Diet, Immunity and Nutritional Therapies

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The search for AIDS treatments has induced researchers and people with HIV infection to investigate health factors, such as nutrition, which often go unexamined in diseases that respond readily to medical therapies. In particular, attention has focused on how good nutrition promotes immune function and whether aggressive nutritional support enhances immune competence. Among people with HIV infection, malnutrition can contribute to the development of opportunistic infections, can hasten physical deterioration, and in those with AIDS can be the underlying cause of death. Conversely, an aggressive, individually-tailored, nutritional program is crucial to slowing infection, increasing the efficacy of medical treatment, and enriching quality of life.

People with HIV infection rely on medical and mental health providers to offer guidance and support in making decisions about nutrition. They also seek advice about “alternative” nutritional therapies, many of which are unproven and may be harmful. Health practitioners need to understand the relationship between nutrition and immunity, particularly among those with HIV infection. In addition, practitioners must be aware that good nutrition is not an “alternative” therapy; it is a fundamental component of medical care. Practitioners must also know when to counsel about nutrition and when to refer patients to registered dietitians who have HIV-related training for in-depth counseling.

Nutrition and Immunity

It has long been recognized that the risk and severity of any infection is influenced by an individual’s nutritional status: immune function can be impaired when the intake of certain nutrients is even partially deficient. There are similarities in the immunological changes caused by HIV infection and malnutrition. Among these similarities are: reduced numbers of T-helper cells, impaired delayed hypersensitivity (an immune response mediated by T-cells), increased antibody levels, reduced antibody response, and reduced lymphocyte production and thymus gland hormone activity (T-lymphocytes are produced in thymus). These changes are consistent with what is known about the effects of nutrition on the immune system: since nutritional problems principally affect cell-mediated immunity, and HIV infection results in defects to cell-mediated immunity, it is reasonable to assume that nutrition could play a role in the progression of HIV disease.

Additionally, researchers have observed impaired nutritional status in people with HIV infection. Infection of any kind can significantly change an individual’s nutritional status, gastrointestinal function, and food intake and metabolism. It is likely that nutritional requirements will vary in response to these changes.

Nutritional requirements may also vary depending on diet itself. It is important to remember that diet and nutrition are defined in terms of “balance”; an excess of a particular nutrient can be as important as a deficiency of another. For example, too much vitamin D can lead to hypercalcemia (a condition in which there is more calcium than the body can absorb) and calcification of bones and tissue and kidney problems; too little vitamin B₁₂ can lead to pernicious anemia.

Effects of Specific Nutrients on Immunity

Among the nutrients that have the greatest positive and negative effects on immunity are proteins and calories, which affect energy and may alter the way in which cells utilize other nutrients. Immune defects also result from excesses or deficiencies of the following nutrients: dietary fats, beta-carotene and vitamin A, pyridoxine (vitamin B₆), pantothenic acid and folic acid (both of which are B vitamins), vitamin B₁₂, vitamin C, vitamin E, iron, zinc and selenium.

While it is difficult to isolate the effects of a particular nutrient excess or deficiency on immunity, it is clear that such imbalances may produce some immune dysfunction. In addition, immune compromise may also cause nutrient deficiency, particularly among those with HIV, infection. People with compromised immunity should incorporate foods rich in these nutrients in their diets.

Different nutrients have different “safe” limits both for deficiency and excess. For example, a depressed immune response is seen at three to four times the recommended daily allowance*

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(RDA) of selenium, whose RDA is 70 micrograms per day for men and 55 micrograms per day for women who are not pregnant or lactating women. Some nutritionists believe even this level is too high and advise an upper limit of 150 micrograms per day. But, a depressed immune response to vitamin C is not seen until the dose is more than 300 times the RDA of 60 milligrams per day. (Some studies have found that large doses of vitamin C, up to 20 grams a day, cause gastrointestinal disturbances and other problems.)

Some beneficial immune-related results of nutrient intake have been reported as well. They include improved immune response from smaller amounts of vitamin C, between .5 and three grams a day, and from vitamin E at dosages of 150 percent of the RDA (10 milligrams per day for men and 8 milligrams per day for women).

Negative immune-related results of nutrient intake include: increased number and size of tumors as a result of excess fat; decreased immune response as a result of large doses of vitamin A taken over several months; and progressive reduction in lymphocyte response as a result of dosages of more than 300 milligrams of zinc per day. Excessive zinc intake may also lead to copper deficiency. Zinc deficiency, on the other hand, has been associated with susceptibility to infection and may be a secondary factor of protein-calorie malnutrition and the development of Pneumocystis carinii pneumonia in children with cancer. Although iron deficiency is widespread throughout the world, iron supplementation among people with HIV infection may stimulate the reemergence of bacterial infections. Increased protein stores may fight the effects of iron deficiency without this drawback.

There is no evidence that multivitamin and mineral supplementation delays or prevents the progression of HIV infection,

*The National Academy of Sciences bases the RDA on scientific knowledge of general nutrient standards for healthy people. The RDA serves only as a guide to be considered along with individual factors, including: age, sex, body size, and activity.

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FOCUS: A Guide to AIDS Research and Counseling

1. Introduction

2. Nutritional Requirements

HIV-infected individuals may experience symptoms that can cause or exacerbate nutritional deficiency. Among these symptoms are: diarrhea, nausea and vomiting, abdominal fullness or pain, lack of appetite, difficulty chewing or swallowing, taste aversions, depression, dementia, poor physical coordination, short-term memory loss, and weakness. In response to these symptoms, a person may experience weight loss, muscle wasting, vitamin, mineral and trace metal deficiencies, loss of body fat, and dehydration. People with HIV infection must ensure that they are maintaining at least minimal nutritional standards, for example, achieving and maintaining appropriate weight and eating a variety of foods with adequate calories and protein.

Mental health practitioners can provide valuable assistance to their clients by screening for psychosocial and economic factors that effect nutrition and health status. Ask clients if they are eating enough and maintaining their desired weight. Are they dependent upon someone else for buying food and preparing meals? If so, is their food being prepared as they would like? Do they eat alone? Do they have adequate cooking and cleaning facilities? Do they have enough money to buy food? Do they have difficulties obtaining food? In discussing these issues with clients, practitioners should explore ways to overcome these obstacles. Some problems can be referred to outside agencies or other professionals, for example, food delivery services or buddy programs through which clients can eat with others. Practitioners should refer clients with specific food and nutritional problems to registered dietitians trained to handle HIV infection. Ultimately, everyone should assist and encourage clients to take steps toward developing adequate and regular eating habits, physical activity and exercise, sleep, and positive attitudes.

3. Evaluating Diets and Supporting Clients

Practitioners may need to offer guidance to clients who have concerns about alternative nutritional therapies. In their serious and at times desperate search for nutritional solutions to HIV infection, clients must remember that the efficacy of “alternative” therapies has not been demonstrated through reproducible studies. Practitioners should question the nutritional adequacy and medical risks of diets that make claims using the following phrases:

- “immunomodulators,” that is substances that will strengthen the immune system, for example, pills produced from the sera of infected mice, injections of thymus gland extract, and megadoses of vitamins, which can also alter the responsiveness of the body to other therapeutic drugs.
- “inhibitors of tumor growth,” for example, laetrile, strict “vegan” (no animal products at all) diets, vitamin supplements, or the indiscriminate elimination of milk products, which are rich sources of protein, calcium and riboflavin.
- “antiviral,” for example, hydrogen peroxide injections, home-made AL 721, which is made from soy and egg yolk lecithin.
- “anti-infective,” for example, yeast-free diets that eliminate other animal protein, milk or soy milk fortified with B12 and iron, and enough vegetables, dairy nutrient and caloric needs can be met.

Draw the distinction between clients and their food and nutrition beliefs. Support the client in no uncertain terms, but be honest in skepticism, and discourage any diet or supplement that you feel is inappropriate. While many seropositive people who embark on unproven therapies may know not to expect a “cure,” they may need your help with their frustration, fear and desire to find a remedy that provides some control. In this regard, health practitioners must balance the risks of a particular diet or therapy, and the lack of scientific proof of efficacy, with positive anecdotal reports and the possible palliative effects of a patient’s use of even an unproven therapy.

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References


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Nutritional Guidelines for People with HIV Infection

John Tighe

Ideal nutritional care begins with a complete nutritional assessment by a dietitian. Such assessments involve studying eating habits, personal food preferences, and calorie and nutrient intake, and then developing guidelines for what patients should be eating. As the connection between immunity and nutrition has become clearer, nutritionists have started to conduct these assessments at earlier stages of infection so that even asymptomatic individuals may develop proper nutritional habits.

In developing a diet, providers must be aware of nutrients that are important for people with HIV infection, the food sources of those nutrients, the preparation of these foods, and the HIV-related conditions that may complicate obtaining adequate nutrition. In addition, health providers must consider different cultural and family traditions that surround food and eating, and, in order to ensure compliance with strict regimens, nutritionists should develop diets that honor individual food preferences.

Nutrients

In general, recommended diets for people with HIV infection include large amounts of protein, a steady intake of calories, and sufficient amounts of vitamins and minerals. Foods high in protein—meats, rice, dairy products, fish, nuts, peanut butter, eggs and beans—are generally better sources of calories than are foods high in fat alone; protein, and not fat, helps rebuild muscle mass and maintain muscle tissue. Fat, however, is a good source of calories, a characteristic that is particularly important when patients are experiencing rapid weight loss or are consuming an insufficient number of calories. For patients who get insufficient amounts of protein in regular diets, nutritionists may recommend special high-protein and high-calorie beverages. These drinks may be taken between meals and are especially useful for patients unable to eat solid foods.

Proper vitamin and mineral intake also is important to a diet. Some vitamins and minerals consumed in large quantities may have positive effects at boosting the immune system, but "overdoses" may also interfere with the effects of other vitamins and may, in some cases, actually weaken the immune system. For this reason, patients consuming large quantities of vitamin or mineral supplements should be monitored. A daily vitamin-mineral supplement that provides 100% of the recommended daily allowance (RDA) of several vitamins and minerals is not considered harmful and is recommended for those whose diets lack these essential nutrients.

The following are important vitamins and minerals, and good food sources for them.

- Iron is found in organ meats, poultry, egg yolk, whole grain breads, cereals, dark green vegetables, nuts, bran and dried fruits. Iron supplements are not advised without professional guidance. Iron deficiencies, common among people with AIDS, can lead to immune dysfunction and atrophy of lymph tissues. Excesses of iron, zinc and selenium can be harmful because infectious agents can feed on these minerals.

- Zinc is found in seafood, beef, liver, yeast, wheat germ, cheese and whole grain foods. It is needed for maintaining immunity and in metabolizing carbohydrates. A deficiency can reduce T-cell levels and interfere with immune response.

- Selenium is found in seafood, brown rice, bran, kidney, onions, milk and nuts.

- Vitamin A is found in green and yellow fruits and vegetables, liver, fortified milk and other dairy products and eggs. Exceptionally large doses may be toxic.

- Vitamin B is found in cereals, wheat germ, rice, yeast, fruit, beans and peas. Riboflavin is helpful in maintaining mucosal barriers essential to the body’s defenses.

- Vitamin C is found in citrus fruits, tomatoes, melons, broccoli, strawberries, fresh potatoes and green leafy vegetables. Some medications, including aspirin, cause a loss of vitamin C. Some physicians have recommended large doses of vitamin C. Excessive amounts, however, can cause kidney stones and diarrhea.

- Vitamin E is found in vegetable oils, green vegetables, wheat germ, meats and eggs. It is beneficial in protecting red blood cells and macrophages, immune system cells. Deficiencies can lead to muscle wasting and gastrointestinal disease, and excess amounts can be immunosuppressive.

People with HIV infection must avoid some foods and food preparations that may transmit infectious bacteria. Nutritionists recommend that patients thoroughly wash produce, especially lettuce and other green vegetables, with warm water; keep eating and cooking areas clean; cook meat well; avoid raw fish or raw eggs; and use only pasteurized dairy products.

Nutritional Implications of HIV-Related Conditions

People with HIV infection may eat less because of the adverse effects of medication, the effects of other diseases, or a lack of appetite. Anorexia, nausea and vomiting, bowel disease, and neurological diseases may also lead to lowered food intake. In addition, mouth pain and sores, swallowing problems, and dulled taste sensations can make eating difficult. The following are guidelines to handle common gastrointestinal symptoms:

- Anorexia can result in a decline in body weight, fat and cell mass. To detect anorexia, health providers should monitor body weight and calorie intake, and devise diets that meet personal tastes. Nutritionists recommend: small, frequent meals with high-calorie foods; high-protein, high-calorie liquid formulas; and, if these interventions are insufficient, tube feeding.

- Oral and esophageal complications, including oral candidiasis and Kaposi’s sarcoma lesions, may cause difficulty in chewing or swallowing. Drinking fluids with meals can improve the ability to chew and swallow. Foods served at room temperature are also easier to handle.

- Bowel disease and diarrhea may be treated by ingesting liquids, caffeine-free foods and beverages, and low-lactose foods, such as aged cheese and cultured yogurt. Foods should be low in fat and fiber, for example, white rice, white bread and cooked fruits and vegetables without the skin.

- Nausea and vomiting are often caused by medications, and may be treated with clear, cool beverages, clear soups and foods with little aroma.

It may be necessary to use alternate feeding routes for patients who cannot be fed orally. Parenteral feeding (outside the digestive tract) may be effective for some individuals, however, nutritionists generally recommend intravenous feeding be used only when a patient’s digestive system is unable to handle food. If possible, alternate forms of enteral feeding (through the digestive tract)—for example, special oral formulas or tube feeding—are preferred.

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References


Recent Reports


AIDS-related gastrointestinal diseases and their symptoms—weight loss, diarrhea and malabsorption—are common among patients with HIV infection, according to a review of reports on the prevalence of gastrointestinal dysfunction. In one study, 96 percent of patients had weight loss, and 55 percent had diarrhea. Other gastrointestinal-related complaints among individuals with AIDS include lactose intolerance, anorexia, nausea, vomiting, abdominal pain, taste alterations, dysphagia (difficulty swallowing), and odynophagia (pain with swallowing). Opportunistic infections affecting the gastrointestinal system include Candida albicans, cytomegalovirus (CMV), Cryptosporidium, Mycobacterium avium-intracellulare (MAI), and salmonella. In addition, other HIV-related diseases, such as Kaposi’s sarcoma and lymphoma may affect esophageal and intestinal function.

Lack of treatment and inability to diagnose gastrointestinal diseases can lead to nutritional deficiencies that decrease food intake and exacerbate illness. Weight loss and diarrhea often continue as predominant clinical problems throughout the course of HIV infection. In greater than 50 percent of the cases of gastrointestinal dysfunction, there is no apparent underlying cause for the dysfunction. These cases are classified simply as AIDS enteropathy. MAI, which may be responsible for a great deal of the diarrhea associated with AIDS, can be misdiagnosed, and is sometimes not diagnosed until autopsy.


The timing of death from wasting among people with AIDS is related to the magnitude of body-cell-mass depletion rather than to the specific disease that causes the depletion, according to a study of the records of 32 patients evaluated within 100 days of death. These results support the idea that there is a critical level of body cell mass below which survival is impossible. They also imply that maintaining body cell mass could prolong survival.

The researchers reviewed 43 body composition studies performed on 32 patients. Body cell mass is the total weight of the cells of the body as measured by potassium levels. The researchers found that there was an average of 54 percent of normal potassium levels in the body at the time of death.

The researchers conclude that since starvation and AIDS may both lead to similar degrees of body-cell-mass depletion at the time of death, the nutritional approach to treating HIV infection should be the same as the approach to treating any other chronic, progressive debilitating illness, even though AIDS is often perceived as an aggressive, overwhelming illness. In addition, many of the general clinical observations of patients with advanced AIDS—apathy, decreased socialization, decreased ability to concentrate—are common among people who are malnourished.


The concentration of HIV in both blood cells and plasma of individuals with HIV infection is significantly higher than previ-ousli suspected, according to a small study. Researchers suggest that these findings should dispel doubts that HIV-1 is the true pathogenic agent of AIDS. They also state that plasma viremia may be a better marker for disease progression than p24 antigen.

Researchers quantified the virus in peripheral-blood mononuclear cells (PBMC) and plasma of 53 men and one woman, all at various stages of disease and none receiving antiviral treatment at the time of the study. Blood samples were subjected to end-point dilution cultures to determine quantity of HIV, and to antibody and p24 antigen testing.

Viral levels in plasma and PBMC (largely CD4+ lymphocytes, but also including other white blood cells such as monocytes) were at least 100 times higher in patients with signs of disease compared to asymptomatic seropositive individuals. Among subjects with AIDS or AIDS-related complex (ARC), at least one in 100 mononuclear cells harbored HIV-1, compared to previous estimates of one in 100,000 cells. Among asymptomatic seropositive subjects, 1 in 50,000 cells contained the virus. The study did not determine in what percentage of cells HIV was active or latent.

HIV was detected in the plasma of all seropositive patients, none of whom were receiving antiviral treatment. P24 antigen, however, was not detected in some of these patients suggesting that, in the absence of chemotherapy, HIV-1 replication is never entirely latent. The researchers state that the plasma culture technique is a sensitive method for detecting HIV in untreated patients, and may be a good way to assess factors that activate viral replication and to determine the effects of antiviral drugs.

Another study, published in the December 14, 1989 NEJM, used similar testing techniques to isolate HIV in PBMC of almost all seropositive subjects regardless of stage of infection. The study of 213 seropositive subjects tested detected HIV in the plasma of 25 percent of asymptomatic subjects, 45 percent of subjects with symptoms, and 82 percent of subjects with AIDS. The development of plasma viremia was associated with a marked decrease of CD4+ lymphocytes and a worsening of clinical symptoms and, unlike p24 antigen levels, was sustained. In addition, p24 antigen was detected in only 45 percent of subjects with plasma viremia.

Next Month

In order to ensure the efficacy of AIDS prevention programs, funding agencies are requiring AIDS groups to provide evidence that their interventions work. “Evaluation,” through which such evidence is gathered, may be particularly difficult for grassroots organizations who lack the resources to perform sophisticated analysis. In the February issue of FOCUS, Deborah Rugg, PhD, a Centers for Disease Control Research Psychologist examines less rigorous adaptations of evaluation techniques that still offer insights into efficacy, and discusses how evaluation may improve interventions. Interventions that may be effective in Western culture may not work in developing countries. Also in the February issue, John David Dupree, PhD, Program Officer at AIDS.COM in Washington, D.C., discusses how four AIDS-related exercises developed in Western countries may be adapted for use in non-Western cultures.