Nutrition Support of HIV+ Patients

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Case management strategies for the nutritional support of patients infected with the human immunodeficiency virus (HIV) are evolving as the disease becomes less rapidly fatal and more chronic. Nutritional status changes in advanced HIV infection are similar in many respects to protein-calorie malnutrition. Current clinical effort and research focuses on the beneficial effects of preserving lean body mass and keeping asymptomatic patients in good nutritional status by preventing micronutrient deficiencies and by treating preexisting nutritional problems rather than attempting to intervene late in the disease’s course. After secondary malnutrition has already developed, nutrition support and intervention trials only late in the disease process have not been promising in reversing weight loss once it has occurred. Special diets, such as lactose- or gluten-free diets, may be helpful in some cases as symptomatic treatment of some opportunistic infections, and such measures may slow additional losses. However, secretory diarrhea, which often seems to be inherent to the disease itself, is not ameliorated by such measures. Current research is focusing on the potential role of glutamine in slowing malabsorption and on combinations of diet and drug treatments.

Asymptomatic patients are now the focus of concern. Preserving good nutritional status by attention to preventing weight loss and loss of lean body mass and assuring food safety are primary. Symptomatic patients require specific assistance depending on the presence of opportunistic infections and the drugs required. Specific nutrition support measures depend on whether or not the gut is functional. New issues relating to the nutrition of HIV infected patients include extensive use of unproven or questionable therapies, the lack of utility of low bacteria diets on an outpatient basis, and special challenges arising with infants and children with HIV. (Henry Ford Hosp Med J 1991;39:60-5)

Nutritional problems of patients infected with the human immunodeficiency virus (HIV) vary, depending on the phase of the illness and on individual responses. No longer as rapidly fatal as it once was, HIV infection resembles other chronic wasting diseases characterized by anorexia, nausea, vomiting, malabsorption, diarrhea, fever, and other pathologies. The frequent result is a patient who has significant weight loss, protein-calorie malnutrition, and multiple nutrient deficiencies. It is not yet possible to reverse the progress of the HIV disease itself, nor all of the resulting nutrition-related pathology. However, quality of life may be enhanced and morbidity and mortality decreased by preventing secondary malnutrition, preserving lean body mass, minimizing signs and symptoms of malabsorption, and providing adequate levels of all nutrients.

The Role of Nutrition in HIV Infection

Several lines of evidence point to a role for nutrition in HIV infection (1), and changes in nutritional status are readily evident. The mechanisms of malnutrition and weight loss in the acquired immunodeficiency syndrome (AIDS) include reduced food intake, malabsorption, and altered metabolism. Decreased dietary intake leads to decreased weight, altered body composition including seriously lowered lean body mass, and deficiency of vitamins and minerals (2,3). Some of these changes, such as decreases in blood levels of zinc and vitamin B-12, may merely be markers of underlying infections and not the direct result of HIV infection. Weight loss is attributed not only to deficient diet but also to malabsorption and altered metabolism. Some of these changes appear to be amenable to early intervention.

Patients who test positive for HIV (HIV+) need nutrition education and support at all stages of their disease. Yet most often these needs receive attention only when malnutrition is frank and the patient is very ill.

Nutritional Supplementation and Immune Function

Nutritional supplementation may improve immune function in nutritionally depleted HIV+ patients. In the 1980s, when AIDS was first recognized as a disease entity, the characteristic protein-calorie malnutrition was postulated to be the cause of the immune dysfunction. Immune function is indeed depressed in patients with protein-calorie malnutrition, and changes in cellular and humoral immunity are similar to those seen in AIDS.
Opportunistic infections are common in both disorders. However, in protein-calorie malnutrition, the immune dysfunction can be reversed by refeeding and treatment of coexisting infections, whereas in AIDS some deficits in immune function remain even after nutritional rehabilitation.

Thus, the wasting and immune dysfunction characteristic of AIDS are not simply the sequelae of protein-calorie malnutrition. However, protein-calorie malnutrition is a factor "which influences both susceptibility to HIV infection and progression of HIV disease by impairing systemic and organ specific (gastrointestinal and pulmonary) immune function" (1). For example, protein-calorie malnutrition may allow depletion of the T-helper cells with a lesser degree of viral invasion, making the patient more vulnerable to those complications so devastating in AIDS. The multiple micronutrient deficiencies which occur in AIDS may also have adverse effects on resistance to infection and immune function. Reasonably, if overall health and function are to be improved, improvement of nutrition must accompany the treatment of other complications.

At present the mostly observational human studies have failed to demonstrate definitive cause-and-effect relationships. In vitro tests of immune function sometimes change in response to nutritional measures, but improvement in the clinical immune status has not been demonstrated. Evidence, however, reveals that nutritional status may be associated with some preventable alterations in immune function. As nutritional status declines, particularly weight and lean body mass, rates of opportunistic infections appear to rise in patients with HIV. Serum levels of some nutrients correlate with immune response, suggesting that nutritional status may affect immune function. Even though nutritional repletion does not appear to improve the immunological status predictably, it may nevertheless improve the overall function of daily living. Accordingly, it seems prudent to maintain the best possible nutritional status.

Consequences of Malnutrition in Patients with AIDS

The possible consequences of malnutrition in patients with AIDS include altered immune system function and increased morbidity, debility, and mortality. The potential role of special nutritional support in assisting these patients merits consideration. When HIV infection was first recognized, nutrition was not often considered a priority concern during the asymptomatic phase of the disease, before a large amount of weight was lost. Even today, many physicians and other health care providers remain ambivalent about its importance. Few hospitals have adopted a nutrition support protocol for patients with AIDS. A 1988 survey of 150 physicians and dietitians in cities with a high incidence of AIDS disclosed that 80% of the hospitals did not have a nutrition management protocol for the condition and only about 50% of hospitalized patients received nutritional support (4). Furthermore, the nutritional support provided was often parenteral despite the greater risk of infection by that route.

For asymptomatic individuals (stages I and II as determined by the Centers for Disease Control), an annual review of nutritional status should suffice after initial diagnosis. However, for those in the later stages of the disease, treating complications and opportunistic infections is critical. Neglecting nutritional support of these debilitated patients, who are being treated aggressively otherwise, unwisely diminishes the possibility of improvement.

Results of Nutritional Intervention Trials

In the ten years since the HIV epidemic first began, we have come to understand what nutritional therapy can and cannot do in treating HIV infection. Progress and problems still remaining have been summarized in a recent monograph (1). Current practices are largely empiric, but as our understanding of the immune system and the role of nutrition increases, giant strides in nutritional support of people with AIDS will be possible.

The administration of specific nutrients or diets including essential fatty acids, cobalamin, and zinc has been attempted in patients with AIDS-related complex (ARC) or AIDS because biochemical indicators of these nutrients are altered for the worse in symptomatic HIV+ patients. However, little symptomatic improvement nor amelioration in immune status was demonstrated. Some of these nutritional changes probably result from the illness itself and are not dietary micronutrient deficiencies.

In HIV+ patients with diarrhea, the effectiveness of special diets, such as lactose- or gluten-free diets, varies. However, enteral or parenteral therapy can produce positive changes in body weight and cell mass even though such changes are not always accompanied by improvement in immune response.

In the next few years, as we learn more about nutritional approaches to anatomic and physiological modulation, it will be possible to enhance immune functions, stimulate anabolism, and improve gastrointestinal integrity. Some substances currently being studied are omega-3 fatty acids, growth factors, special nitrogen sources required by certain cells (glutamine, arginine, cysteine, histidine, taurine, and the nucleotides), and the structured lipids.

At present nutritional support is at least helpful in permitting patients to respond better to treatment for infections or other problems resulting from immune deficiency. Nutritional support by itself does not appear to alter the course of the underlying immunosuppression (1). However, general health as well as immune system function is certainly worsened by malnutrition. Malnutrition during HIV infection increases morbidity, alters organ function, and impairs the patient's tolerance for treatment. Thus, malnutrition in HIV+ patients results in increased dependency, longer hospital stays, reduced quality of life, and increased mortality. Death from wasting in AIDS appears to be due to the depletion of the body cell mass to a level below which death ensues. Similar effects occur in starvation and in death from metastatic cancer (5,6).

Practical Issues

The immediate goals of nutrition support in HIV+ patients are to avoid loss of lean body mass, to prevent micronutrient de-
ficiencies, and to treat preexisting nutritional disorders as well as malnutrition secondary to the HIV-related illnesses. These goals should be accomplished with the least possible disruption of the patient’s usual eating habits. Therefore, nutritional support usually begins with oral feeding and progresses to enteral feeding by special routes if necessary and in some rare instances to parenteral routes. Aside from medical issues, treatment considerations must include the patient’s preferences and prognosis as well as ethical issues and costs.

Satisfactory management of HIV+ patients requires a multidisciplinary approach. Physicians, nurses, registered dietitians, social workers, and various subspecialists must be involved in the caregiving process, both in the hospital and in the community (7).

Nutritional needs of HIV+ patients vary with the stage of the illness. Few studies are available on nutritional status during the early stages of the disease. In one recent study, a group of patients were enrolled in a protocol to test the efficacy of AZT therapy in early ARC and asymptomatic HIV+ patients. In about a year, body weight, body fat, and serum proteins fell slightly in the asymptomatic patients, while those with more advanced disease had changes in total lymphocyte count and hematocrit (8). Loss of weight may be one of the earliest signs of disease in otherwise asymptomatic patients.

Early in HIV infection, patients usually experience little difficulty eating but often are concerned about diet and may adopt nutritional practices which they believe will improve their general health, particularly the immune system. Intentional weight gain has been accomplished by some HIV+ patients (9). However, normal weight does not always imply normal nutrition, and it is unknown whether intentional weight gain is beneficial (6,8).

When they learn of the diagnosis, most HIV+ patients make some dietary changes. These are usually consistent with the Dietary Guidelines for Americans (less fat, less alcohol, and the like) (10) but may also include unproven practices such as the use of megadose vitamin supplements and health foods (11). Among homosexual men, the group which has been studied most, these unproven remedies include not only large amounts of vitamin and mineral supplements but also various special diets such as macrobiotics and herbal preparations (12-15).

Of course, loss of lean body mass and micronutrient deficiencies should be prevented if possible. The Commonwealth of Massachusetts has recently developed a nutrition protocol for HIV+ patients. All such patients are viewed as needing an initial nutritional assessment. At the first visit, information is provided about basic nutrition and food safety, oral hygiene, and food assistance programs, such as WIC (the special supplemental federal program for women, infants and children), food stamps, food pantries, and home-delivered meals. A culturally-specific, individual nutritional care plan can then be developed, and eating habits are kept as close to normal as possible.

**Food Guides for HIV+ Patients**

In asymptomatic HIV+ patients at any stage of the disease, the goal of nutrition counseling is an adequate and balanced diet to maintain weight and prevent malnutrition. Energy intake must be adequate and nutrient density high, while meeting the Recommended Dietary Allowances (RDA) for protein, vitamins, and minerals. The recently published Dietary Guidelines for Americans is a useful guide (10). Vitamin/mineral supplements, if used at all, are kept between 100% and 200% of RDA levels. Megadoses of single or multiple nutrients are not recommended. Whether the period of disease-free survival is extended by improved nutritional status is unknown, but there is little doubt that nutritional status can be enhanced.

For newly diagnosed patients, sound guides written in lay terminology are available on nutrition and AIDS (16,17). Unproven remedies abound, and patients are likely to need information and advice about them. Another area of concern is substance abuse, particularly alcohol. Some patients overindulge in alcohol in their attempt to deal with the devastating implications of HIV infection. Anticipatory guidance may help them to recognize and deal with this sort of problem.

Food-borne infections must be scrupulously avoided in immunosuppressed patients, because what would be a minor incident for a healthy person might become life-threatening. HIV+ patients are 300 times more susceptible to salmonella than healthy persons if they ingest contaminated food. To counter such food risks, a videotape on food safety is available free of charge (18) (see the Appendix for a brief summary of these guidelines). An excellent set of articles on all aspects of foodborne illness is also available (19-28).

Symptomatic HIV+ patients suffer from a variety of opportunistic infections which flourish because of the impaired immunity. Infections with *Pneumocystis carinii*, *Mycobacterium*, *Candida*, *Cryptosporidium*, and herpes virus are frequent. Because of gut changes, the drugs used to control infections may themselves cause iatrogenic malnutrition. Several studies suggest that nutritional status may be associated with survival in AIDS and that the rate of decrease in serum albumin may be an indicator of survival (6). Wasting is extremely common in AIDS patients (29), and the Task Force on Nutrition Support in AIDS (30), as well as other groups (1), has marshalled evidence that nutritional support can minimize deterioration. Certainly, good nutrition is a priority during hospital treatment, and discharge planning should include attention to nutritional maintenance at home. Few such patients are well when they are discharged, and liaisons between inpatient and outpatient services in referral centers, home care services, and other community resources are needed. Unfortunately, services for these patients are often fragmented. Frequent visits to nutritionists may be necessary for special diets including oral nutritional supplements. If special feeding routes are employed, home supplies and equipment, feeding tubes, pumps, intravenous lines, and hyperalimentation fluids and blender use must be provided. The patient may need services from a commercial company, the visiting nurse association, home health aids, and homemaker services. With very debilitated patients living alone or without much help, food procurement and preparation and cleanup services may be necessary.

McQuiggin and Andrassy (31) have provided a useful flow chart for dealing with patients at risk for nutrition depletion or
those already malnourished. They also provide indications for nutrition counseling.

**Nutritional Assessment**

In nutritional assessment the first essential determination is whether gut function is normal or if treatment can permit oral intake. The next assessment is to determine that energy intakes are adequate. Procedures for calculating energy needs consist of estimates of resting metabolic rate plus a factor for physical activity and additional allowances for fever or other stresses known to be present (2).

If oral intake meets over two-thirds of needs, oral supplements and nutritional counseling relative to individual problems will suffice. Advice must be individualized, because measures for dealing with one symptom may be inappropriate for another.

In addition to reduced food intake caused by anorexia, depression, fatigue, drug side effects, or fever, the presence of oral and esophageal lesions may make chewing and swallowing difficult. While antinausea and anti diarrheal medications may be helpful (1-3,32), dietitians can assist by developing an individualized nutritional care plan (33).

When energy intake by the oral route is below two-thirds of needs and cannot be remedied by supplements and nutritional counseling, more aggressive nutritional support must be provided. Not only the technicalities of providing such support must be considered but also whether or not improved nutritional status, quality of life, and/or patient comfort will result (2,3,33). If the gut is functioning, an enteral formula is usually provided. When nutrition support is planned for less than one month, nasogastric tube feeding is preferred; if therapy will exceed four to six weeks, a tube enterostomy is preferred (31). Patient wishes must be considered in making this decision, especially when the clinical condition makes options possible (1).

Gastrointestinal tolerance for fat and other nutrients, as well as maintenance of satisfactory serum albumin levels, must be monitored when using any enteral regimen. Lactose-free polymeric formulas are usually used, and the level of fat depends on fat tolerance. If absorption is poor, elemental formulas may be employed, but there is no evidence that they confer specific advantages (32). Because associated health problems vary, reassessment of the individual's tolerance of the formula is needed from time to time. Adjustments may be needed in rate, volume, or composition of the formula.

**Use of Parenteral Nutrition**

Parenteral nutrition is considered only when the gut is not functioning or when the patient is unable to tolerate an enteral formula. The coexisting disease should be treatable with a favorable prognosis. Although there are no absolute indications or contraindications, restoration of nutritional status clearly does not alter the underlying immunodeficiency. Accordingly, the therapeutic team must consider the patient's wishes and quality of life before initiating therapy.

Two surveys have been completed on the outcome of parenteral nutrition in patients with AIDS. Data on 56 HIV+ patients receiving parenteral nutrition at home were collected for over four years. Like patients with advanced cancer, these patients required frequent hospitalization and most experienced little rehabilitation; 95% were dead within a year of commencing total parenteral nutrition (TPN) support (34). Another series reviewed 54 hospitalized AIDS patients over a four-year period (35). Nutrition support, either enteral or parenteral, was not correlated with survival. In fact, survival was lower in those who received TPN, but these patients were probably sicker initially.

Although routine parenteral nutrition for very ill AIDS patients does not appear to increase quality of life, rehabilitation, or survival, it may be warranted in specific cases. There are no unambiguous means for making these decisions. They are difficult and too important to be made by the physician alone. Significant others, the patient, religious advisers, those with expertise in medical ethics, and even medicolegal experts may need to be involved.

Intervals of peripheral alimentation may be used when enteral feeding is insufficient as is the case during an episode of pneumonia or during courses of aggressive drug treatment.

TPN is required for survival when severe malnutrition is associated with a nonfunctioning gut or when patients are unable to achieve adequate caloric intake by any other route. By using home care services, parenteral and enteral nutritional therapies are possible at home. However, the patient or a caregiver must be able and willing to manage the equipment and the procedures; the home care services provide assistance but not total support (3). Although the risk of contracting nosocomial infection is low to well-trained caregivers, hygienic precautions are essential in administering intravenous nutrition therapy to HIV+ patients (36). With regimens of TPN, periodic reassessment to determine the possibility of transition to enteral nutrition is a prudent policy.

**New Issues in HIV Infection**

**Unproven therapies**

For several years we have studied the impact of various unproven therapies, including nutritional therapies, on HIV+ patients (37). We became aware of the extensive use of unproven remedies in the 1980s, when HIV+ patients started seeking our advice about unconventional preparations of vitamin/mineral supplements, often in megadose amounts, health foods, and diets which they believed were helpful in preventing progression of the disease to ARC and AIDS. Many HIV+ patients spent large amounts of money on these therapies, but quality of life often suffered from their use, and they wasted their limited time and resources on inefficacious treatments. In some cases deception and outright fraud were evident, and, in their hope for cure, patients were neglecting conventional treatments, including nutritional support measures, which might be helpful in dealing with some of the opportunistic infections and other health problems. The common therapies include megadoses of vitamins A, E, C, B-12, selenium, and zinc, the so-called "immune power


**Glutamine**

The possible role of glutamine in preserving intestinal villi has generated much interest. The most abundant amino acid in the body, glutamine serves as the primary carrier of nitrogen from the periphery to visceral organs, and its carbon skeleton is used to make nucleotides in cells. Until recently it was regarded as a nonessential amino acid, but increasing evidence shows that some tissues, including the gut, have requirements for the amino acid that exceed their synthetic ability. When the gut is damaged or altered by opportunistic infections, it may be impossible for food sources of amino acids to reach the cells of the gut wall, even if they are provided in foods, and supplies may be further reduced if the patient is not eating. There is some evidence that intestinal utilization may also be elevated in AIDS, as it is in many other catabolic illnesses and in stress. Also, parenteral nutrition formulas do not always provide large amounts of glutamine, unlike enteral formulas. When glutamine is added to TPN solutions, colonic mucosal cellularity improves and fatty liver does not develop in other catabolic illnesses in which it has been used (38,39). Therefore, work is now proceeding to determine if protein catabolism in AIDS can be reduced by use of TPN solution supplemented with glutamine.

**"Low bacteria diets"**

Immunosuppressed patients are particularly vulnerable to infections. Sterile or low microbial foods are often provided to patients undergoing bone marrow transplants for leukemia during the period of chemotherapeutic bone marrow suppression immediately prior to transplantation. Patients are hospitalized during these procedures, and provision of a sterile environment is attempted because they are extremely vulnerable to infection. HIV+ patients also suffer from immunosuppression, and the use of low bacteria diets has also been suggested for them. The problem is that the HIV+ patients are not hospitalized and the immunosuppression is not temporary but long-lasting. Because present evidence does not suggest that low bacteria diets offer an advantage over usual diets, they are not recommended (3). Moreover, for practical reasons alone, such measures are unwarranted on an outpatient basis. The Appendix provides guidelines for food safety which are appropriate.

**HIV+ infants and children**

The diagnosis of HIV in infants and children has been well described (40). The HIV pandemic will kill at least 3 million women and children worldwide in the 1990s and more than 1 million uninfected children will become orphans because their parents died of AIDS (41). Special concerns about cases of AIDS among infants and young children are that in them the disease progresses faster, the manifestations of the disease are different from those of affected adults, and all of these patients are by their very nature dependent. Medical issues which must be addressed include the possibility of transmission through human milk and its implications for milk banks, the care and feeding of HIV+ infants and children when they are in relative health and when they are ill, and how to provide nutritional care and anticipatory guidance when care is so uncoordinated (unpublished observations).

Problems of case management are especially acute among infants and children who are chronically ill with AIDS. Social problems including abandonment, child abuse and neglect, crises involving "boarder babies" who are kept in hospitals because there are no alternative sources for care, and issues surrounding school attendance and stigmatization must all be confronted.

The major mode of HIV transmission to babies occurs either during pregnancy or the labor and delivery process, while transfusion-transmitted disease occurs among both hemophiliac and other children. Mothers’ milk does not seem to be a major route of transmission. However, HIV+ women are advised to avoid breast-feeding because the virus is present in human milk and transmission is theoretically possible (3,40). The natural history of HIV infection and risk of transmission are now becoming clear. Monitoring methods, which include titers of the virus, immunologic status, and clinical signs, permit earlier identification and symptomatic treatment, but definitive therapies are still unavailable (42).

**Conclusion**

The HIV epidemic raises ethical and economic issues which previously were debated primarily among those caring for the acutely ill or the very old and chronically sick. People most likely to suffer from HIV infection are often disenfranchised and stigmatized for other reasons, such as homosexuality, substance abuse, sexual freedom, or a previous handicap such as hemophilia. The tendency to find fault and to assign blame, common among providers of health care as well as patients and their families, is in no way helpful for treatment. Progress continues in the nutritional field as well as in many others in developing comprehensive and humane systems for caring for the problems of daily living as well as the medical and terminal illness problems of patients with AIDS (7).

**Appendix**

**Food Safety Guidelines**

Avoid raw foods high in protein, such as uncooked eggs, rare or raw meat, sushi, raw fish, rare poultry, etc. (due to parasites and microbiological contamination).

Avoid raw or cracked eggs; cook eggs well.

Thoroughly cook red meats, poultry, and fish before eating.

Do not reheat poultry which is stuffed; cook and serve stuffing separately.

Avoid raw milk; use only certified milk products.

Use appropriate and hygienic preparation, storage, holding, and cleanup procedures.

Wash fruits and vegetables thoroughly.
Do not use foods after the “sell by” date.
Refrigerate foods at 35° to 40° F.
Refrigerate perishables as soon as possible after purchase and immediately after they are used.
Avoid overcrowding refrigerators; cold air must circulate.
Do not use perishable food which has been refrigerated for many weeks.
When in doubt, throw out questionable foods.
Refrigerate egg-based and other animal food-based items after opening (including mayonnaise, formula, eggnog, and nutritional supplements).
Use different cutting boards for raw and cooked foods and wash cutting boards in hot, soapy water; avoid wooden cutting boards which are difficult to clean.
Avoid inappropriate use of microwave ovens.
Thaw frozen foods, especially meats, in microwave oven or refrigerator, not by leaving out at room temperature.
Be sure foods are completely heated through before eating.
Do not thaw and reheat items several times.
Keep food either hot (above 140° F) or cold (below 45° F).
Avoid leaving foods out for more than two hours between 45° F and 140° F (temperature range at which bacterial growth is greatest).
Wash hands before and after handling or eating food.

References