Nutritional Management for HIV

Lucie Raffanti, MEd, RD, LDN
Overview

- Nutrition in HIV
  - Undernutrition
  - Overnutrition
  - Fat redistribution
- Medical Nutrition Therapy (MNT)
  - Nutrition Assessment
    - BIA
  - Nutrition Education
    - Supplements
- Case Study
Nutrition is a cornerstone that affects and defines the health of all people, rich and poor. It paves the way for us to grow, develop, work, play, resist infection and aspire to realization of our fullest potential as individuals and societies.

Gro Harlem Brundtland, MD, MPH
Director-General
World Health Organization
HIV and Nutrition

- “A well nourished person with HIV who has a controlled viral load is more likely to withstand the effects of HIV infection, supporting immune status and possibly delaying the progression of HIV disease.”

AND Position Paper on HIV
July 2010
Food is Fundamental

Having inadequate access to food is linked to lower intake of¹:

- Vitamins A, C, B6, E, and folate
- Minerals: calcium, potassium, magnesium, iron, and zinc
- Fiber²
- Fruits and vegetables²

Associated with fair/poor health status:³

↑ levels of depression⁴,⁵

↑ quality of life⁴

↓ Multiple chronic conditions⁶

1) Dixon 2001
2) Lee 2001
3) Klesqs 2001
4) Siefert 2001
5) Vozorziz 2003
Food is Fundamental

Nutritional Cost of Fighting HIV
- Protein
- Vitamins: B1, B2, B6, B12, E and folate
- Minerals: zinc, selenium, copper and iron

Associated with Deficiencies
- Low CD4 cell counts
- HIV related diseases
- Faster progression of disease
- Increased mortality

(Drain 2007)
HIV and Nutrition: Where have we been?

- **1980’s**
  - Wasting
  - Malnutrition due to poor intake, poor absorption

- **1990’s**
  - Advent of HAART
  - Improved outcomes for HIV care
  - Beginnings of lipodystrophy
  - Wasting continues

- **2000’s**
  - “Lipodystrophy”
  - Malnutrition due to various factors
  - Drug-induced toxicities
  - Wasting (not as prevalent as in 1980’s)
  - Fragility and aging
  - Obesity, Metabolic issues
Stages of the Continuum of HIV Care

Out of the more than one million Americans with HIV:

- 80% know they are infected
- 62% were linked to HIV care
- 41% have stayed in HIV care
- 36% are receiving treatment
- 28% have a very low amount of virus in their bodies
Undernutrition in HIV
Global impact of undernutrition

- Undernutrition
  - ↓ food security
  - ↓ appetite
  - ↓ absorption
  - ↑ utilization
  - ↑ excretion
  - ↓ immunity

- Poverty
  - ↓ living conditions
  - ↑ pathogen load
  - ↑ enteropathy
  - ↓ access to health care
  - ↓ social support

- Infections
  - Non-immunological factors increasing severity of disease:
    - ↓ respiratory muscles
    - ↑ prone to dehydration
    - ↓ cardiac function

- Mortality
HIV/AIDS affects Nutrition

- Decreases nutrient intake
- Impairs absorption
- Alters metabolism
Decreases nutrient intake

- Inability to eat or swallow
- Loss of appetite
- Nausea or vomiting
- Depression
- Fatigue
- Side-effects from medications
- Poverty
Impaired absorption

**CAUSES:**
- HIV infection of the intestinal cells
- Opportunistic infections with diarrhea can further impair intestine function
- Medication side-effects

**RESULTS IN:**
- Poor absorptions of fats, carbohydrates, and other nutrients
Altered metabolism

- Changes the way the body uses, stores, and excretes nutrients
- Increases demand for protein and energy:
  - Asymptomatic phase: 10% increase in energy requirements
  - Symptomatic phase: 20-30% increase in energy requirements
- RESULTS in:
  - Muscle wasting
  - Lipid abnormalities and glucose dysregulation
The Vicious Cycle of Malnutrition and HIV

- Insufficient nutrient intake, Diarrhea, Malabsorption, Altered metabolism and nutrient storage
- Increased HIV replication, Hastened disease progression, Increased morbidity
- Increased oxidative stress, Immune suppression
- Nutritional deficiencies
Wasting

- CDC definition: unintentional 10% weight loss from baseline/UBW accompanied by diarrhea or fever for more than 30 days without other known causes.
- Inaccuracies: baseline weight, instances where no fever or diarrhea, doesn’t account for body compartment changes;
- Lipodystrophy, aging population, menopausal changes, substance abuse, dieting fads can all affect “wasting”.

- At the VCCC true wasting is usually due to untreated AIDS or substance abuse.
Take Home Wasting Message

- True wasting or unintentional weight loss must be addressed:
  - In advanced disease concentrate on treating HIV;
  - In controlled or early disease check for caloric intake, look for other causes (new diagnosis, substance abuse, etc);
  - Consider treatment targeted to specifics of problem: anorexia, nausea, diarrhea, etc.
“Overnutrition” and HIV
Body Mass Index

Underweight BMI < 18.5

- Normal 18.5 - 24.9
- Overweight 25 - 29.9
- Obesity (Class) 30.0 - 34.9 (I)
  35.0 - 39.9 (II)
- Extreme Obesity > 40 (III)
Body Mass Index (BMI)

- BMI is accepted as a better estimate of body fatness and health risk than body weight.
  - **BMI = Wt(kg)/Ht(m)^2**
  - Calculation of BMI allows comparison of individual with population standards.
  - A BMI >30 is associated with Type II diabetes, hypertension and CHD in men (NIH expert panel).
  - Increased BMI is associated with increased risk of mortality related to breast, kidney, uterine and gastrointestinal cancers in women. Similar but less marked associations are seen in men (NEJM, 2003).
  - BMI < 18.5 is associated with an increased risk of malnutrition or starvation.
  - An abrupt decline in BMI predicts progression to AIDS (Maas, 1998).
Obesity Trends* Among U.S. Adults

(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)
Incidence of Obesity 2010
Obesity among HIV infected Adults in Care

- Obesity is common, affecting 2 in 5 HIV + women and 1 in 5 HIV+ men.
- Correlates of obesity differ for HIV + men and women:
  - Only younger age (<40 vs >60) was associated with obesity in women.
  - Race/ethnicity, annual income <20K, heterosexual orientation and CD4 count >200 cells/mm3 were associated with obesity in HIV+ men.

(Thompson-Paul et al 2015)
# Overweight/Obesity Rates at the CCC

<table>
<thead>
<tr>
<th>Year</th>
<th>% BMI 25-30</th>
<th>% BMI &gt;30</th>
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</thead>
<tbody>
<tr>
<td>2000</td>
<td>29</td>
<td>15</td>
</tr>
<tr>
<td>2003</td>
<td>30</td>
<td>17</td>
</tr>
<tr>
<td>2005</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>2008</td>
<td>33</td>
<td>19</td>
</tr>
<tr>
<td>2016</td>
<td>34</td>
<td>28</td>
</tr>
</tbody>
</table>
Obesity in HIV

- No data to indicate that accepted weight loss programs are ineffective in HIV infected patients;
- Intensive lifestyle modification program was successful in decreasing cardiovascular risk in HIV infected subjects with metabolic syndrome:
  - Decreased waist circumference, systolic blood pressure, hgbA1c;
    - (Fitch AIDS 2006)
- Diet and exercise regimen resulted in weight loss, fat mass loss, as well as improvements in strength, fitness and QOL in obese HIV infected women.
  - (Engelson Metab Clin & Exper 2006)
Waste Circumference: Where's the Fat?

- If BMI is in overweight category, then waist circumference becomes an independent predictor of increased disease risk:
  - Male: >40 inches = increased risk;
  - Female: >35 inches = increased risk;
- If BMI > 30, then obesity and waist circumference is not indicated.
  - Measured at top of hip, across umbilicus
“Lipodystrophy Syndrome”

- Includes both metabolic and morphologic symptoms
- Prevalence
  - Reported in 2% to 60% of persons living with HIV/AIDS (various studies)
  - Discrepancy due primarily to inconsistent definition of syndrome
- Lack of strong case definition
- Poor understanding of diagnosis and treatment
Metabolic and Morphologic Complications of HIV and HAART

- Morphologic changes
  - Wasting
  - Fat redistribution
    - Fat accumulation (lipohypertrophy)
    - Fat loss (lipoatrophy)
Morphologic Changes:
Fat Redistribution

- Fat Accumulation (lipohypertrophy)
  - Abdominal visceral fat gain
  - Dorsal fat gain (“Buffalo hump”)
- Breast enlargement

PHOTO REFERENCE:
International Association of Physicians in AIDS Care (IAPAC), 2004
Morphologic Changes: Fat Redistribution

- Fat Loss (lipoatrophy)
  - Face
  - Extremities
  - Buttocks

PHOTO REFERENCE: International Association of Physicians in AIDS Care, 2004
Implications of Morphologic Changes

Psychosocial
- Lowered self-esteem
- Stigmatization (may mimic traditional “AIDS wasting”)
- Depression
- Decreased medication adherence due to side effects

Clinical/Physical
- Neck pain
- May cause impaired breathing (fat on diaphragm)
- Pain associated with breast enlargement
- Gastroesophageal reflux
- Lipoatrophy associated with CV disease
MNT Goals

- Early assessment and treatment of conditions leading to malnutrition (social and clinical);
- Maintenance of nutritional status (weight and protein stores);
- Management of co-morbidities;
- Management of nutrition-related side effects of HIV or HIV treatment;
Nutrition Assessment

- Anthropometrics and Body Composition
- Biochemical Assessment
- Dietary Assessment
- Medication and Nutrient Interactions
- Clinical Assessment
Bioelectrical impedance analysis (BIA)

- Quick, non invasive test to measure LBM, body fat, and fluids, and is an accurate screening tool for clinically unapparent changes in body mass;
- Diagnostic tool for evaluating fluid disorders/body changes due to disease, therapy and aging;
- Resistance/reactivity and software program;
Detecting electrode edge is placed on an imaginary line bisecting the ulnar head (bone on little finger side of wrist)

Red clip
Red leads
Black clip

Signal electrode is placed on the first joint of the middle finger

Right hand

Detecting electrode edge is placed on an imaginary line bisecting the medial malleolus (bone on big toe side of ankle)

Red clip
Black leads
Black clip

Signal electrode is placed on the base of the second toe

Right foot

RJL
Limitations of BIA

- Hydration state can alter results;
- Lipodystrophy can not be assessed other than total body fat or BCM;
- Standards are based on cultural norms;
- Different stressors can cause significant changes in compartments.
BIA Fluid - Nutrition Assessment

Body Composition Report created by
Lucie Raffanti, MEd, RD, LDN

<table>
<thead>
<tr>
<th>Name:</th>
<th>ID #:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
<td>Female</td>
</tr>
<tr>
<td>Height:</td>
<td>64.0 in</td>
</tr>
<tr>
<td>Age:</td>
<td>44.0</td>
</tr>
<tr>
<td>Current Weight:</td>
<td>195.0 lb</td>
</tr>
</tbody>
</table>

Study date: 09/08/2012 9:30:25 AM
Report date 05/08/2012 6:04:18 AM

| Current weight | 195.0 lb |
| BMI | 33.47 |
| Measured Resistance | 535.0 ohms |
| Calculated Impedance | 538.1 ohms |
| Parallel Resistance | 541.3 ohms |
| Impedance Index | 1271.0 |
| Equation Set | Cypress/Finna |
| Test Comments | |
| Measured Reactance | 58.0 ohms |
| Phase Angle | 6.2 degrees |
| Parallel Capacitance | 637 pf |
| Ideal weight | 120.0 lb |

Predicted results based on bioelectrical impedance analysis

<table>
<thead>
<tr>
<th>FLUID ASSESSMENT</th>
<th>Results</th>
<th>Normal range (height - age - gender)</th>
<th>Percent of actual</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Body Water</td>
<td>36.7 L</td>
<td>22.4 - 28.1 liters</td>
<td>41.5% (WT)</td>
<td>*</td>
</tr>
<tr>
<td>Intracellular Water</td>
<td>19.5 L</td>
<td>13.0 - 16.3 liters</td>
<td>53.0% (TBW)</td>
<td>*</td>
</tr>
<tr>
<td>Extracellular Water</td>
<td>17.3 L</td>
<td>9.0 - 12.2 liters</td>
<td>47.0% (TBW)</td>
<td>*</td>
</tr>
</tbody>
</table>

NUTRITION ASSESSMENT

| Basal Metabolism | 1387 KcaL |
| Body Cell Mass | 47.1 lb | 30.3 - 40.7 lb | 24.2% (WT) | * |
| Extracellular Mass | 53.5 lb | 52.2 - 62.5 lb | 27.4% (WT) | * |
| Fat Free Mass (FFM) | 100.5 lb | 89.9 - 95.9 lb | 51.6% (WT) | * |
| Fat Mass | 94.5 lb | 24.1 - 30.1 lb | 48.4% (WT) | * |

Historical Profile of

Component weight lb

AETC Southeast
AIDS Education & Training Center Program
Nutrition Education

- Pregnancy, lactation, infancy and childhood
  - Basic nutrition concepts and habits;
- Lifestyle
  - Emphasis on optimal BCM;
  - Achieve and maintain a healthy weight
- Nutrition Interactions
  - Review of potential interactions with prescription, non-prescription medications and CAM;
- Life Skills and socioeconomic issues
  - Food hygiene; Nutrition on a budget
Supplements and HIV

- **Oral Supplements:**
  - The goal of supplementation is to augment total nutrient/caloric intake not substitute meals.
  - Supplements are recommended when appropriate as part of an ongoing nutritional care plan.
  - The most effective use of oral supplements is a short term intervention with well defined goals
- Other “supplements” rarely have large trials to support use: Juven, glutamine etc.
Supplements can Harm

- 28 year old male, HIV+, undetectable virus and CD4 count of 646.
- Admitted to the hospital with a total bilirubin of 36.
- He had been taking muscle building and liver saving supplements he bought on line.
- He is now on the liver transplant waiting list.
Ken’s Story

- **Clinical History**: 46 year old male diagnosed in 1988. Complications include CMV retinitis, wasting, chronic renal failure, hypogonadism, anemia, peripheral neuropathy, hyperlipidemia and destructive pseudomonal sinusitis.

- **Treatment History**: Seen at VUMC for sinusitis. HAART started, surgery, discharged on TPN, bedbound.

- **Clinical Course**: Nutritional status is main issue: BMI of 15. Nutritional interventions include TPN, testosterone, oxandrin, marinol, and Juven. Chronic diarrhea (c.diff) is also most debilitating issue.
Ken’s Story

<table>
<thead>
<tr>
<th>Date</th>
<th>CD4 Count</th>
<th>Weight</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/07</td>
<td>21</td>
<td>122</td>
<td>Off TPN</td>
</tr>
<tr>
<td>12/07</td>
<td>41</td>
<td>113</td>
<td>Anorexia, diarrhea</td>
</tr>
<tr>
<td>2/08</td>
<td>68</td>
<td>136</td>
<td>Fatigue, depression</td>
</tr>
<tr>
<td>6/08</td>
<td>127</td>
<td>172</td>
<td>Stable</td>
</tr>
<tr>
<td>5/09</td>
<td>346</td>
<td>175</td>
<td>Hyperlipidemia</td>
</tr>
</tbody>
</table>
Future Areas in HIV Nutrition

- Treatment of lipodystrophy
  - Local measures for lipoatrophy
  - Egrifta (GHRF) for fat accumulation
- Bone Disease
  - HIV related
  - Medication related
- Health care reform (ACA) and MNT
HIV/AIDS

Evidence-Based Nutrition Practice Guidelines

Executive Summary of Recommendations