Nutrition Issues in Chronic Drug Users Living With HIV Infection

Human immunodeficiency virus (HIV) infection and chronic drug abuse both compromise nutritional status. For individuals with both disorders, the combined effects on wasting, the nutritional consequence that is most closely linked to mortality, appear to be synergistic. Substance abuse clinicians can improve and extend patients' lives by recommending healthy diets; observing and assessing for food insecurity, nutritional deficits, signs of weight loss and wasting, body composition changes, and metabolic abnormalities; and providing referrals to food programs and nutritionists. More studies are needed on the nutritional consequences of using specific illicit drugs, the impact on health of specific micronutrient and metabolic deficiencies seen in people with HIV, and the causes and clinical implications of body fat changes associated with HIV.

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Nutritional status strongly influences the well-being and survival of individuals living with human immunodeficiency virus (HIV) infection, which compromises nutritional status in complex ways that may produce malnutrition via multiple mechanisms (Mangili et al., 2006). The limited data available on the topic indicate that injection drug use further increases HIV-infected individuals' nutritional risk (Forrester, Tucker, and Gorbach, 2004; Smit et al., 1996):

- illicit drugs may interfere with nutrient absorption or alter appetite or metabolism;
- chronic drug users' lifestyles may lower nutritional status by impairing access to food, food selection, housing, and social support (Kim et al., 2001; Smit et al., 1996); and
- coinfection with hepatitis is common in injection drug users (IDUs) and has the potential to alter nutritional status significantly (Piroth et al., 1998). Patients with hepatitis frequently lose weight and may develop anemia and neutropenia (Soriano et al., 2002). As liver disease advances, alterations in metabolism may lead to dietary intolerance or limit nutrient intake.

This article reviews nutritional issues affecting HIV-positive IDUs. Many of the same issues likely also apply to HIV-infected chronic noninjecting users of illicit drugs and individuals in early recovery, who often confront lifestyle, social, and economic issues similar to those that compromise the nutrition of IDUs. We discuss the prevalence, causes, assessment of, and appropriate clinical responses to wasting and weight loss, micronutrient deficiencies, and body fat redistribution and metabolic abnormalities.

WASTING AND WEIGHT LOSS

Early in the HIV epidemic, researchers established an independent link between severe malnutrition and mortality among HIV-infected individuals. Death was found to occur, on average, when body weight fell below 66 percent of the ideal body weight (IBW) or when lean body mass (LBM) fell below 54 percent of the norm (Kotler et al., 1989). Today, advances in understanding and treatment of HIV have markedly lowered the frequency of severe malnutrition in populations with access to highly active antiretroviral therapy (HAART). For example, data from the Adult and Adolescent HIV Disease Project indicate that the incidence of HIV wasting syndrome, as defined by the Centers for Disease Control and Prevention (CDC), declined from 30.2 to 11.9 cases per 1,000 person-years of infection between 1992 and 1999, with most of the drop occurring after the introduction of HAART in late 1995 (Dworkin, Williamson, and Adult/Adolescent Spectrum of HIV Disease Project, 2003). This progress notwithstanding, unintentional weight loss and wasting continue to contribute to morbidity and mortality in the HIV-infected population. One study found that a drop of 5 to 10 percent from the patient's initial body weight quadrupled his or her risk of death (Tang et al., 2002). Conversely, in a cohort of HIV-positive women, none of whom were on HAART at baseline and almost half of whom had a history of injection drug use, a higher body mass index (BMI) and increases in BMI were associated with a decreased risk of disease progression (Jones et al., 2003).

The most widely used standard for identifying individuals with HIV whose condition warrants nutritional or medical intervention to increase weight or body mass is the CDC AIDS surveillance case definition for wasting: profound involuntary weight loss of more than 10 percent of baseline body weight plus either chronic diarrhea (at least two loose stools per day for 30 days or more) or chronic weakness and documented fever (constant or intermittent for 30 days or more) in the absence of a concurrent illness or other condition that might cause such symptoms (e.g., cancer, tuberculosis, cryptosporidiosis, or other specific enteritis) (Centers for Disease Control and Prevention, 1987).

A Department of Health and Human Services Working Group has suggested expanding the diagnosis of wasting to also include patients who weigh less than 90 percent of their IBW (or have a BMI less than 18.5), have lost more than 10 percent of their pre-illness maximum weight, or have experienced weight loss of more than 5 percent in the previous 6 months (Grinspoon, Mulligan, and Department of Health and Human Services Working Group on the Prevention and Treatment of Wasting and Weight Loss, 2003). The aim of the proposed changes is to identify at-risk patients sooner, especially in light of evidence that HAART has altered the characteristics of wasting in ways that render the CDC definition a less sensitive predictor of nutritional risk. For example, the Multicenter AIDS Cohort Study of 5,622 men in Baltimore, Chicago, Los Angeles, and Pittsburgh found that patients reported diarrhea as frequently in the HAART era as before, but experienced less anemia, fever, fatigue, and thrush (Smit et al., 2002). Using three of the newly proposed criteria—weight less than 90 percent of IBW, or a BMI less than 18.5, and weight loss of more than 10 percent—Campa and colleagues (2005) found an 18 percent prevalence of wasting among 119 HIV-infected IDUs.

Reviews of wasting and malnutrition in HIV-positive IDUs indicate that the causes are multifactorial and may be secondary to decreased dietary intake, malabsorption, or increased resting energy expenditure (see *Etiology of Wasting and Weight Loss in HIV-Infected Injection Drug Users*) (Mangili et al., 2006; Smit and Tang, 2000). Injection drug use promotes each of these factors independently of HIV. In one study among Hispanic HIV-negative women, IDUs reported more food insecurity, fewer meals per week, lower intake of vegetables and fish, and more ingestion of sweets and fried foods than non-IDUs from the same relatively low socioeconomic stratum (Himmelgreen et al., 1998) (Figure 1). The IDUs registered lower scores in all anthropometric measures except height.

The combined impact of HIV and injection drug

ETIOLOGY OF WASTING AND WEIGHT LOSS IN HIV-INFECTED INJECTION DRUG USERS

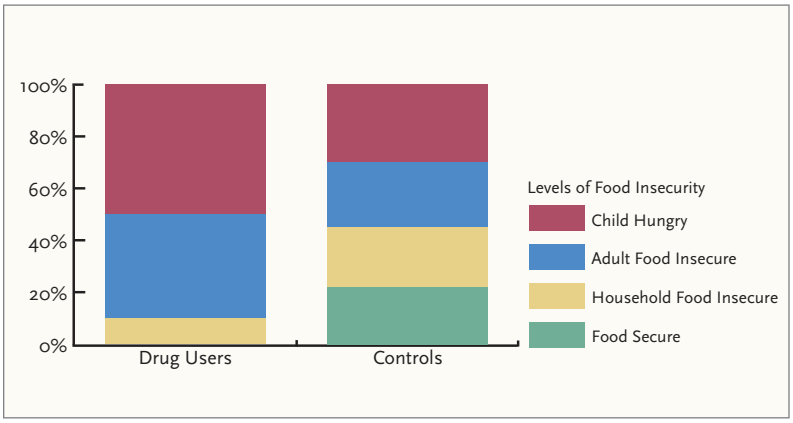
Decreased dietary intake related to abdominal pain, anorexia, chaotic lifestyle, dementia, depression, diarrhea, esophagitis, fatigue, food insecurity, mouth sores, nausea, and vomiting.

Malabsorption related to antibiotic-induced alterations in intestinal flora, enteropathy, HIV-induced mucosal changes, Kaposi's sarcoma, medication effects on absorption of specific nutrients, and opportunistic gastrointestinal infections.

Altered metabolism related to drug effects (e.g.,from cocaine), fever or cytokine-induced increase in basal metabolic rate, hormonal deficiencies, increased lean body mass breakdown, and medication (HAART) effects on metabolism.

use on weight loss and wasting appears synergistic. The inadequate nutrient intake associated with chronic drug use leads to decreased nutritional status and impaired immunity. In turn, weakened immunity allows viral loads to increase, leading to more frequent secondary infections. New infections increase nutritional needs, further widening the gap between nutritional requirements and attainment. Several studies suggest that HIV and injection drug use together exert a more deleterious effect on weight and body mass than either alone:

FIGURE 1. Injection Drug Use and Levels of Food Insecurity



All 32 low-income, injection drug-using (IDU) women in a survey indicated that they sometimes could not obtain enough food to allay hunger and maintain adequate nutrition. Nearly half indicated that they had experienced the most severe level of food insecurity, in which parents' dietary sacrifices still do not leave enough food to fill their children's stomachs. Food insecurity was common but not universal and was less severe among a comparison group of 41 low-income non-IDU women. (Himmelgreen et al., 1998; Adapted with permission of John Wiley & Sons, Inc.)

- Smit and colleagues (1996) surveyed 107 IDUs and found that those who were HIV-positive had a higher prevalence of involuntary weight loss than those who were HIV-negative, even though their self-reported intakes of macro- and micronutrients and calories were higher and exceeded estimated needs.
- Studies of Hispanics in the Bienestar cohort ($n = 285$) disclosed that HIV-positive IDUs had lower BMIs than HIV-positive non-IDUs (Forrester, Tucker, and Gorbach, 2004, 2005). Use of cocaine and concurrent use of cocaine and opiates were both associated with weight loss over time, while use of other illicit drugs was associated with weight stability. Infection with HIV or hepatitis, intestinal malabsorption, resting energy expenditure, diet and physical activity, as measured in these studies, did not explain the observed differences in weight and BMI. Studies are needed to evaluate more precisely how different illicit drugs affect metabolism and whether they have a role in wasting.
- A study using data from the Nutrition for Healthy Living (NFHL) cohort found that injection drug use predicted lower BMI and fat mass among HIV-positive women, but not men (Forrester et al., 2000). Both male and female IDUs in this study reported adequate dietary energy intake, on average, although male IDUs' intakes of iron and zinc were significantly lower than those of male non-IDUs.

Several other reports from the NFHL cohort shed additional light on HIV-positive IDUs' diets. Woods and colleagues (2002) linked injection drug use to greater dietary vulnerability among HIV-positive women in the sample; overall, 25 to 35 percent of infected women, half of whom were drug users, reported intakes below 75 percent of the recommended dietary allowance for key micronutrients. Woods also found that dietary intake increased as weight and CD4 cell count decreased, perhaps because individuals needed more nutrients to maintain weight as their disease progressed. Another analysis (Kim et al., 2001) revealed that 36 percent of the NFHL cohort met formal assessment criteria for food insecurity as defined by Radimer, Olson, and Campbell (1990; see *U.S.D.A. Food Security Survey*) and that an additional 8 percent described themselves as persistently hungry. IDUs consumed less energy than nonusers, and dietary inadequacy correlated with lifestyle and behavioral factors (Kim et al., 2001). Minorities, subjects without an adult caregiver, subjects with dependent children, and those without food shopping assistance had less adequate diets.

Data from other studies also indicate that lifestyle and socioeconomic issues contribute to the nutritional vulnerability of IDUs with HIV. Food insecurity and viral load were independent predictors of wasting in HIV-positive IDUs in a study that also identified heavy alcohol consumption, heavy cocaine use, and inability to hold a job as contributors to the syndrome (Campa et al., 2005). HIV infection also has been independently associated with food insecurity; in a Canadian study, the problem was five times as prevalent among HIV-positive individuals as in the general population (Normén et al., 2005). The impact of lifestyle and socioeconomic factors on HIV-related care, including adherence to HAART, is likely important but has not been well studied.

MICRONUTRIENT STATUS

Researchers have tied individual micronutrients to HIV-associated outcomes since the beginning of the epidemic.

Low levels of vitamins A and B12, zinc, and selenium accelerate disease progression (Baum, 2000). Individuals with HIV generally have low levels of many other micronutrients as well. However, the implications of those deficits remain unclear, as their relationships to outcomes are confounded by variations in disease severity, chronic inflammation, and treatment regimens (Tang et al., 2005).

IDUs in one study reported adequate mean dietary intake of micronutrients, but a significant percentage of those who were HIV-positive were taking in less than the recommended amounts of selenium, retinol, and vitamin E (Forrester, Tucker, and Gorbach, 2004). In other studies, researchers have documented low serum micronutrient levels in IDUs, regardless of their HIV status (Nazrul Islam, Jahangir Hossian, and Ashan, 2001). For example, injection drug use increases the risk for iron deficiency and iron deficiency anemia in both HIV-positive and HIV-negative women (Dancheck et al., 2005). HAART therapy can alleviate or resolve anemia, which is a risk factor for shortened survival in HIV-infected women (Berhane et al., 2004).

The majority of clinical trials assessing the impact of micronutrient supplementation on HIV-associated outcomes in developed countries have been small and have shown modest effects; the results, taken collectively, are mixed (Tang et al., 2005). Interestingly, a recent study found that elevating the serum selenium level through micronutrient supplementation increased CD4 cell counts and reduced viral load in HIV-infected IDUs (Hurwitz et al., 2007). Participants whose serum selenium level did not increase despite supplementation—because of either noncompliance with the regimen or individual differences in response to supplementation—gained no benefit compared with the placebo group. These results underscore the need for individual nutritional assessment to determine the necessity of and response to micronutrient supplementation.

Ideally, people should strive to achieve an adequate micronutrient intake by consuming a balanced diet of varied, high-quality foods, rather than by relying on supplementation. Many questions remain with regard to micronutrients and their role in HIV-associated outcomes, including the potential impact of coinfections and oxidative stress. HIV infection increases oxidative stress—a buildup of potentially toxic oxygen-containing molecules—as indicated by increased plasma levels of lipid peroxidation and/or reduced antioxidant levels compared with those of healthy controls (Tang et al., 2005). HIV-positive IDUs, with their combination of dietary and metabolic risk for micronutrient deficiency, should be the focal population in research to answer these questions.

U.S.D.A. FOOD SECURITY SURVEY

A questionnaire developed by U.S. Department of Agriculture researchers assesses levels of food security. The questioner begins by saying, "I'm going to start by reading you statements people have made about their food situation and ask you whether they were true for you during the past 12 months."

1. "The food that I bought just didn't last, and I didn't have money to get more." During the last 12 months, was this true for you often, sometimes, or never?

2. "I couldn't afford to eat balanced meals." During the last 12 months, was this true for you often, sometimes, or never?

3. In the last 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?

4. If so, did this happen once or twice, in more than a couple of some months but not all, or in almost every one of the last 12 months?

5. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? Yes or no?

6. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food? Yes or no?

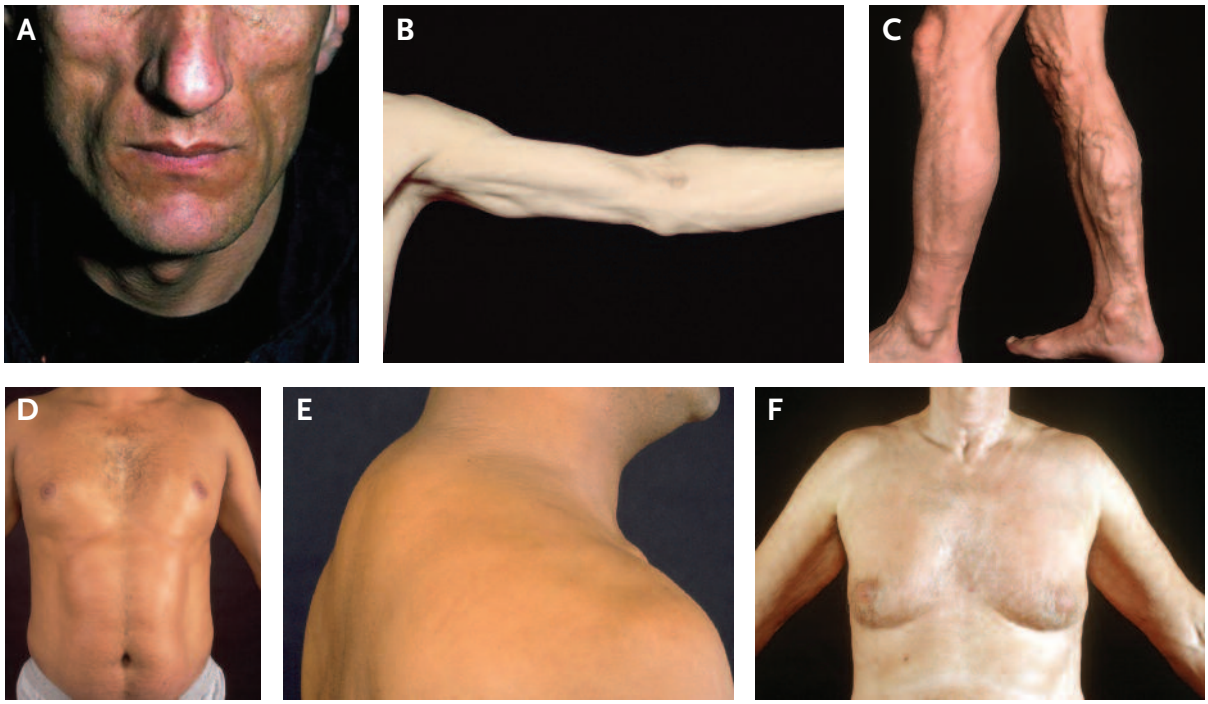
For complete survey materials, with instructions for scoring, see: *www.ers.usda.gov/Briefing/FoodSecurity/surveytools/short2008.pdf.* While this survey was developed for research, providers may find the questions useful in clinical settings and may consider recommending food assistance programs to clients with survey scores corresponding to low or very low food security.

FAT REDISTRIBUTION AND METABOLIC COMPLICATIONS

Changes in body fat distribution are a common complication of HIV infection (Wohl et al., 2006). Called HIV-associated lipodystrophy syndrome (HALS), these changes may be peripheral (affecting the arms, legs, buttocks, and face) or central (affecting the abdomen, chest, and upper back) and may involve either lipoatrophy (fat loss) or lipohypertrophy (fat gain; Figure 2).

The Fat Redistribution and Metabolic Change in HIV Infection (FRAM) study systematically evaluated fat loss and accumulation (Bacchetti et al., 2005; Study of FRAM, 2006). Peripheral lipoatrophy emerged as the body composition change unique to HIV and was not

FIGURE 2. HIV-Associated Lipodystrophy Syndrome (HALS)



HALS affects the distribution of fat throughout the body. These images of HIV-positive men show typical manifestations of the syndrome, such as lipoatrophy or fat loss in the face and arms (A and B), lipohypertrophy or fat deposition in the legs and abdomen (C and D), a hypertrophied dorsocervical fat pad (E), and gynecomastia or fat gain in the fatty tissue of the chest (F). Studies suggest that a high-fiber diet and healthy fat intake may forestall or alleviate HALS.

Panel A courtesy of AIDS Images Library, *www.aidsimages.ch*; panels B-F © 2008 Mediscan.

typically associated with a reciprocal increase in visceral adipose tissue or trunk fat. Forrester and Gorbach (2003) found, similarly, that HIV-positive subjects on HAART, both IDUs and non-IDUs, had less fat in their arms and legs than subjects who were either HIV-negative or not on HAART. In a comparison between HIV-positive (n = 213) and HIV-negative (n = 100) IDUs, the picture was not as clear (Smit et al., 2005). Fat loss was more common among the infected group and was not associated with HAART use. Central adiposity was more common among IDUs who had not injected drugs during the previous 6 months, who were HIV-positive as opposed to seronegative, or who were receiving HAART as opposed to not receiving this therapy. These investigators found that IDUs' reports of body changes were reasonably valid. HALS appears to be a dynamic syndrome, with patients developing and losing features of fat loss and accumulation (Jacobson et al., 2005). The syndrome continues to be a subject of intense research.

No therapy has been found to reverse lipoatrophy completely (Wohl et al., 2006). Although changing the HAART regimen or stopping protease inhibitor therapy has been shown to improve some of the metabolic abnormalities seen in HIV infection, it has not improved lipoatrophy. Relatively little is known about the influence of diet on the development of HIV-associated lipoatrophy, and more research is needed to determine specific guidelines for clinically efficacious nutrition therapy (Dong and Hendricks, 2005). Studies to date indicate that patients may decrease their risk of some forms of fat deposition by maintaining high-fiber and healthy fat intakes (Hadigan et al., 2001; Hendricks et al., 2003) and, more generally, by following the same dietary guidelines that decrease chronic disease risk in the general population (Dong and Hendricks, 2005).

HIV infection and some HIV medications increase the risk of dyslipidemia and altered glucose metabolism. The lipid abnormalities seen most commonly in HIV-infected individuals include reduced high-density lipoprotein (HDL) levels and increased triglyceride levels (Wanke et al., 2002). Theoretically, the risk for cardiovascular disease that is normally associated with these factors may be exacerbated in a state of chronic inflammation such as that caused by HIV infection; as a result, lifestyle

COMMON NUTRITION DISORDERS IN HIV-INFECTED INJECTION DRUG USERS

Wasting and Weight Loss

Micronutrient Deficiencies
- Iron
- Selenium
- Zinc
- Retinol

Metabolic Abnormalities
- Dyslipidemia
- Insulin resistance
- Body composition changes
- Fat atrophy
- Fat deposition
- Obesity

changes such as diet and smoking cessation may be particularly important in this population (Dubé et al., 2003). The alterations in glucose metabolism associated with HIV and HAART include hyperglycemia and insulin resistance (Wanke et al., 2002). Along with the virus and medications, additional factors such as gender, age, BMI, diet, and levels of physical activity affect these abnormalities (Wanke et al., 2002). Pending studies that focus specifically on HIV-infected IDUs, the same interventions used to control these problems in the overall population of HIV-infected individuals are warranted.

The advances in understanding and treatment that have made HIV infection a chronic manageable disease have moved diet and other lifestyle risk factors forward in research and clinical importance. Nutrition issues related to aging—which include changes in taste and appetite, decreased ability to perform activities of daily living such as shopping for and preparing food, and the impact of other medications on nutritional status—also are of increasing concern as more people live longer with HIV.

ASSESSMENT AND INTERVENTION

Common Nutrition Disorders in HIV-Infected Injection Drug Users lists the nutrition issues seen most frequently in HIV-infected IDUs. For the substance abuse clinician, the best way to assess potential wasting may be to observe or inquire about weight changes and to ask simple questions about the patient's access to adequate food. Food security is routinely monitored in the United States with household or individual surveys developed by the U.S. Department of Agriculture (USDA); the six-item Short Module, which may be useful for screening, may be found at *www.ers.usda.gov/Briefing/Food Security/surveytools/short2008.pdf* (see also *U.S.D.A. Food Security Survey*). Patient self-report may be the best early indicator of body composition changes; when such changes are noted or suspected, clinicians should use specific body composition measures to assess body fat redistribution.

Treatment providers should tailor nutrition recommendations to each patient's social and medical needs. Chronic drug users in treatment may be inpatients, in which case meals at the facility should be the emphasis. For outpatients, counselors should help individuals identify Federal nutrition program eligibility and educate them about nutrition and food choices. Treatment providers should counsel all HIV-positive IDUs, especially those with metabolic risk, to follow key recommendations from the *Dietary Guidelines for Americans* (U.S. Department of Health and Human Services, 2005), which encourage the consumption of a nutrient-rich, balanced diet that is adequate in micronutrients, appropriate exercise, and smoking cessation (see *Dietary Guidelines for IDUs with HIV*). Individuals vary in their nutritional needs and their ability to make dietary changes. Many will benefit from referral to a nutritionist for further help with nutrition counseling and food assistance.

Involuntary weight loss is a serious medical concern, and patients should be interviewed to determine potential underlying causes.

Involuntary weight loss is a serious medical concern, and patients should be interviewed to determine potential underlying causes. Multiple therapies exist for wasting and weight loss; appropriate interventions for individual patients depend on the etiology of their weight loss. In general, initial recommendations to reverse or slow weight loss should promote greater calorie and nutrient intake through increased consumption of a nutrient-dense diet. Patients should be encouraged to keep a simple food diary to share with their health care provider, who can use it to identify reasons for weight loss and ways to improve dietary intake. If weight loss is not reversed, the patient requires referral to a nutritionist for more in-depth dietary assistance. Although the use of meal replacements and appetite stimulants can be helpful in some cases, these interventions should be supervised by a clinician or nutritionist who can evaluate their impact on overall dietary intake, metabolic risk factors, and nutritional efficacy.

CONCLUSION

Malnutrition, deficiencies of micronutrients, and complications with metabolism and body composition are

DIETARY GUIDELINES FOR IDUs WITH HIV

Basic healthy eating guidelines for IDUs with HIV do not differ from those for the general public, given below. Those individuals who cannot maintain healthy weight or who develop malabsorption or metabolic alterations may require specialist nutritional attention and clinical intervention.

Balance energy consumption and expenditure to achieve a healthy weight.

Eat a balanced diet and engage in regular physical activity.

Consume a diet rich in a variety of fruits and vegetables.

Consume whole grains and high-fiber foods often.

Keep total fat consumption between 20 and 35 percent of calories and saturated fat to less than 10 percent, with most fats coming from fish, nuts, and vegetable oils.

Limit salt consumption.

If you drink alcohol, do so in moderation.

Remember that food safety is important; clean, cook, and store food appropriately.

Sources: *www.health.gov/dietaryguidelines* and *www.americanheart.org*.

common in HIV and often lead to lowered immunity and reduce the chance of survival. Drug use complicates these issues and increases the likelihood of food insecurity and wasting. When treating patients with HIV who are chronic drug users or in recovery, clinicians must pay particular attention to nutrition status as well as lifestyle and socioeconomic problems that may compromise individuals' access to food and dietary intake. Basic assessments for nutritional deficits include global observation; patient self-reports of weight changes, food availability, and food intake; calculations of BMI; and estimated nutrient needs. To prevent or reverse nutritional deficits, clinicians and counselors can promote normal healthy diets; direct patients to food assistance programs; refer patients to nutritionists; or prescribe meal replacements and dietary supplements. Research is needed to better understand the nutritional consequences of illicit drug use, the impact of specific micronutrient and metabolic deficiencies, and the causes and implications of HALS.

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