General Nutrition Management in Patients Infected with Human Immunodeficiency Virus

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Nutritional management is integral to the care of all patients infected with human immunodeficiency virus (HIV). HIV infection results in complicated nutritional issues for patients, and there is growing evidence that nutritional interventions influence health outcomes in HIV-infected patients. We define levels of nutritional care, and we discuss when patients should be referred to providers (i.e., registered dietitians) with nutritional and HIV expertise.

Nutritional management is integral to the care of all HIV-infected patients. Approximately 920,000 Americans (36 million people worldwide) are estimated to be infected with the HIV, with ~40,000 new infections in the United States per year [1, 2]. During the course of HIV infection, several nutritional issues are likely to arise, including the need for education about the following:

- Healthful dietary principles.
- Management of metabolic complications due to drug therapies.
- Management of drug and food or nutrient interactions.
- Management of gastrointestinal symptoms that may influence the types and amount of food ingested.
- Appropriate use of herbal and/or nutritional supplements.
- Cultural and ethnic beliefs related to diet and food [3, 4].

HIV-infected patients may be at nutritional risk at any point in their illness [5–8]. Severe malnutrition and weight loss, particularly loss of lean tissue, and delayed weight gain and height velocity in children, can affect morbidity and mortality [9–21]. Fear of developing fat redistribution syndrome, with central obesity and loss of subcutaneous fat, may prevent patients from beginning or continuing potent antiretroviral therapies [22–26]. Development of hyperglycemia and lipid abnormalities may increase the risk of diabetes, heart disease, and stroke [27–31]. The appearance of these metabolic changes may induce patients to cease HAART or to change to less effective antiretroviral regimens.

Food and drug interactions are an important issue for effectiveness and tolerability of HAART regimens. The presence of food in the gastrointestinal tract can influence the absorption of several HIV medications such as didanosine, indinavir, saquinavir, and nelfinavir. Drug-food interactions can influence serum drug concentrations, thus increasing the likelihood of side effects when serum concentrations are too high and increasing
the risk for viral resistance and loss of durable viral suppression when serum concentrations are too low. In addition, complicated medical and food schedules as well as side effects of the medications can compromise adherence to and tolerability of the regimen. Table 1 summarizes the drug-food interactions with antiretroviral medications [32–34]. It is important for health care professionals to be knowledgeable about these interactions so they can help patients with timing of their antiretroviral regimens with regard to food.

Anorexia and oral/gastrointestinal symptoms such as pain, nausea, vomiting, malabsorption [35–37], and diarrhea may arise from HIV infection, secondary infections, encephalopathy [38], or drug therapies. Inability to eat food secondary to complicated medical regimens or fatigue adds to the nutritional risk. Opportunistic infections [39] are associated with increased resting energy expenditure, and HAART may be associated with increased [40] or decreased [41, 42] resting energy expenditure. Clinically, these symptoms may prevent adequate nutritional intake [8, 43–46], resulting in continued weight and lean tissue loss [39, 41], vitamin or mineral deficiencies [47–58], and poor nutritional status [59, 60]. Chemical dependency and socioeconomic factors can limit access to proper food and nutrition [61–63]. The malnutrition that results can itself contribute to an increased immunocompromised state [64–68].

WHAT EVIDENCE IS THERE THAT NUTRITIONAL INTERVENTION INFLUENCES OUTCOME?

Nutritional counseling has been shown to be effective; it has also been shown to influence health outcomes in HIV infection [69–71]. When dietary counseling is combined with oral nutritional supplements, there is additional evidence for its value [72–76]. Nutritional counseling also facilitates access to adequate dietary intake.

A regular resistance exercise program has been shown to improve lean body mass and strength in HIV-infected patients [77]; such exercise reduces serum triglyceride levels with [78] and without [79, 80] anabolic therapies. Promoting regular fitness may minimize muscle wasting [81] and normalize blood lipids without requiring the addition of pharmacologic therapies to patients already receiving complicated medical regimens.

Several studies have documented marginal-to-deficient vitamin and mineral status associated with adverse outcomes [5, 6, 50–59]. However, there is little documentation in the literature that supplementation beyond what is recommended has had any impact on clinical outcome. If a patient’s vitamin or mineral status is deficient, supplementation is clearly necessary.

Few studies have looked at enteral and parenteral feedings in HIV-infected patients. In general, patients who have gastrointestinal disease, including malabsorption, benefit from enteral or parenteral feedings [82–94]. Despite the small number of studies, the benefit of enteral and parenteral feedings was demonstrated for patients who were not receiving active antiretroviral therapy. This benefit was also demonstrated to extend to life expectancy.

Various pharmacological therapies have been used to maintain or increase body weight in patients who experience wasting. Studies vary in design from open-label to placebo-controlled trials. Appetite stimulants such as megestrol acetate [95–97] and dronabinol [98, 99] improve appetite and body weight. Anabolic therapies such as growth hormone [100–103], oxandrolone [104, 105], nandrolone decanoate [80, 106, 107], and combinations thereof [108, 109] can help maintain or increase lean body mass, even in those patients who require physiologic testosterone replacement [110–114]. Anticytokine therapies such as thalidomide [115] and pentoxifylline [116] have been used to attenuate the catabolic response to inflammation. Other agents have been used to treat the signs and symptoms of the metabolic complications associated with HAART, including antilipemic medications such as statins, fibrates, fish oil, and niacin and antiglycemic medications such as metformin and the glitazones. Therapies for symptomatic relief such as anti diarrheals, antiemetics, and analgesics can also help reduce a patient’s nutritional risk.

Since the era of HAART, incidence of wasting has been reduced [117], which is perhaps the result of the prevention of disease progression and opportunistic infections. However, it is not clear that HAART results in improved body weight [118]. If weight does increase while the patient receives antiretroviral therapy, the gain appears to be mostly fat rather than lean body mass [119]. In children, catch-up growth has been reported after initiation of HAART [120, 121].

WHAT ARE THE LEVELS OF NUTRITION CARE?

Because of the rapidly changing picture of HIV disease, the CDC classification by CD4 count and clinical signs and symptoms may not be appropriate for nutritional complications or referrals. Rather, defining levels of risk for nutritional compromise as the trigger for nutrition referral and intervention may be more practical, given current resources. Ideally, all patients infected with HIV should have access to a registered dietitian (RD). Nutritional and medical assessments are needed for optimal individualized care [70, 122].

The initial visit of a new HIV-positive patient should include screening for nutritional risk. A validated screening tool is needed to assess the degree of nutritional risk. The purpose of screening is to categorize a patient’s nutritional needs as low, moderate, or high risk for nutritional compromise. If indicated, referral to an RD for nutrition assessment and development of an individualized care plan should be made. Follow-up visits of stable HIV-positive patients should include an annual screen-
<table>
<thead>
<tr>
<th>Antiretroviral medication and usual adult daily dosage</th>
<th>Food effect</th>
<th>Dietary recommendation</th>
<th>Dosage form</th>
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</thead>
<tbody>
<tr>
<td><strong>NRTI</strong></td>
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<tr>
<td>Zidovudine (Retrovir-AZT-ZDV), Glaxo Wellcome, 300 mg b.i.d.</td>
<td>Administration of zidovudine capsules with food decreased peak plasma concentration by &gt;50%; however, AUC may not be affected; or AUC decreased by 25% after meal. Avoid alcohol.</td>
<td>Take on empty stomach, if possible. If this is not possible because of GI side effects, recommend taking with low-fat meal.</td>
<td>300 mg tablet; 100 mg capsule; 50 mg/5 mL syrup</td>
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<tr>
<td>Lamivudine (epivir-3TC), Glaxo Wellcome, 150 mg b.i.d. or 300 mg q.d.</td>
<td>Food has little effect on the extent of absorption. Avoid alcohol.</td>
<td>Can be taken without regard to meals. If taken with meals, may decrease GI side effects.</td>
<td>150 mg tablet; 10 mg/mL oral solution</td>
</tr>
<tr>
<td>Zidovudine-lamivudine (Combivir, AZT-3TC), Glaxo Wellcome, 1 tablet b.i.d.</td>
<td>Administration of zidovudine capsules with food decreased peak plasma concentration by &gt;50%; however, AUC may not be affected; or AUC decreased by 25% after meal. Avoid alcohol.</td>
<td>Take on empty stomach, if possible. If this is not possible because of GI side effects, recommend taking with low-fat meal.</td>
<td>300 mg AZT and 150 mg 3TC per tablet</td>
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<tr>
<td>Abacavir (Ziagen-ABC), Glaxo Wellcome, 300 mg b.i.d.</td>
<td>There was no significant difference in systemic exposure (AUC) in the fed and fasted states. Alcohol increased AUC by 41%. Avoid alcohol.</td>
<td>Can be taken without regard to meals.</td>
<td>300 mg tablet; 20 mg/mL oral solution</td>
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<tr>
<td>Zidovudine-lamivudine-abacavir (Trizivir,AZT-3TC-ABC), Glaxo Wellcome, 1 tablet b.i.d.</td>
<td>Administration of zidovudine capsules with food decreased peak plasma concentration by &gt;50%; however, AUC may not be affected; or AUC decreased by 25% after meal. Alcohol increased AUC of ABC by 41%.</td>
<td>Take on empty stomach, if possible. If this is not possible because of GI side effects, recommend taking with low-fat meal. Avoid alcohol.</td>
<td>300 mg AZT and 150 mg 3TC and 300 mg ABC per tablet</td>
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<tr>
<td>Didanosine (Videx EC-ddI), Bristol Myers–Squibb, 400 mg tablets q.d. for &gt;60 kg and 250 mg tablets q.d. for &lt;60 kg</td>
<td>Food decreases absorption. Administration with food results in approximately 55% decrease in AUC. Avoid alcohol as it exacerbates toxicity. Avoid antacids containing magnesium and aluminum.</td>
<td>Take on empty stomach, at least 30 min before or 2 h after a meal. Take only with water.</td>
<td>25, 50, 100, 150, 200 mg chewable/buffered tablets; 100,167, 250 mg/packet buffered powder for oral solution; 2 or 4 g/bottle of pediatric powder or oral solution; 125, 200, 250, 400 mg enteric-coated ddI</td>
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<tr>
<td>Stavudine (zerit-d4T), Bristol Myers–Squibb, 40 mg b.i.d for &gt;60 kg 30 mg b.i.d. for &lt;60 kg</td>
<td>Food has little effect on absorption. Avoid alcohol.</td>
<td>Can be taken without regard to meals.</td>
<td>15, 20, 30, 40 mg capsule, 1 mg/mL oral solution</td>
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<tr>
<td>Tenoforvir (Viread), Gilead Sciences, 300 mg qd</td>
<td>Administration with high-fat meal increased AUC by 40%. If taking didanosine, must take tenoforvir 2 h before or 1 h after didanosine.</td>
<td>Take with food.</td>
<td>300 mg tablets</td>
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<tr>
<td>Zalcitabine (Hivid-ddC), Roche Laboratories, 0.75 mg q8h</td>
<td>Administration with food decreases AUC by 14% (not clinically significant). Do not take antacids containing magnesium and aluminum at the same time as medication. Avoid alcohol. Do not take with metoclopramide (decreases AUC by 10%).</td>
<td>Can be taken without regard to meals.</td>
<td>0.375, 0.750 mg tablets</td>
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<td><strong>NNRTI</strong></td>
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<td>Delavirdine (Rescriptor-DLV), Pharamcia and Upjohn, 400 mg t.i.d.</td>
<td>Concentrations similar in fasting and fed states in steady-state dosing. Medications such as antacids containing aluminum and magnesium and didanosine should be taken at least 1 h after, they can decrease absorption. Avoid St. John’s wort (Hypericum perforatum), alcohol.</td>
<td>Can be taken without regard to meals.</td>
<td>100, 200 mg tablets</td>
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<tr>
<td>Efavirenz (Sustiva-EFV), Du Pont Merck, 600 mg/d</td>
<td>Low-fat meal improves tolerability. High-fat meal increased bioavailability by 50%. Take in the evening or bedtime to minimize side effects. Alcohol may increase side effects. Avoid St. John’s wort.</td>
<td>Can be taken without regard to meals; however, avoid high-fat meal.</td>
<td>50, 100, 200 mg capsules; 600 mg tablets</td>
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<tr>
<td>Drug</td>
<td>Absorption details</td>
<td>Dosage details</td>
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<tr>
<td>Nevirapine (Viramune-NVP),</td>
<td>Absorption not affected by food, antacids, or didanosine. Avoid St. John’s wort,</td>
<td>200 mg tablet, 50 mg/teaspoon oral suspension</td>
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<td>Roxane, 200 mg/d for 14 d,</td>
<td>alcohol.</td>
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<td>then 200 mg b.i.d.</td>
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<tr>
<td>Ampranavir (Agenerase-APV),</td>
<td>Take with or without food. If taken with food, avoid high-fat meal (&gt;87 g fat),</td>
<td>Can be taken without regard to meals.</td>
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<tr>
<td>Glaxo Wellcome, 1200 mg</td>
<td>as high-fat decreases absorption (decreases C_{max} and AUC). Avoid grapefruit juice</td>
<td>50, 150 mg soft-gel capsules (109 IU vitamin E/150 mg capsule). * 15 mg/mL oral solution (14% less bioavailable than capsules, thus doses not equivalent to capsules)</td>
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<td>b.i.d.</td>
<td>Increase fluid intake. Avoid extra vitamin E supplements (872 IU vitamin E /1200 mg ampranavir). Avoid St. John’s wort. Do not take antacids within 1 h of this medicine.</td>
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<tr>
<td>Indinavir (Crixivan-IDV),</td>
<td>Administration with high-fat, high-protein meal decreased serum concentrations by 84% and decreased AUC by 77%. It can be taken with a nonfat snack. Avoid grapefruit juice. Drink an additional 48 ounces of liquid daily to avoid kidney problems. Avoid St. John’s wort. Ritonavir-indinavir combination (400 mg q12h each) significantly increases the drug level of indinavir and eliminates the need to fast.</td>
<td>Take on empty stomach at least 1 h before or 2 h after a meal or with a low-fat meal (juice, skim milk, etc.). Take 1 h before or after ddI as buffer impairs IDV absorption.</td>
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<td>Merck, 800 mg q8h</td>
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<td>200, 333, 400 mg capsules</td>
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<td>Saquinavir (soft-gel capsule)</td>
<td>Administration with food (i.e., fatty meal) increases AUC 670%. Store capsules in refrigerator. Avoid alcohol, St. John’s wort. Tot intake.</td>
<td>Can be taken without regard to meals; however, avoid high-fat meal.</td>
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<tr>
<td>(Fortovase-SQVsgc), Roche</td>
<td></td>
<td>200 mg soft-gel capsule</td>
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<td>Laboratories, 600 mg t.i.d.</td>
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<tr>
<td>Saquinavir (hard-gel capsule)</td>
<td>Administration with food (i.e., fatty meal) increases AUC 200%. Taking with grapefruit juice will also increase absorption by 40%–100% as a result of inhibition of gut CYP3A4. Avoid alcohol, St. John’s wort.</td>
<td>Take with meal or up to 2 h after a full meal.</td>
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<tr>
<td>(Invirase-SQV), Roche</td>
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<td>200 mg hard-gel capsules</td>
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<td>Laboratories, 600 mg t.i.d.</td>
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<tr>
<td>Lopinavir-ritonavir (Kaltea,</td>
<td>Take with high-fat food for better absorption. Store the capsules in the refrigerator. Avoid St. John’s wort.</td>
<td>Take with meal or up to 2 h after a full meal with high calories and high-fat foods for better absorption.</td>
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<td>LPV-RTV), Abbott, 3 capsules b.i.d.</td>
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<td>200 mg soft-gel capsules</td>
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<tr>
<td>Ritonavir (Norvi-RTV), Abbott</td>
<td>Extent of absorption of ritonavir from the soft gel capsule formulation was 13%–15% higher when administered with a meal. Store capsules in refrigerator. Avoid St. John’s wort.</td>
<td>Take with meals, especially with high fat content.</td>
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<tr>
<td>600 mg b.i.d.</td>
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<td>133.3 mg LPV and 33.3 mg RTV per soft-gel capsule, 80 mg LPV and 20 mg RTV per mL oral solution</td>
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<tr>
<td>Nelfinavir (Viracept-NLF),</td>
<td>Plasma concentrations and AUC were 2–3-fold higher under fed versus fasting conditions. Increase fluid intake. Lactose-free dairy products or lactose may be needed to minimize diarrhea. Avoid acidic food or liquid. Avoid St. John’s wort.</td>
<td>Take with meals if possible. Mix oral solution with chocolate milk or oral supplements to improve taste.</td>
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<tr>
<td>Agouron, 750 mg t.i.d. or</td>
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<td>100 mg soft-gel capsules, 80 mg/mL oral solution</td>
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<td>1250 mg b.i.d.</td>
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</table>

**NOTE.** From [32–34]. AUC, area under the concentration-time curve (the total amount of drug absorbed is reduced when the AUC is decreased); GI, gastrointestinal; NNRTI, nonnucleoside reverse transcriptase inhibitor; NRTI, nucleoside reverse transcriptase inhibitor. Dosages for protease inhibitors are listed at nonboosted amounts. Ritonavir is often given in combination with other protease inhibitors, and the dosages are different. Refer to a physician with HIV expertise.

* Recommended daily intake for adults for vitamin E is 30 IU.
ing for nutritional risk. Follow-up visits for those with greater risk for nutritional problems should be referred to an RD in a timely manner on the basis of the urgency of the problem. Referrals to RDs are recommended on the basis of these priorities. The timing for the referral to an RD is made on the basis of these guidelines and expert opinion. In general, they apply to all age groups and both sexes.

Levels of nutritional risk are categorized as low, moderate, and high risk for nutritional compromise. The risk reflects consideration of multiple factors that may lead to nutritional compromise. The spectrum of nutritional intervention includes ensuring basic education on healthy diets, identifying common practices and diseases that traditionally require nutrition counseling or intervention, and assessing conditions that are specifically seen in HIV disease that are known to affect morbidity and mortality if nutritional intervention does not occur. Many of these factors span the spectrum of HIV disease; therefore, individualized assessment, rather than triage by stage of HIV disease, is recommended.

The following categories are based on those published by the American Dietetic Association [122, 123] and the Los Angeles County Commission on HIV Health Services [124]. The priority timeline for referral for patients categorized by nutritional risk is as follows: (1) **high risk**, to be seen by an RD within 1 week; (2) **moderate risk**, to be seen by an RD within 1 month; and (3) **low risk**, to be seen by an RD as needed. Detailed descriptions of the categories appear below:

### I. High risk (see RD within 1 week).

- A. Poorly controlled diabetes mellitus.
- B. Pregnancy (mother's nutrition; infant: artificial infant formula).
- C. Poor growth, lack of weight gain, or failure to thrive in pediatric patients.
- D. >10% unintentional weight loss over 4–6 months.
- E. >5% unintentional weight loss within 4 weeks or in conjunction with
  - 1. Chronic oral [or esophageal] thrush.
  - 2. Dental problems.
  - 3. Dysphagia.
  - 4. Chronic nausea or vomiting.
  - 5. Chronic diarrhea.
  - 6. CNS disease.
  - 7. Intercurrent illness or active opportunistic infection.
- F. Severe dysphagia.
- G. Enteral or parenteral feedings.
- H. Two or more medical comorbidities, or dialysis.
- I. Complicated food-drug-nutrient interactions.
- J. Severely dysfunctional psychosocial situation (especially in children).

### II. Moderate risk (see RD within 1 month).

- A. Obesity.
- B. Evidence for body fat redistribution.
- C. Elevated cholesterol (>200 mg/dL) or triglycerides (>250 mg/dL), or cholesterol <100mg/dL.
- D. Osteoporosis.
- E. Diabetes mellitus, controlled or new diagnosis.
- F. Hypertension.
- G. Evidence for hypervitaminoses or excessive supplement intake.
- H. Inappropriate use of diet pills, laxatives, or other over-the-counter medications.
- I. Substance abuse in the recovery phase.
- J. Possible food-drug-nutrient interactions.
- K. Food allergies and intolerance.
- L. Single medical comorbidity.
- M. Oral thrush.
- N. Dental problems.
- O. Chronic nausea or vomiting.
- P. Chronic diarrhea.
- Q. CNS disease resulting in a decrease in functional capacity.
- R. Chronic pain other than oral/gastrointestinal tract source.
- S. Eating disorder.
- T. Evidence for sedentary lifestyle or excessive exercise regimen.
- U. Unstable psychosocial situation (especially in children).

### III. Low risk (see RD as needed).

- A. Stable weight.
- B. Appropriate weight gain, growth, and weight-for-height in pediatric patients.
- C. Adequate and balanced diet.
- D. Normal levels of cholesterol, triglycerides, albumin, and glucose.
- E. Stable HIV disease (with no active intercurrent infections).
- F. Regular exercise regimen.
- G. Normal hepatic and renal function.
- H. Psychosocial issues stable (especially in children).

All patients of all levels of risk should be educated about healthy, balanced diets for their given lifestyle and physiologic requirements. Medical nutrition therapy should take into account the patient's age, sex, and physiological state, with special attention paid to pediatric growth and development, pregnancy, obesity, quality of dentition, and exercise practices. During nutrition assessment, family and medical history should be considered, particularly regarding diabetes, coronary artery disease, hypertension, and other cardiac risk factors. Recommendations (individualized care plans) should be adapted to stage of HIV progression, from asymptomatic to advanced stages with active
secondary infections. Socioeconomic, cultural, and ethnic background should be considered, including a history of mental health disorders or substance abuse as well as literacy level and financial status. Nutritional counseling or medical nutrition therapy should also be tailored to make the most of available access to care.

WHO SHOULD BE DOING THE NUTRITION ASSESSMENTS?

HIV medical nutrition therapy requires specialized knowledge of nutrition, especially in relation to HIV disease, medications, complications, and sensitivity to the infected and affected populations served. The number of qualified medical nutrition therapy providers is inadequate, and there are scant opportunities for training. HIV medical nutrition therapy providers can do the following:

- Work in concert with the HIV medical team.
- Receive continuing education each year, to include HIV medical, pharmacological, and nutritional updates as well as updates in any other relevant area.
- Be targeted for education and ongoing training through the Ryan White CARE Act, AIDS Education and Training Centers, or other comparable systems. The education and training of other health care professionals should include at least basic nutrition for patients with HIV.

The Food and Nutrition Board and Institute of Medicine (IOM) Committee on Nutrition Services for Medicare Beneficiaries issued a report in December 1999 evaluating the benefits and costs of the provision of nutrition services, including the services of an RD, to Medicare beneficiaries [125]. The IOM report found that the RDs are currently the single identifiable group of health care professionals with standardized education, clinical training, continuing education, and national credentialing requirements necessary to be directly reimbursed as a provider of nutrition therapy. The committee also recognized that other health care professionals could in the future submit evidence to be evaluated by the Centers for Medicare and Medicaid Services for consideration as reimbursable providers.

The Medicare Medical Nutrition Therapy Act of 1999 [126] defines medical nutrition therapy, requires a physician’s referral, and identifies and defines the qualifications of the provider. The Medical Wellness Act of 2000 [127], introduced on 9 March 2000, would provide preventive screening and counseling benefits to the Medicare program. This includes screening for hypertension and cholesterol and coverage for medical nutrition therapy by RDs for diabetes and for cardiovascular and kidney disease.

It is recommended that nutritional evaluations be performed by an RD [122, 123, 126, 128, 129] with experience in HIV nutrition, or an RD without such experience who consults with an HIV-experienced RD. In pediatric situations, an RD with pediatric experience and HIV knowledge is ideal. Otherwise, an RD who consults with a pediatric HIV-experienced RD is acceptable. The scope of practice laws in each state should be checked; they specify who may legally provide nutrition assessment, medical nutrition therapy, and basic nutrition information.

SCREENING TOOLS VALIDATED FOR HIV NUTRITION PROBLEMS

Several screening tools are used for assessment of risk for nutritional problems. After a review of the literature for nutrition screening of HIV-infected individuals, the following tools were identified. Only the Revised Subjective Global Assessment [130, 131] has been studied and reported for use in HIV-infected populations. The others, however, have been adopted and adapted for use in the screening of HIV/AIDS patients. They are as follows (descriptions follow):

- Scored Patient-Generated Subjective Global Assessment.
- Revised Subjective Global Assessment for HIV-Infected Individuals.
- Quick Nutrition Screen.
- Nutrition Referral Criteria for Adults and for Pediatrics.
- Nutrition Screening Initiative.

**Scored Patient-Generated Subjective Global Assessment.**

The Scored Patient-Generated Subjective Global Assessment (PG-SGA) [132] is validated for use in oncology patients. It is a widely used screening form that can also be used in the context of a comprehensive assessment. There are 2 sections to the PG-SGA. The first is generated by the patient and includes components of patient history with an assigned prognostic value, history of weight status, list of food intake, a checklist of symptoms that impede food intake, and a measure of functional capacity. The remainder of the form is generated by the health care provider and includes diagnosis, stress level, physical findings, and a score based on comprehensive review of the information. The form was designed to be administered by RDs, registered nurses, physician assistants, physicians, and other medical providers.

The form is based on the validated SGA of nutritional status developed by Detsky and associates [133–135]. The American Dietetics Association uses the PG-SGA as the standard in clinical pathways for oncology patients [136]. The original version was based on the premise that complications associated with malnutrition are minimized or reversible with refeeding.

**Revised SGA for HIV-Infected Individuals.**

Bowers and
Dols [130] revised the SGA and used it to evaluate the nutritional status of 36 HIV-positive patients. The revised SGA is an effective evaluation tool for stratifying patients into categories according to their nutritional status. Weight loss history, dietary intake, wasting, functional impairment, and gastrointestinal symptoms identified through the revised SGA relate directly to malnutrition. It can be used in a variety of settings, including homes, hospitals, home-care settings, doctors’ offices, and nurse-run clinics.

**Quick Nutrition Screen.** The Quick Nutrition Screen [137] was published in the Health Care and HIV Nutrition Guide for Providers and Clients by the Bureau of Primary Health Care and distributed for the use by its Ryan White CARE Act grantees. It was developed and reviewed by HIV nutrition, nursing, and other health care professionals and community representatives from both nongovernment and government agencies. Completed by clients, this screening tool has been adopted and adapted in numerous agencies across the country. As published in 1996, it requires updating. It has not been validated.

**Nutrition Referral Criteria for Adults (18 or more years) with HIV/AIDS and Nutrition Referral Criteria for Pediatrics (<18 years) with HIV/AIDS.** Nutrition Referral Criteria for Adults (18 or more years) with HIV/AIDS [122] and Nutrition Referral Criteria for Pediatrics (<18 years) with HIV/AIDS [123] were screening tools originally developed in 1997 by Dietitians in AIDS Care, a networking group in Los Angeles, as part of the nutrition standards of care, approved by the Los Angeles County Commission on HIV Health Services [124], a Title I EMA planning council. It had been reviewed by the multidisciplinary Standards of Care Committee of the Commission and subsequently adopted by agencies within Los Angeles County and throughout the country. It contains both time and symptoms and conditions that trigger nutrition referral to an RD. It has not been validated.

**Public Awareness Checklist of the Nutrition Screening Initiative.** The Nutrition Screening Initiative [138], formed in 1990, is a broad, multidisciplinary effort led by the American Academy of Family Physicians, the American Dietetic Association, the National Council on the Aging, and a coalition of more than 25 national health, aging, and medical associations. The Nutrition Screening Initiative developed the Public Awareness Checklist, a series of screening tools (Level I and Level II), along with a manual for professionals. This simple test was intended to increase the nutrition awareness of elderly people and not to diagnose malnutrition. The initiative validated the usefulness of the checklist as a public awareness tool. The Public Awareness Checklist, however, is the basis of nutrition screening tools developed for HIV and other disease conditions. A Clinician’s Guide to Nutrition in HIV and AIDS adapted both Nutrition Screening Initiative Levels I and II screening tools as its recommended screening tool for identifying persons at risk for nutritional problems [139]. There has been no report of its validation in HIV.

**HIV/AIDS Medical Nutrition Therapy protocols.** The purpose of HIV/AIDS Medical Nutrition Therapy protocols [122, 123] is to clearly define the level, content, and frequency of nutrition care needed in HIV disease. Originally developed and reviewed by members of HIV/AIDS and Pediatric Dietetic Practice Groups and the American Dietetic Association, it was published in 1996 and revised in 1998.

The screening criteria for nutrition referral are based on the following:

I. **Time considerations, starting with a nutrition assessment at baseline and thereafter according to the individual’s level of care, defined in the protocol.**

   A. **For adults:**
      1. Asymptomatic HIV infection: 1–2 times a year.
      2. HIV/AIDS symptomatic but stable: 2–6 times a year.
      3. HIV/AIDS acute: 2–6 times a year.
      4. Palliative: 2–6 times a year.

   B. **For children/adolescents:**
      1. No signs/symptoms or mild signs/symptoms: 1–4 times a year.
      2. Moderate signs/symptoms: 4–12 times per year.
      3. Severe signs/symptoms: 6–12 times a year.

II. **New or ongoing clinical conditions, and**

III. **The individual’s ability to understand and incorporate nutrition management skills.**

Although the protocol does not list specific screening conditions, it assumes that the health care team will base referrals on assessment factors spelled out in the protocols.

To date, no validation studies of the Medical Nutrition Therapy protocols have been reported. The Nutrition Guidelines for Agencies Providing Food to People with HIV/AIDS [140] refers to the protocols given above as the guide RDs should follow to provide medical nutrition therapy to persons with HIV/AIDS.

Of note, Heller et al. [141] have recently reported on an instrument to assess nutritional risk in HIV-infected children. Fifteen providers evaluated 39 children. Information collected included medical history and sociodemographic, dietary, anthropometric, and biochemical data. Medical, dietary, and anthropometric data were found to be good predictors of nutritional risk. In spite of the small sample size, the instrument was found to be valid and a good predictor of nutritional risk in HIV-infected children.
It is important to the health of persons with HIV/AIDS to have access to the services of an RD whose knowledge in the area of nutrition for HIV/AIDS is current. We recommend that each program have an RD in some capacity: full time, part time, or in consultation. The RD should provide a nutrition assessment, provide appropriate nutrition intervention counseling with appropriate educational materials, and participate in case conferences as part of the medical team.

References

33. Package inserts from all FDA-approved antiretroviral agents: zidovudine, lamivudine, didanosine, stavudine, zalcitabine, abacavir, delavirdine, efavirenz, nevirapine, ampranavir, lopinavir/ritonavir, ritonavir, indinavir, saquinavir (soft and hard gel capsules), nelfinavir, tenofovir.


125. Committee on Nutrition Services for Medicare Beneficiaries. The role of nutrition in maintaining health in the nations elderly; evaluating coverage of nutrition services for the medicare population. Washington, DC: Food and Nutrition Board, Institute of Medicine; December 1999.


129. California Medi-Cal Managed Care, RFA section 14, p. 4, glossary definition 5, addendum 6; February 1995.


