the nervous system with a physiological accuracy ahead of her time. "The continued use of these nerve irritants . . . wear(s) away the life forces. Tired nerves need rest and quiet instead of stimulation and overwork. Nature needs time to recuperate her exhausted energies."⁶⁵ Caffeine can adversely affect pregnancy outcomes⁶⁶ and initiates cancer through damaging the cell's chromosomes or genetic material.

Beyond abstemiousness from alcohol, tobacco, and caffeine; temperance, in the form of

moderation, includes all areas of daily life. The intricate interactions between the various immune system components and their environment take place most efficiently within the framework of the physical and spiritual laws. For example, an excess or a deficiency of certain trace metals or other nutrients results in impaired immune function.

Temperance is vital to the spiritual well-being. Notably, temperance is listed as one of the fruits of the Spirit in Galatians 5:23. Paul declared: "Whether therefore ye eat or drink, or whatsoever ye do, do all to the glory of God."⁶⁷ It is not surprising that "intemperate eating is often a cause of sickness."⁶⁸ "If we could realize... that our eternal destiny depends upon strictly temperate habits, we would work to the point of strict temperance in eating and drinking."⁶⁹

Trust in Divine Power

People who feel helpless, hopeless, or unable to control stressful events experience greater immune disturbances than their counterparts who feel they have some control over a stressful situation. A significant decrease in NK cell activity, the body's major defense against cancer and viral infections, is found in young adults who are unable to adjust to major life change stressors.

As mentioned previously, chronic stress, mental depression, and conditions conducive to cancer development all share common signs which result in impaired immune function. In some animal studies, cancer growth was promoted when stressful stimulation was acute and inescapable. Cancer cell growth was inhibited when stressful stimulation was chronic or repetitive.⁷⁰ Although very mild and very intense stress suppresses the immune response, moderate stress enhances the immune response.⁷¹

While researchers ponder the significance of this zone or window in the immune response, it may be one of the Creator's most remarkable provisions for preserving immune health. It is known that prisoners of war and victims of religious or ethnic persecution have suffered from uncontrollable stress. However spiritual resources can protect one against even the most adverse stress.⁷² The Bible clearly states, "... all that will live godly in Christ Jesus shall suffer persecution."⁷³ However, Psalm 34:19 contains the promise, "Many are the afflictions of the righteous: but

the Lord delivereth him out of them all."

"Grief, anxiety, discontent, remorse, guilt, (and) distrust all tend to break down the life forces and to invite decay and death."⁷⁴ By contrast, "the love which Christ diffuses through the whole being is a vitalizing power. Every vital part... it touches with healing... it frees the soul from guilt and sorrow."⁷⁵

How does one escape the harmful effects of uncontrollable stress? Researchers do not know. However, "there is... no necessity to search for some mysterious science... We already have the answer—the science... of salvation, the science of restoration, the science of a living faith in a living Saviour."⁷⁶

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