

## HIV/AIDS

### Strengthening the Weakened Immune System

When human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) was first identified in 1981, it was thought to be a devastating disease—in essence, a death sentence. This outdated thinking has been replaced by an understanding of HIV/AIDS as a dangerous, but still treatable, disease. It is a communicable disease that can be spread in a number of ways, including transfusions of tainted blood, infected needles (usually from illegal intravenous drug use), and even from mother to fetus (Hirschel B 2003).

The most common method of transmission, however, remains through sexual (both heterosexual and homosexual) contact—about 90 percent of new patients worldwide contract HIV/AIDS through sexual contact (Craiel M et al 2003). Today, HIV/AIDS is a worldwide problem. Women and girls throughout developing countries are infected at rising rates. In the United States, 72 percent of new cases of HIV/AIDS reported in 2003 were in minorities (Dean HD et al 2005). Among these, about 30 percent were caused by intravenous drug use.

HIV is especially dangerous because, once infected, the person is a carrier (and thus a potential transmitter) of the virus for life. There is no cure for HIV, only a series of strategies meant to slow the replication of the virus and retain quality of life for as long as possible. AIDS itself is not the direct cause of death. Rather, the virus targets the immune system. When the immune system has been weakened sufficiently (so that it can no longer protect the body), the patient begins to get so-called opportunistic infections (infections that usually can occur only in people who have weakened immune systems). These might include bacterial and fungal infections that would otherwise be relatively harmless. In a patient with AIDS, however, repeated opportunistic infections weaken the already challenged immune system. Subsequently, an accelerated degeneration process begins that may be accompanied by extreme weight loss (wasting syndrome), gastrointestinal problems, and chronic illness.

Infection with HIV follows a fairly predictable course. After exposure to the virus, it takes between 2 weeks and 6 months for the virus to become detectable in the blood. To diagnose HIV/AIDS, physicians check the blood for the virus itself and for antibodies produced by the body to fight the virus (Kuritzkes DR 2003).

In the earliest stages of infection, it is unlikely a person with HIV will experience any alarming symptoms, making early detection of the virus difficult. HIV operates by entering immune system cells known as CD4+ T-cells (hereafter referred to simply as T-cells) and replicating within these host cells. During this first stage of infection, the viral load increases sharply, while there is a corresponding dip in the number of T-cells in the blood. However, after about 6 months, the immune system mounts an effective response: the viral load decreases, and the number of T-cells rises again. This marks the end of the acute phase of primary HIV infection (Bart PA et al 2003; Cohen OJ et al 2001; Fauci AS et al 2004; Hirschel B 2003; Masur H et al 1989).

At this point, the disease enters a period of clinical dormancy. There may be no symptoms, and the carrier may be entirely unaware that he or she is carrying HIV. The virus, however, is not gone. Researchers have discovered that it remains incorporated in the DNA of inactive T-cells within the lymph system (Bart PA et al 2003; Fauci AS et al 2004; Liang C et al 2003). During this dormant period, T-cell counts decline slowly but surely, falling by about 50 cells per microliter (mc) annually, depending on the person (Bart PA et al 2003; Masur H et al 1989). When the T-cell count falls below 200 cells/ $\mu$ L, the risk of opportunistic infections increases greatly. At this point, there is a sharp acceleration in the progress of the disease, with the viral load increasing rapidly and the T-cell count falling dramatically (Cohen OJ et al 2001; Fauci AS et al 1996).

For the majority of patients who have HIV, the dormancy period lasts about 10 years (Bart PA et al 2003). About 10 percent to 20 percent of patients progress to having AIDS within 5 years (they are called rapid progressors). It is estimated that another 5 percent to 10 percent of patients will not reach the AIDS phase for more than 15 years (slow progressors). Roughly 1 percent of people with HIV have been infected for more than 10 years and have not received therapy but show no signs of progressing to having AIDS. Such patients are referred to as nonprogressors (Bart PA et al 2003).

Modern HIV therapy is based on a sophisticated cocktail of drugs that has been shown to reduce the viral load and slow the progression from HIV to AIDS. While these drugs are effective at prolonging life, many have severe adverse effects, and they do not address some of the widespread biological damage caused by HIV.

Because of their disease, patients with HIV/AIDS have nutritional deficiencies, and are subject to much greater oxidative stress than healthy people. In 1985, the Life Extension Foundation was among the first organizations to propose that patients with HIV/AIDS would benefit from taking high doses of antioxidants. Since then, many scientific studies have examined a wide range of nutrients and supplements for use in HIV/AIDS.

## What You Have Learned So Far

- HIV infection can occur as a result of sexual activity, intravenous drug use, infusion with tainted blood, or passage of the virus from mother to fetus.
- HIV targets the immune system by replicating in T-helper cells, a kind of immune cell. The disease is tracked by measuring the number of viruses in the blood (viral load) with the T-helper cell count.
- Once a person is infected, the number of viruses rises rapidly before being brought under control by the immune system (the acute phase). After this, the disease enters a period of dormancy marked by few symptoms.
- During the dormant period, the viral load is slowly increasing and the number of T-helper cells is decreasing. After the number of T-helper cells falls below 200 cells/ $\mu\text{L}$ , the immune system can no longer protect the body and opportunistic infections begin to appear. This stage is known as AIDS.
- Conventional HIV/AIDS therapy is designed to reduce the viral load. Several dietary nutrients and supplements have been shown to support and strengthen the immune system in HIV/AIDS.

## DIAGNOSING AND MONITORING HIV/AIDS

The diagnosis of HIV begins with a test that detects natural antibodies produced against the virus. If the test result is positive, another more sensitive test is performed called a Western blot analysis. A negative result on a Western blot analysis demonstrates absence of antibodies, while a positive result confirms the diagnosis of HIV infection (Cohen OJ et al 2001; Fauci AS et al 2004; Kuritzkes DR 2003).

Once the HIV infection has been diagnosed, the progress of the disease is tracked with two blood markers: T-cells and viral load (Kuritzkes DR 2003).

The T-cell count is regarded as the hallmark of disease progression. In all clinical observations of HIV/AIDS, T-cell counts have proven to be a good predictor of the risk of developing illnesses that define AIDS (Masur H et al 1989).

Viral load can be measured in a number of ways, including direct measurement of the number of viruses in the blood (Piatak M Jr et al 1993). The viral load of HIV predicts the rate and severity of immunodeficiency and serves as a marker for monitoring therapy (Kuritzkes DR 2003; O'Brien WA et al 1996).

## TREATMENT: A DRUG COCKTAIL

HIV/AIDS therapy relies on powerful antiretroviral drugs to decrease the viral load. People may be recommended for antiretroviral therapy if:

- They have a history of opportunistic infections and severe symptoms of HIV infection regardless of T-cell counts.
- They have a T-cell count of less than 200 cells/ $\mu\text{L}$ , whether or not symptoms are present. Additionally, antiretroviral therapy may be offered to asymptomatic patients who have a T-cell count of from 201 to 350 cells/ $\mu\text{L}$ .

The first major drug for HIV treatment was zidovudine (or AZT; formerly called azidothymidine), which was approved in 1987 to treat patients with AIDS. Since then, researchers have improved upon zidovudine therapy by designing a three-drug regimen called highly active antiretroviral therapy, or HAART (Fauci AS et al 2004). HAART drugs include:

- **Nucleoside reverse transcriptase inhibitors (NRTIs)**—These drugs interfere with HIV's ability to be imported into the DNA of healthy immune cells. Examples: abacavir, emtricitabine, lamivudine, stavudine, tenofovir, zalcitabine, zidovudine.
- **Non-nucleoside reverse transcriptase inhibitors (NNRTIs)**—These drugs (like NRTIs) also bind to a specific part of HIV and inhibit its growth. Examples: delavirdine, efavirenz, nevirapine.
- **Protease inhibitors**—These drugs inhibit protease, an enzyme that is used to help assemble HIV after it has been incorporated into host DNA. Examples: amprenavir, atazanavir, fosamprenavir, indinavir, lopinavir, nelfinavir, ritonavir, saquinavir.

In 2004, the first member of a fourth class of drugs—called fusion inhibitors (Carpenter CC et al 1998)—was approved for treatment of patients with HIV. Only one new fusion inhibitor, enfuvirtide, has been approved for use in patients. Enfuvirtide interferes with the ability of viral particles to fuse with the host cell (Fauci AS et al 2004).

HAART drugs are used in various combinations; choosing the best HAART regimen is an art (Fauci AS et al 2004). There is a significant risk of drug resistance, at least partly due to HIV's ability to mutate into drug-resistant forms. In other words, a drug may

work extremely well until HIV, through multiple replications, adapts to the drug and becomes resistant to its effects. Moreover, once the virus develops a resistance to one drug, it will usually also resist other drugs. Because of this cross-resistance, initial treatment decisions have a long-term impact on future options for the patient. If an initial regimen fails because of drug resistance, it is very difficult to make an effective change (Fauci AS et al 2004).

Antiretroviral drugs are highly toxic and have a host of negative side effects, which affect mostly the liver, gastrointestinal tract, and skin. In many cases, a patient may not be able to tolerate one or more drugs. HAART drugs are also closely associated with increased insulin resistance and abnormal cholesterol and triglyceride levels, increasing the risk of cardiovascular complications (Hansen BR et al 2004). To counteract the rise in blood lipids and insulin resistance, it is recommended that patients on HAART closely monitor their blood lipids and blood glucose. If these measures are abnormal, patients may choose to counteract these conditions with a carefully design program of dietary nutrients (Fauci AS et al 2004; Hansen BR et al 2004).

## ANTIOXIDANTS: PROTECTING YOURSELF

Patients infected with HIV are frequently malnourished and deficient in antioxidants, especially glutathione (Foster HD 2004). This is especially worrisome because glutathione, an internally produced antioxidant, appears to interfere with HIV's entry into its target cells (Markovic I et al 2004). Glutathione deficiency in patients who have HIV/AIDS can exacerbate inflammatory bowel disease, which prevents absorption of vital nutrients and may hasten wasting syndrome (Sido B et al 1998).

As a result of glutathione deficiency, patients with HIV/AIDS have a buildup of free radicals. Numerous studies have shown that antioxidants can counter this buildup of dangerous free radicals (Foster HD 2004; McDermid JM et al 2002; Mollace V et al 2001; Patrick L 2000 Aug; Townsend DM et al 2003; Wu G et al 2004). Some of the antioxidants that have been clinically tested in patients with HIV/AIDS include:

- **Alpha-lipoic acid**—This powerful antioxidant plays a central role in defense against free radicals (Pande V et al 2003; Suzuki YJ et al 1992). Moreover, alpha-lipoic acid has the remarkable ability to recycle several other important antioxidants, including vitamins C and E, glutathione, coenzyme Q10 (CoQ10), as well as itself. Alpha-lipoic acid can boost the level of intracellular glutathione, and may directly inhibit HIV-1 replication (Baur A et al 1991).
- **Beta-carotene**—Beta-carotene has been shown to stimulate the immune systems of patients with HIV/AIDS (Coodley GO et al 1993). In people infected with HIV who were given 100,000 international units (IU) of vitamin A from beta-carotene daily for 4 weeks, white blood cell counts rose by 66 percent, but T-helper cells rose only slightly. Six weeks after beta-carotene treatment was discontinued, the immune-cell measurements returned to pretreatment levels (Fryburg DA et al 1995).
- **Green tea**—Green tea leaves contain catechins with powerful antioxidant properties. The most abundant catechin found in green tea, epigallocatechin gallate (EGCG), inhibits HIV from infecting human T-cells. One recent study showed that EGCG can bind to T-cells and block the virus from attaching (Kawai K et al 2003). This breakthrough may significantly impact HIV research if future investigators can determine the precise location on the T-cells in which EGCG exerts its effect and whether it is the same location in which HIV binds to the T-cell.
- **Selenium**—Selenium is required for proper functioning of the immune system (Look MP et al 1997). It is also essential in the synthesis of glutathione. Selenium's many benefits include protecting the central nervous system from dementia caused by HIV (Shor-Posner G et al 2002a) and infection with *Mycobacterium tuberculosis* (Shor-Posner G et al 2002b); slowing the loss of T-cells (Look MP et al 1997); and decreasing the effect of inflammatory cytokines, which may reduce the risk of developing neurological damage (Bjugstad KB et al 1998; Ryan LA et al 2001; Seilhean D et al 1997), Kaposi's sarcoma (a common HIV-associated cancer), and wasting syndrome. Selenium also suppresses the enhancing effect of cytokines on HIV replication (Hori K et al 1997; Tolando R et al 2000).
- **Vitamin C and N-acetylcysteine**—Vitamin C (ascorbic acid) and N-acetylcysteine (Renis HE 1975) have multiple benefits in patients with HIV/AIDS. They maintain glutathione levels (Fawzi WW et al 2004; McComsey G et al 2003), improve T-cell counts and reduce viral load in patients who have advanced AIDS (McComsey G et al 2003; Standish LJ et al 2001; Tantcheva LP et al 2003), and have a toxic effect on HIV-infected cells (high levels of vitamin C) (Harakeh S et al 1991; Rivas CI et al 1997). Supplementation with N-acetylcysteine is recommended for people who are infected with HIV, whether or not they are receiving HAART.
- **Whey**—Whey protein contains all essential and nonessential amino acids, which are important to maintaining an adequate immune system response. Whey is also an important supplement to help boost the body's synthesis of glutathione, and clinical trials have successfully used whey protein in treating HIV (Marshall K 2004). Whey protein appears to be unique among proteins in its ability to improve immune function, elevate cellular glutathione levels, and maintain muscle mass (Marshall K 2004; Micke P et al 2002).

## BOOSTING THE IMMUNE SYSTEM

In addition to boosting blood levels of antioxidants, studies have shown that it is helpful to include dietary supplements that directly enhance the immune system. Nutrients that have been documented to boost immune function include:

- **CoQ10**—People infected with HIV are often deficient in this important substance. CoQ10 is found in high concentrations in

the healthy heart, where it improves cardiac function. CoQ10 also increases a number of immune parameters, including T-cell counts (Folkers K et al 1991; Yamashita S et al 1997).

- **L-carnitine.** Also recommended as an antioxidant, L-carnitine boosts immune function to protect the heart against zidovudine toxicity (Mutomba MC et al 2000). L-carnitine can also protect against an increased level in triglycerides that is associated with protease inhibitors. High doses of L-carnitine enhance immunological and metabolic functions (Evangelidou A et al 2003). L-carnitine helps preserve T-cells by inhibiting cell death (Cifone MG et al 1997).
- **L-glutamine.** In addition to its important role as an antioxidant, the amino acid L-glutamine plays a major role in the overall health of the gastrointestinal tract. Cells in the gastrointestinal tract have high energy requirements; glutamine is converted into adenosine triphosphate, which is a primary energy source (Alverdy JC 1990; Newsholme EA et al 1985; Souba WW et al 1985). Supplementation of antioxidants and glutamine increases body weight and cell mass. Thus, it provides a highly cost-effective therapy for the rehabilitation of patients infected with HIV who are losing weight (Shabert JK et al 1999).
- **Vitamin B12.** Studies have shown that patients with AIDS have a vitamin B12 deficiency as a result of severe nutrient malabsorption (Ehrenpreis ED et al 1994; Remacha AF et al 1991). Vitamin B12 deficiency is associated with reduced red blood cell count, depression, memory loss, insomnia, impotence, and lowered energy. If supplementation does help restore normal levels of vitamin B12, weekly injections may be indicated (Rule SA et al 1994).
- **Zinc and magnesium.** On average, patients with HIV/AIDS who have low zinc levels have a higher viral load and lower T-cell counts (Ferencik M et al 2003; Rousseau MC et al 2000). While on HAART, the conditions of patients with HIV should be monitored for zinc deficiencies, and supplements recommended when necessary (Wellinghausen N et al 2000). Additionally, low magnesium levels are related to HIV symptoms and disease progression (Patrick L 2000 Feb; Skurnick JH et al 1996).

### ***Wasting and Metabolic Syndromes: The Scourges of AIDS***

One of the most dreaded aspects of HIV/AIDS infection occurs near the end of the infection cycle. Known as wasting syndrome, it is defined as the involuntary loss of more than 10 percent of body weight. The weight loss is accompanied by chronic diarrhea, weakness, and fever (Salomon J et al 2002).

The major cause of the weight loss is malnutrition, which emphasizes the need for adequate nutrition in patients with HIV/AIDS. A comprehensive and diversified nutritional regimen is critical in order to obtain optimal benefit from the moment HIV is diagnosed.

Maintaining adequate nutrition is easier in the earlier stages of infection. Opportunistic infections may make it harder to absorb the proper amount of calories and maintain nutritional health. Low levels of antioxidants and micronutrients in patients with HIV/AIDS are often related to low nutrient intake, as well as to malabsorption resulting from diarrhea and metabolic problems (Butensky EA 2001; Chariot P et al 2003).

## **FIGHTING THE VIRUS: NATURAL APPROACHES**

Although there is no cure for HIV/AIDS, therapy has focused on reducing the ability of HIV to replicate. HAART drugs work to inhibit viral replication, but the following nutrients and supplements also have direct antiviral activity.

### ***Lactoferrin***

Lactoferrin is derived from whey protein. It has been found to directly inhibit viruses by binding to viral receptor sites, thus preventing the virus from infecting healthy cells (van der Strate BW et al 2001). In vitro studies have found that lactoferrin strongly binds to the receptors on various strains of HIV, making it more difficult for the virus to fuse with healthy immune cells and to enter the cell (Swart PJ et al 1996, 1998).

One study that compared 22 asymptomatic and 45 symptomatic patients with HIV to 30 healthy control subjects found that plasma lactoferrin levels were decreased in patients infected with HIV (Defer MC et al 1995). Lactoferrin causes no damage to healthy cells (Swart PJ et al 1998).

### ***Olive leaf extract***

Olive leaf extract is a nonprescription, over-the-counter food supplement used for centuries as a natural treatment of viral, bacterial, fungal, and parasitic infections; skin diseases; arthritis; heart disease; and many other illnesses. The ancient Egyptians may have been the first to employ the olive leaf as part of the mummification of their royalty. Hippocrates, the father of medicine, used olive oil to treat ulcers, cholera, and muscle pain more than 2500 years ago.

Olive leaf extract contains a substance known as oleuropein, which has powerful disease-resistant properties and antiviral activity (Renis HE 1969). Oleuropein selectively destroys virus-infected cells but has never shown any toxicity to human DNA alpha-, beta-, or gamma-polymerases (Renis HE 1969, 1975). Recently, it has also been shown to have antioxidant activity (Briante R et al 2001).

Olive leaf extract does not have any side effects itself, although some people may experience a "die-off " effect (also called the Herxheimer reaction) as the olive leaf extract exerts an antibiotic effect and kills off bacteria. A die-off effect is caused by a rapid increase in the volume of waste material and pathogens being carried into the lymph system and bloodstream. Reactions to the die-off effect include extreme fatigue, diarrhea, headaches, muscle and joint aches, and flu-like symptoms. These reactions are temporary and will pass once the body has rid itself of the circulating toxins. To protect good bacteria in the gut, a probiotic might be considered in conjunction with the olive leaf extract.

### ***Licorice root extract***

Licorice root extract has a wide range of pharmacological properties, including anti-inflammatory, antiulcer, antiallergy, antioxidant, antitumor, and antiviral effects. It is usually used as an anti-inflammatory and has been studied as an inhibitor of HIV (Baltina LA 2003).

### ***Thymus-gland boosters***

The thymus gland is the key enabler of T-cell-mediated immunity. Boosting the thymus with synthetic thymic factors may improve the ability of the immune system to mount an effective response to antigens (Al-Harathi L et al 2002; Berzins SP et al 2002; Carcelain G et al 2001; Combadiere B et al 2002; Manfredi R 2002; Meissner EG et al 2003; Rudy BJ et al 2001). Patients with HIV/AIDS may consider supporting thymic function with specially formulated immunological tissue extracts.

### ***Milk thistle extract***

Milk thistle extract, or silymarin, is a unique type of bioflavonoid that exerts a protective effect on the liver (Flora K et al 1998). This is important to patients with HIV/AIDS who are on HAART. Silymarin supports key functions of the liver, including the production of glutathione (Flora K et al 1998). Silibinin is the most active constituent of silymarin, which is now available in the United States.

## RESTORING HORMONE BALANCE

The final component of a healthy nutrient and supplement approach to HIV/AIDS is to correct the hormonal imbalances caused by the disease. Before beginning supplementation with hormones, the Life Extension Foundation recommends testing the blood to determine the levels of major steroid hormones, including pregnenolone, DHEA, testosterone, estrogen, and progesterone. A comprehensive hormone restoration program seeks to return hormone levels to those of a healthy person in his or her middle 20s. A number of hormone deficiencies have been associated with HIV/AIDS.

### ***Low serum levels of dehydroepiandrosterone (DHEA)***

Low DHEA levels are associated with high HIV load and tend to indicate a negative disease course (Ferrando SJ et al 1999). DHEA declines in patients as they progress from the latency phase of HIV infection to AIDS (Jacobson MA et al 1991; Mulder JW et al 1992). These declines in DHEA have been associated with the development of opportunistic infections. DHEA also helps maintain healthy functioning of the immune system while HAART reduces viral load (Clerici M et al 2000).

### ***Cortisol***

Cortisol is a major hormone produced by the adrenal glands. At normal levels, cortisol assists in the metabolism of glucose, protein, and fats. It also has a strong impact on the immune system. At consistently high levels due to illness or stress, however, cortisol suppresses immune response and accelerates aging. In general, rising levels of cortisol are associated with physical and mental stress. Similarly, cortisol levels are increased in people infected with HIV, and cortisol has been shown to cause T-cell death (Clerici M et al 2000).

With progression of HIV, cortisol rises and DHEA decreases (Christeff N et al 2000). Therefore, it is in the patient's best interest to restore a more normal, healthy cortisol/DHEA ratio. This could be done by increasing DHEA (see above).

### ***Growth hormone***

Supplemental growth hormone is an approved treatment for the HIV-associated wasting syndrome. A 2-week course of growth hormone at the time of acute opportunistic infection is also beneficial (Paton NI et al 1999). The dose of growth hormone in HIV infection therapy is much higher than the dose used for replacement therapy in the healthy aging adult.

Many insurance companies will underwrite the cost of growth hormone therapy if it is used in conjunction with HAART.

### ***Melatonin***

Melatonin is a hormone secreted by the pineal gland. It exerts a regulatory effect over many body systems. Evidence suggests HIV immune suppression may be slowed by nightly intake of melatonin. Melatonin enhances the production of T-cells and other components of the immune system. In addition to enhancing the immune system, melatonin is a formidable antioxidant and can prevent immune system cell loss (Lissoni P et al 1989; Maestroni GJ 1993, 1999).

### ***Testosterone***

In both men and women, testosterone declines with HIV progression. Because a low testosterone level is very common in men with HIV, it may also contribute to wasting syndrome. Because treatment with HAART does not reverse the testosterone deficiency, testosterone replacement is required (Rietschel P et al 2000). Testosterone therapy helps depression and improves decreased energy and libido (Rabkin JG et al 2000). It also decreases opportunistic infections and dementia and improves quality of life (Kopicko JJ et al 1999).

### ***Thymosin alpha-1***

Thymosin alpha-1 has been extensively studied for its effects on immune response. Thymosin alpha-1 is found in highest concentrations in the thymus, but has also been detected in the spleen, lungs, kidneys, brain, blood, and a number of other tissues. In more than 70 studies, thymosin alpha-1 showed immune-enhancing benefits (Sjogren MH 2004). It may work best in combination with other immunomodulators (Roch-Arveiller M et al 1991; Serrate SA et al 1987; Svedersky LP et al 1982).

- The benefits of thymosin alpha-1 are due mostly to its ability to enhance T-cell function. Studies have shown the following benefits:
- Increased activity from natural killer (NK) immune cells (Favalli C et al 1989; Roch-Arveiller M et al 1991; Serrate SA et al

1987).

- Enhanced production of T-cells in patients with chronic hepatitis B (Mutchnick MG et al 1991) and cancer (Salvati F et al 1996).
- Decreased replication of HIV-1 in human blood cells (Moody TW et al 1993).
- Thymosin alpha-1 is currently being considered for phase 3 clinical trials in the treatment of hepatitis. It is not yet approved in the United States, but has been approved for various uses in more than 30 countries.

## LIVING WITH HIV/AIDS

Twenty years ago, a diagnosis of HIV/AIDS was a death sentence. Yet, with current drug regimens, patients with HIV/AIDS can now hope to live longer, more productive and more comfortable lives than patients who had HIV/AIDS in the past. By drawing on the best of both conventional and complementary medicine, patients with HIV/AIDS can design a holistic therapy that can help suppress HIV while supplying the body with a robust nutritional intake to support immune system function and general health.

Because patients with HIV/AIDS often have malabsorption problems, particularly in the later stages of the disease, it is a good idea to add a comprehensive digestive enzyme formula to the program to encourage the most efficient digestive activity.

After a physician has diagnosed HIV/AIDS, it is important to carefully monitor therapy by testing T-cell and viral loads and by having complete blood tests that measure antioxidants and other nutrient levels. Regular blood testing will also help you and your physician decide when is the best time to begin HAART (Fauci AS et al 2004).

## LIFE EXTENSION FOUNDATION RECOMMENDATIONS

Dietary supplementation in HIV/AIDS is an important part of the overall strategy.

With any program of dietary supplementation in patients with HIV/AIDS, it is important that no supplement or nutrient is added to the diet without the approval of the patient's physician. Fortunately, more physicians are beginning to understand the value of robust nutritional supplementation for patients with HIV/AIDS. The Life Extension Foundation suggests:

### ***Glutathione boosters:***

- **N-acetylcysteine**—600 milligrams (mg) twice daily
- **Vitamin C**—1000 mg three times daily
- **R-lipoic acid**—210 mg twice daily
- **Whey protein isolate**—30 to 60 grams (g) of powder in two or three divided doses
- **Glutathione**—500 mg twice daily

### ***Antioxidants:***

- **Vitamin C**—1000 mg three times daily
- **Selenium**—200 mcg three times daily
- **Beta-carotene**—25,000 IU daily
- **Vitamin E**—400 IU daily
- **Green tea extract (93 percent polyphenols)**—three 725-mg capsules three times a day
- **Life Extension Mix**—As directed on label.
- **CoQ10**—200 mg daily

### ***Micronutrients:***

- **Zinc**—30 mg daily
- **Magnesium**—160 to 500 mg daily
- **Vitamin B12**—one 5000-mcg sublingual lozenge daily in the form of methylcobalamin

### ***Amino acids:***

- **L-glutamine**—1 to 2 g daily. Do not take with other proteins or amino acids.
- **L-carnitine**—3 to 4 g daily in two divided doses. Do not take with other proteins or amino acids.

### **Natural antivirals:**

- **Lactoferrin**—300 mg daily
- **Olive leaf extract (containing 23 percent oleuropein)**—one 500-mg capsule four times daily
- **Deglycyrrhizinated licorice (DGL)**—760 mg of deglycyrrhizinated licorice (2 tablets a day)
- **Thymic extract**—2 capsules daily of Thymic Immune Factors
- **Silymarin**—100 mg of silymarin or silibinin, 2 to 6 capsules daily

### **Digestive enzymes:**

- **Super Digestive Enzymes**—2 capsules with each meal

### **Hormonal treatments:**

- **Growth hormone**—After testing and with supervision of a physician
- **Testosterone**—After testing and with supervision of a physician
- **DHEA**—After testing and with supervision of a physician. Usual dosages are 15 to 75 mg daily.
- **Melatonin**—3 mg at bedtime

## **HIV/AIDS SAFETY CAVEATS**

An aggressive program of dietary supplementation should not be launched without the supervision of a qualified physician. Several of the nutrients suggested in this protocol may have adverse effects. These include:

### **Beta-Carotene**

- Do not take beta-carotene if you smoke. Daily intake of 20 milligrams or more has been associated with a higher incidence of lung cancer in smokers.
- Taking 30 milligrams or more daily for prolonged periods can cause carotenoderma, a yellowish skin discoloration (carotenoderma can be distinguished from jaundice because the whites of the eyes are not discolored in carotenoderma).

### **Coenzyme Q10**

- See your doctor and monitor your blood glucose level frequently if you take CoQ10 and have diabetes. Several clinical reports suggest that taking CoQ10 may improve glycemic control and the function of beta cells in people who have type 2 diabetes.
- Statin drugs (such as lovastatin, simvastatin, and pravastatin) are known to decrease CoQ10 levels.

### **DHEA**

- Do not take DHEA if you could be pregnant, are breastfeeding, or could have prostate, breast, uterine, or ovarian cancer.
- DHEA can cause androgenic effects in woman such as acne, deepening of the voice, facial hair growth and hair loss.

### **Green Tea**

- Consult your doctor before taking green tea extract if you take aspirin or warfarin (Coumadin). Taking green tea extract and aspirin or warfarin can increase the risk of bleeding.
- Discontinue using green tea extract 2 weeks before any surgical procedure. Green tea extract may decrease platelet aggregation.
- Green tea extract contains caffeine, which may produce a variety of symptoms including restlessness, nausea, headache, muscle tension, sleep disturbances, and rapid heartbeat.

### **L-Carnitine**

- L-carnitine can cause gastrointestinal symptoms such as nausea and diarrhea.

### **L-Glutamine**

- Consult your doctor before taking L-glutamine if you have kidney failure or liver failure.
- L-glutamine can cause gastrointestinal symptoms such as nausea and diarrhea.

## **Licorice**

- Do not take licorice extract if you have diabetes, high blood pressure, heart irregularities, abnormal muscle tension, poor kidney function, low blood potassium levels, or chronic hepatitis, cirrhosis of the liver, or any disease that impedes the flow of bile from the liver.
- Do not take licorice for more than 6 weeks in a row. High doses of licorice (more than 20 grams of licorice extract daily or 50 grams of licorice root daily) taken for extended periods may lead to excessive loss of sodium from the blood, water retention, high blood pressure, heart irregularities, fatigue, headaches, and muscle cramps.

## **Lipoic Acid**

- Consult your doctor before taking lipoic acid if you have diabetes and glucose intolerance. Monitor your blood glucose level frequently. Lipoic acid may lower blood glucose levels

## **Melatonin**

- Do not take melatonin if you are depressed.
- Do not take high doses of melatonin if you are trying to conceive. High doses of melatonin have been shown to inhibit ovulation.
- Melatonin can cause morning grogginess, a feeling of having a hangover or a “heavy head,” or gastrointestinal symptoms such as nausea and diarrhea.

## **NAC**

- NAC clearance is reduced in people who have chronic liver disease.
- Do not take NAC if you have a history of kidney stones (particularly cystine stones).
- NAC can produce a false-positive result in the nitroprusside test for ketone bodies used to detect diabetes.
- Consult your doctor before taking NAC if you have a history of peptic ulcer disease. Mucolytic agents may disrupt the gastric mucosal barrier.
- NAC can cause headache (especially when used along with nitrates) and gastrointestinal symptoms such as nausea and diarrhea.

## **Phytosterols**

- Phytosterols can cause gastrointestinal symptoms such as nausea and diarrhea.

## **SAMe**

- Consult your doctor before taking SAMe if you have bipolar disorder. See your doctor frequently if you take SAMe and you have bipolar disorder.
- Consult your doctor before taking SAMe if you take antidepressants. See your doctor frequently if you take SAMe in place of or in addition to antidepressants.
- Consult your doctor before taking SAMe if you have cancer. Nucleic acid methylation patterns may change in people who have cancer and take SAMe.
- Do not take SAMe if you are undergoing gene therapy.
- SAMe can cause anxiety, hyperactive muscle movement, insomnia, hypomania, and gastrointestinal symptoms such as nausea and diarrhea.

## **Selenium**

- High doses of selenium (1000 micrograms or more daily) for prolonged periods may cause adverse reactions.
- High doses of selenium taken for prolonged periods may cause chronic selenium poisoning. Symptoms include loss of hair and nails or brittle hair and nails.
- Selenium can cause rash, breath that smells like garlic, fatigue, irritability, and nausea and vomiting.

## **Vitamin B12 (cyanocobalamin)**

- Do not take cyanocobalamin if you have Leber's optic atrophy.

## **Vitamin C**

- Do not take vitamin C if you have a history of kidney stones or of kidney insufficiency (defined as having a serum creatine level greater than 2 milligrams per deciliter and/or a creatinine clearance less than 30 milliliters per minute).
- Consult your doctor before taking large amounts of vitamin C if you have hemochromatosis, thalassemia, sideroblastic anemia, sickle cell anemia, or erythrocyte glucose-6-phosphate dehydrogenase (G6PD) deficiency. You can experience iron overload if you have one of these conditions and use large amounts of vitamin C.

## **Vitamin E**

- Consult your doctor before taking vitamin E if you take warfarin (Coumadin).
- Consult your doctor before taking high doses of vitamin E if you have a vitamin K deficiency or a history of liver failure.
- Consult your doctor before taking vitamin E if you have a history of any bleeding disorder such as peptic ulcers, hemorrhagic stroke, or hemophilia.
- Discontinue using vitamin E 1 month before any surgical procedure.

## **Zinc**

- High doses of zinc (above 30 milligrams daily) can cause adverse reactions.
- Zinc can cause a metallic taste, headache, drowsiness, and gastrointestinal symptoms such as nausea and diarrhea.
- High doses of zinc can lead to copper deficiency and hypochromic microcytic anemia secondary to zinc-induced copper deficiency.
- High doses of zinc may suppress the immune system.

For more information see the Safety Appendix

All Contents Copyright © 1995-2009 Life Extension Foundation All rights reserved.

**LifeExtension®**

These statements have not been evaluated by the FDA. These products are not intended to diagnose, treat, cure or prevent any disease. The information provided on this site is for informational purposes only and is not intended as a substitute for advice from your physician or other health care professional or any information contained on or in any product label or packaging. You should not use the information on this site for diagnosis or treatment of any health problem or for prescription of any medication or other treatment. You should consult with a healthcare professional before starting any diet, exercise or supplementation program, before taking any medication, or if you have or suspect you might have a health problem. You should not stop taking any medication without first consulting your physician.