

Positive Communication

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Bariatric Surgery & HIV Disease

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In the United States, 32% of adults were obese in 2003–2004, and these percentages appear to be accelerating, having doubled in the past 20 years. (1) Individuals with a body mass index (BMI) >35 are at greatest risk for obesity-related co-morbidities, including type 2 diabetes, cardiovascular disease, hypertension, high cholesterol, and sleep apnea. Obesity is a common problem for those individuals living with HIV on HAART medications. Individuals on HAART are likely to develop co-morbidities, such as dyslipidemia, lipodystrophy, and insulin resistance. The metabolic complications that may arise as a result of obesity put the HIV positive patient at risk. (2)

Bariatric surgery is an effective intervention for the general population as well as the HIV positive patient. Surgery can provide significant weight loss and an improved quality of life by significantly reducing obesity-related co-morbidities such as dyslipidemia, diabetes, and sleep apnea. Bariatric surgery leads to weight loss by restricting food intake (so-called restrictive procedures) and/or by decreasing absorption.

Gastric surgery produces weight loss by restricting food intake and leads to gradual weight loss. In contrast, bariatric surgery produces a malabsorptive effect and leads to rapid weight loss.

Banding procedures, which are restrictive, include 1) vertical banded gastroplasty (VBG), 2) laparoscopic adjustable banding (LABG), and 3) the gastric sleeve procedure. VBG is

often referred to as “stomach stapling” because a small pouch is created with staples near the esophagus. VBG has been largely replaced by LABG, where a small pouch is created by placing a hollow band around the stomach, proximal to the upper end. This band is then inflated with a salt solution and can be adjusted by adding or removing solution. (3)

A gastric sleeve is a newer procedure used for those individuals classified as obese class III with a BMI > 50. This surgery removes approximately 60% of the stomach and presupposes that the patient will lose enough weight to undergo a second surgery, such as a Roux-en-Y gastric bypass (RYGB) or biliopancreatic diversion (BPD). The long-term outcomes of the gastric sleeve are unknown.

A gastric sleeve helps to decrease ghrelin production. Ghrelin, which is produced by the cells that line the fundus of the stomach, acts on the hypothalamus to stimulate hunger. Ghrelin levels have been observed to be suppressed after gastric bypass, depending on the degree to which the surgery excludes the fundus and the ghrelin-producing cells from direct stimuli. Gastric bypass surgery leaves a 15-ml pouch near the esophagogastric junction, and excludes the major curvature, thereby isolating the fundus and the richest source of ghrelin production. Due to this exclusion of the fundus and the related ghrelin isolation, satiety is triggered before it

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The Continuing Relevance of Body Circumferences in HIV Nutrition Care

Ben Atkinson, MS, RD, CD is a Registered Dietitian at Harborview Medical Center's Madison Clinic, the largest HIV and infectious disease clinic in metropolitan Seattle, WA. His favorite piece of medical equipment is the tape measure.

In the last fifty years, abdominal obesity rates have trended upward in the United States (1, 2). Both body mass index (BMI) and abdominal circumference have increased during this period. Larger abdominal circumference and smaller hip circumference, or waist-to-hip ratio, put individuals at greater risk of myocardial infarction (3). Loss of adipose tissue in the thighs or hips has also been linked to increased metabolic and cardiovascular risk (4).

Changes in body shape are common among people living with human immunodeficiency virus (HIV). Studies have suggested that 13 to 62% of individuals with HIV develop lipodystrophy, the term used to encompass lipoatrophy and lipohypertrophy (5-7). Waist circumference tends to increase and thigh circumference to decrease in the presence of HIV, with or without antiretroviral therapy (8).

Changes in body shape can be upsetting to the affected individual and have been found to be associated with decreased antiretroviral adherence (9) and depression (10).

The changes in the body shape of those living with HIV have clinical implications. Body shape changes have been shown to affect metabolic parameters, such as insulin levels, blood pressure, and blood lipid levels in the context of HIV infection (11). Both lipoatrophy, the reduction of body fat, and lipohypertrophy, the accumulation of body fat, are independently associated with elevated blood pressure readings (12). Cross-sectional comparisons of HIV positive and HIV negative subjects enrolled in the Fat Redistribution and Metabolic Change (FRAM) study indicated that waist circumference correlated with homeostatic model assessment of insulin resistance (HOMA-IR) and HDL-cholesterol, and waist-to-hip ratio with triglycerides (13). Interestingly, these findings predicted metabolic abnormalities as well as magnetic

resonance imaging (MRI). Investigators from the FRAM study also found higher triglycerides in HIV positive subjects with less thigh subcutaneous fat (14).

The dietetics practitioner has several tools available to help assess lipodystrophy and reduce the risk of metabolic diseases.

1) In clinical settings, changes in body shape are usually self-reported. A reliable qualitative scale similar to that used in the FRAM study can be used to confirm reported changes (15). The scale assesses self-reported changes in peripheral and central body sites compared to healthy individuals with normal body shape. These changes should be confirmed with medical providers.

2) Circumference measurements may be taken serially using methods described online in the Anthropometry Procedures Manual from the National Health and Nutrition Examination Survey (NHANES) (16). These rapid, inexpensive, and reliable methods should be used to quantify reported changes in body shape.

3) Patients should be provided with guidance and counseling on adequate fiber, protein and energy intake, along with resistance training and smoking cessation, which appear to reduce the risk of lipohypertrophy (17). Adherence to a Mediterranean diet also may reduce the incidence of both lipohypertrophy and lipoatrophy (18). Resistance training is additionally helpful in reversing or reducing the risk of adverse changes in body shape. A 2008 meta-analysis of randomized trials described significant gains in arm and thigh girth (19), which may help those with lipoatrophy regain lean body mass.

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(References continued on next page)

Winter 2010 Positive Communication Chair Message

Wow! Another Food & Nutrition Conference & Expo (FNCE) is now a fond memory. The afterglow and fulfillment from Boston will stay with me for a long time. Our Spotlight Session at FNCE was able to educate over 140 dietetic practitioners and students. Participants were given cutting-edge knowledge on “The Future of HIV Nutrition: The Role of Diet Quality, Micronutrients, and Cardiovascular Disease” by leading researchers at Tufts University Medical Center, Christine Wanke, MD and Kimberly Dong, MS, RD. Their presentation was well received and timely. If you missed their session, please be sure to check out the new IDN DPG website (www.idndpg.org) that went live in November 2010 for a copy of their PowerPoint presentation and please see the summary of this session in this newsletter issue. It is also on the ADA website at <http://www.eatright.org/fnce/>. The new IDN DPG website is fresh, organic, and evolving. The feedback so far from members has been positive. We want your feedback on how we can make it even better. You can send any feedback to me at alanleerd@yahoo.com.

Abbott Nutrition is a new sponsor to the DPG and their charter support was to host the IDN Member Reception at the Whiskey Priest at FNCE. All had a fun evening of networking. Did you know that you could earn Continuing Education credits on the Abbott Nutrition Health Institute (www.ahn.org)? Please look at their website for many good resources. At the reception, we had an awards ceremony that honored our hard working and dedicated EC members. Jennifer Eliasi, MS, RD, CDN, the past-chair of the IDN DPG, is the recipient of the Distinguished Service Award and Linnea Matulat, MS, RD, CDN, the current IDN DPG Treasurer, is the recipient of the IDN Emerging Registered Dietitian Award.

The member showcase at FNCE was spearheaded by Jeffrey Whitridge, RD, LDN, who created a new interactive game of “IDN Concentration!” to test the knowledge of our members as well as passersby at the showcase. The leadership team was grateful for the chance to engage members and inform them about the opportunities available to get more involved. I hear we were also able to persuade a few non-members to join our DPG on the spot!

Please remember to vote this year for the 2011-2012 Ballot that was put together by Lisa Zullig, MS, RD, CDN and our Nominating Committee. I hope to see you many of you next year in San Diego for FNCE. Until next time, stay well and warmest regards to all IDN colleagues and friends.

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(Bariatric Surgery, from page 1)

would normally occur, which further contributes to weight loss. (4, 5)

RYGB produces both restrictive and malabsorptive effects because it combines the restriction of a banding procedure with the bypassing of the small intestine, which increases weight loss. RYGB isolates the gastric cardia while excluding the distal stomach (the source of ghrelin) which reduces hunger and increases satiety. RYGB also produces a malabsorptive effect because the Y-shaped section of the small intestine that is attached to the new pouch allows food to bypass the lower stomach, the duodenum, and the first portion of the jejunum so that the body absorbs less energy and fewer nutrients. After gastric bypass surgery, the passage of undigested nutrients directly into the jejunum may activate chemoreceptors that further stimulate satiety and decrease hunger. (6)

The BPD procedure removes a large portion of the stomach to promote smaller meal sizes and re-routes food away from much of the small intestine to partially prevent absorption of food. (7) Although the BPD procedure is the most effective bariatric procedure for permanent weight loss, it also requires the greatest amount of anatomical restructuring and produces the greatest number of adverse metabolic effects caused by malabsorption, potentially resulting in nutrient deficiencies

(4, 8)

As with any major surgery, complications may occur during the operative process.

Bariatric surgical complications include bleeding, inadvertent

injury to the GI tract, stapling inaccuracies, pulmonary embolism, GI leaks, small bowel obstruction, wound infection, incisional hernia, and, less often, cardio-respiratory complications and intractable vomiting. Pre- and post-operative dietary counseling is extremely important because of the metabolic complications and potential nutritional deficiencies. Potential deficiencies include iron, vitamin B12, folate, calcium, and fat as well as protein calorie malnutrition (PCM). (9)

Dumping syndrome may also occur and is a common side effect of bariatric surgery. Undigested contents of the

stomach (usually fat and concentrated sweets) are “dumped” into the small intestine too quickly and this causes abdominal cramping and nausea. Symptoms usually arise 15 to 30 minutes after a meal and can result in a shift of fluid from the blood and decrease in blood pressure, which can, in turn, increase the heart rate and lead to dizziness and lightheadedness. Patients may also experience low blood sugar because of the excessive levels of insulin delivered to the bloodstream as part of the syndrome. Symptoms of dumping may also cause decreased oral intake and produce significant weight loss and subsequent malnutrition. (10)

Diet therapy for dumping syndrome includes small meals that are high in protein, low in fat, and high in complex carbohydrates in order to increase absorption and decrease fluid shifts. Increasing fiber-rich foods and lying down after eating can help to slow gastrointestinal transit time, thus lessening the effects of dumping syndrome. Patients are advised to consume fruits and vegetables, because natural sugars are well tolerated. Patients are also instructed to limit or avoid milk and ice cream, and sip beverages 30 minutes before or after a meal.

Iron deficiency post bariatric surgery occurs due to decreased intake of heme iron. The reduced acidity in the stomach also reduces the conversion of ferrous iron to ferric iron, also decreasing the bioavailability of non-heme iron. Bariatric surgery also creates a bypass of the duodenum where iron is absorbed. Iron supplementation is recommended (40–65 mg daily), especially for menstruating women. (9)

Folate deficiency is less common and is due to decreased intake. Folate is absorbed mainly in the duodenum, but may also be absorbed along the small bowel after surgery. The recommendation for folate supplementation is between 800 to 1000 micrograms daily. (11)

Thiamine deficiency is also caused by a decreased intake and not usually the result of malabsorption. Thiamine is absorbed in the jejunum and ileum and nutrient stores can be exhausted after

an unbalanced carbohydrate intake. A multivitamin is sufficient to prevent thiamine deficiency. If a deficiency occurs, it should be treated with 50–200 mg of parenteral thiamine daily until symptoms clear and then maintenance 10–100 mg by mouth daily. (11)

Vitamin B12 status can be significantly compromised because of a decreased intake of foods that are rich in this vitamin. Moreover, since there is a decrease in the acidity of the stomach, there is a reduction in protein-bound vitamin B12 from the ingested food. Supplementation with 350 micrograms, or 175 times the RDA, is usually adequate to maintain optimal vitamin B12 levels. (9)

Dietary calcium is generally absorbed in the duodenum and proximal jejunum and mediated by vitamin D. When these sections of the small intestine are bypassed, along with a decreased intake, deficiency can occur. With any weight loss, there is a change in the skeleton’s mechanical load, and bone density is usually decreased. Along with hyperparathyroidism, osteoporosis and osteopenia, metabolic bone disease following bariatric surgery can occur. Calcium citrate with vitamin D is the preferred supplementation because it is more soluble than calcium carbonate particularly in the absence of gastric acid production. A daily dosage of 1200–1500 mg of elemental calcium with intramuscular vitamin D is recommended to reduce the risk of bone disease. (11)

Fat malabsorption is most frequent with BPD because this is one of the main mechanisms by which this procedure produces weight loss. The length of the common channel in BPD determines the degree of fat malabsorption. A 100-cm common channel is better tolerated than a 50-cm common channel, and is associated with less diarrhea and steatorrhea and improved protein metabolism. (9) While BPD patients can consume larger quantities of food than RYGB patients, there is significant malabsorption, which results in foul smelling stools, flatus and protein malabsorption. Fat-soluble vitamins (A, D, E, and K) must be provided in a water-soluble form. Iron, vitamin D, and calcium supplementation are also recommended. (9)

The most serious metabolic com-

plication of bariatric surgery is protein-calorie malnutrition (PCM), reported in 7–12% of patients who have undergone bariatric surgery. (11) After bariatric surgery, red meat is not well tolerated. This complication is most common with BPD and most likely to occur when mechanical problems such as stomal stenosis (a narrowing of the new connection between the stomach and lower intestine post bariatric surgery) impairs the patient's ability to tolerate food. (12)

Bariatric Surgery and HIV Disease

Patients with HIV are overweight or obese in similar rates to those in the general population, and so suffer similar co-morbidities. (13) The HIV-positive patient on HAART may, in fact, have an even more difficult weight management problem because of lipohypertrophy.

A study of six morbidly obese, asymptomatic HIV patients undergoing bariatric surgery found that bariatric surgery in patients whose HIV infections were stable, in terms of CD4 count, appeared to resolve all co-morbidities., and that the weight loss was safe. Other research suggests that bariatric surgery may also be beneficial in patients who are infected with HIV and are being treated with ART. One recent study found that bariatric surgery did not significantly alter the absorption of ART in test subjects and that CD4 cell counts were maintained post operatively. (14) In this study, one patient who was not on ART had a significant drop in his CD4 cell count; this was attributed to nutritional deficiencies resulting from malabsorption. The rate of post operative complications was not greater in this study compared to the general population undergoing bariatric surgery. A recent case history of a single patient also found that HIV medication absorption was not impaired following bariatric surgery. (15) It was concluded that the administration site was important in whether or not the ART medications were successfully absorbed by the patient. While both of these studies showed positive results with regard to the effectiveness and safety of bariatric surgery in patients with HIV on ART, studies with larger sample sizes are still needed.

There are four theoretical problems of drug absorption in patients who have

had bariatric surgery: 1) the process of dissolution and disintegration of drugs in the stomach is impaired and affects the bioavailability of some drugs; 2) the passive diffusion across the GI epithelium is affected after surgery; 3) transport functions are distributed differently along the GI tract; and 4) alterations in the pre-systemic metabolism in intestinal epithelial tissue. Clinicians must have a clear understanding of the anatomy and physiology of the GI tract of the post operative patient in order to accurately predict the patient's prognosis and HIV drug responses following bariatric surgery.

In conclusion, while bariatric surgery holds promise as an effective treatment for obesity and its co-morbidities

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ties in HIV positive patients, large-scale studies are needed to fully understand the post operative and long-term consequences and complications for this population, particularly in terms of CD4 counts and viral suppression. (14, 16)

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The Future of HIV Nutrition: The Role of Diet Quality, Micronutrients, and Cardiovascular Disease

Presented by Dr. Christine Wanke of Tufts University School of Medicine and Kimberly Dong, MS, RD, President of the Massachusetts Dietetic Association and reviewer, American Dietetic Association's Evidence Analysis Library for HIV/AIDS, at the American Dietetic Association Food & Nutrition Conference & Expo (FNCE), November 9, 2010, Boston, Massachusetts.

Jan Zimmerman, MS, RD, Administrator of Community Services, VillageCare/The Momentum Project, NYC

Joanne Tehrani, RD, Nutritionist, VillageCare, AIDS Day Treatment Program, NYC

Dr. Christine Wanke began the session by asking, "Is nutrition still important in this treatment era of HIV?" This question framed the information that followed describing both weight management issues and the new challenges associated with HIV disease, including cardiovascular disease, metabolic syndrome, and other co-morbidities. With access to quality care and HIV medications in the United States, HIV/AIDS is now considered a chronic and manageable disease.

Weight loss has changed in the era of highly active anti-retroviral treatment (HAART), but is still a primary concern and continues to impact mortality and morbidity. Body composition changes among individuals on HAART make it difficult to determine if weight loss is due to metabolic changes or fat atrophy. While severe wasting is now uncommon, Dr. Wanke defined "Weight Loss of Concern" as high-risk weight loss related to the amount and pace of weight loss as well as its end point as follows:

- Loss of >10% body weight (measured & unintentional) in a defined period of time
- Loss of > 5% body weight (measured & unintentional) in 6 months & sustained for 1 year
- Body mass index (BMI) < 20

Studies have shown that every 1% increase in weight loss is associated with an 11% increase in risk of mortality (1) and that higher levels of lean body mass are significantly associated with better physical functioning in men, general health perceptions and fewer days in bed. (2)

The relationship of HAART and the incidence of weight loss in HIV/AIDS was studied using data from the Nutrition for Healthy Living Study (NFHL), which followed 469 HIV posi-

tive individuals living in Boston, MA. The researchers (who included both presenters) found that "Weight Loss of Concern" occurred in 48% of those on first HAART regimen after initiation of HAART and who were not failing their regimen (as indicated by falling CD4 count or increasing viral load), in 31% on stable HAART who could be failing their regimen, and in 26% with early disease who had not progressed to the point of initiating HIV medications. (3) Another NFHL study of 130 HIV positive women showed that weight and BMI are associated with CD4 counts below 200. (4)

Dr. Wanke next discussed weight changes, alterations in body composition, and HIV-associated lipodystrophy. The percentage of lean body mass/muscle is proportional to the percentage of fat. Normal mean percentages of body fat for men are 19% fat and for women are 24% fat. In HIV disease, fat atrophy or the loss of subcutaneous fat is produced by a variety of metabolic dysfunctions, including chronic inflammation, mitochondrial toxicity, and side effects of some HAART combinations. Fat atrophy is difficult to distinguish from wasting. Fat deposition in HIV disease, which can be subcutaneous and/or visceral, is likewise difficult to distinguish from obesity. Fat deposition produces the big bellies, breasts, and buffalo humps that are seen in individuals living with HIV.

Dr. Wanke provided an overview of how to assess the amount of lean tissue (muscle and functional tissue) and the amount of fat tissue (visceral or subcutaneous) in people living with HIV. Body composition is difficult to measure accurately. Dual energy x-ray absorptiometry (DEXA) measures fat and lean tissue accurately but does not identify location. Bioelectrical impedance analysis (BIA) is measured indirectly and calculated

and does not measure regional change. CT/MRI is expensive and there are no reference values. Anthropometry is useful if standardized. She noted that these approaches, except for anthropometry, are expensive.

The complex etiology of weight loss in HIV was discussed. Kilocalorie intake may be insufficient due to the presence of anorexia, oral ulcers, nausea, malabsorption or diarrhea. Depression often reduces food intake, as does food insecurity. Also driving weight loss in HIV disease is altered metabolism, which is not well understood. Metabolism in HIV disease is influenced by the HIV infection itself, HAART, opportunistic infections, malignancies, hormonal deficiencies (for example, testosterone, thyroid, and adrenal/cortisol), cytokine dysregulation, and chronic inflammation.

Gastrointestinal dysfunction in HIV was discussed using data from the NFHL. Eighty eight percent of the cohort had at least one abnormality in gastrointestinal function; 47% had abnormal serum D-xylose levels, and 39% reported diarrhea within the last month. (5) These facts, when combined with elevated fat in the stool, all suggest malabsorption. Dr Wanke noted that although dietary intake may be adequate, if malabsorption present, some of the nutrients ingested may not be absorbed.

The impact of HAART and viral load on resting energy expenditure (REE) was examined in the NFHL cohort. Researchers found that both viral load and HAART have independent effects on REE. Although HAART may decrease metabolic rate by lowering viral burden, it also appears to increase metabolic demands through some other mechanism(s) independent of its effect on viral burden. This may result in an overall elevated REE despite control of viral replication. (6)

Overweight and obesity has increased in the HIV positive population, and is associated poor dietary intake related to food insecurity and low education level. Another NFHL study revealed that almost 40% of women who are not IV drug users, had a BMI greater than 30, which indicates obesity. Among men, the prevalence of obesity is lower than in women, but the prevalence of overweight (BMI greater than 25) is similar, around 40%. (3)

Dietary Intake

Kimberly Dong, MS, RD discussed HIV, weight, and dietary intake. In the NFHL study, 348 HIV positive men were assessed using biochemical, body composition, and three-day food records. The following three dietary patterns were observed: 1) juice and soda, 2) fast food and fruit drinks, and 3) fruit, vegetable, and low-fat dairy. Individuals in the fruit, vegetable, low-fat dairy group had the lowest level of poverty and food insecurity, and the highest intakes of protein, fiber, and micronutrients. This group also had the highest levels of lean body mass and CD4 counts among all groups. Individuals in the fast food and fruit drinks group were more likely to live in poverty or use injection drugs, have the highest viral load and lowest CD4 counts, and were most likely to have an AIDS diagnosis. Interestingly, the juice and soda group had the lowest BMI and highest mean kilocalorie intake of the three groups. (8)

Another NFHL study compared actual intake to the American Heart Association's (AHA) Dietary Guidelines and found that 47% of the participants did not meet any of the AHA Dietary Guidelines. Adherence to nutrient specific guidelines was also very low: cholesterol (25% of study subjects), saturated fat (24%), total fat (20%), fiber (9%) and sodium (8%). The study subjects who are the most likely to meet the dietary and nutrient guidelines were females, college graduates, had a BMI greater than 30, and have a diagnosis of metabolic syndrome. Those less likely to meet the guidelines were smokers and living in poverty. (9)

The 2003 WHO Dietary Guidelines defined two categories for estimation of energy requirements for individuals living with HIV depending on whether the person was symptomatic or asymptomatic.

When estimating energy requirements for PLHIV, there are now additional population and clinical variables that are taken into account, including age, pregnancy, and a person's resources. Clinical considerations include whether or not a person is being treated with ART, presence of malignancies or opportunistic infections, weight status, and HIV-associated lipodystrophy.

For asymptomatic adults and those that are ART naive, REE is increased by 10%. This can be compensated for by increasing food intake and/or decreasing physical activity. For those that are resource-poor, it is important to recommend nutrient and calorie dense foods. However, for those symptomatic and on ART, the results are conflicting. Some researchers have noted that REE is increased by 10% in this case. However, among the NFHL cohort, REE did not differ between those on ART and those that were not. Therefore, it is unclear if ART has an effect on REE.

Micronutrients

Ms. Dong, MS, RD discussed micronutrient recommendations in HIV disease. The 2003 WHO Guidelines state that there is no evidence to support the use of supplements above the Dietary Reference Intakes (DRI), and warns that supplementation with vitamin A, zinc, and iron may produce adverse outcomes. Since 2003, there have been several research studies examining the effect of supplementation in the HIV positive population. Studies have shown that low serum micronutrient levels are common and associated with poor outcomes. What is not clear is if whether serum levels are true nutrient deficiency states, and/or if these deficiencies are the result of altered metabolism. Low levels of specific micronutrients, such as selenium, vitamin E, and vitamin D have been identified in many studies. Selenium and vitamin E have been found to be associated with a progression from HIV to AIDS and poor immune function (low CD4 counts).

For vitamin D, low levels of vitamin D have been associated with poor bone health, metabolic syndrome, diabetes, high blood pressure, cancer, and CVD. The research on HIV and vitamin D is inconclusive. For example, here is no agreement on what ideal serum concentrations are. Another limitation is that

studies on vitamin D and HIV needs to take in to account gender, race/ethnicity, diet quality, socioeconomic status, geography and seasonal differences. Finally, there is also little known on ART's effect on vitamin D levels.

Ms. Dong's also discussed problems ascertaining true micronutrient status. Acute and chronic infections affect nutrient metabolism, which can lead to redistribution of some nutrients. In addition, micronutrient intake measures are difficult to measure precisely. Finally, serum levels may not always reflect cellular stores. In conclusion, there is a need for more research on the role of micronutrient status and supplementation in relation to HIV viral replication.

Cardiovascular Disease

Dr. Wanke discussed cardiovascular disease (CVD) risk. Epidemiological studies suggest that there is an increased risk of CVD in HIV infected individuals. CVD and HIV both lead to states of inflammation and viral load has been associated with C reactive protein, a marker of disease inflammation. There are several other co-morbidities that may increase the inflammatory response, such as substance use, obesity and hepatitis C. For those with untreated HIV who may have low total cholesterol, high triglycerides and low HDL, HAART therapy may negatively affect some of these levels, except for total cholesterol. Some lifestyle issues, such as smoking, diet, food insecurity associated with a high BMI, drug and alcohol use, as well as obesity/lipodystrophy/metabolic syndrome, and low socioeconomic status may also lead to CVD in HIV infected individuals.

In summary, CVD risk in HIV infections is likely associated with known risk factors as well as specific factors associated with HIV related to inflammation due to chronic viral replication. Nutritional status and dietary quality may impact both. Optimal care for HIV infected patients should pay attention to lipid status and dietary quality.

Nutrition Interventions in HIV

The benefits of high omega-3 fatty acid intake in lowering triglyceride levels were discussed. The recommendation for supplementation with omega-3 fatty acids has increased from 2 grams/day to 2 to 4 grams/day. (11) Food sources that

are rich in omega-3 fatty acids include fish (salmon, sardines and swordfish), nuts (walnuts, flaxseeds), and canola oil. The DIET study at Tufts University found a positive correlation between the intake of omega 3-fatty acids and a decrease in total blood cholesterol and triglycerides. (10)

The major goals of medical nutrition therapy for HIV disease are: 1) optimize nutrition status, immunity and overall well being; 2) prevent the development of specific nutrient deficiencies; 3) prevent the loss of weight and lean body mass; 4) maximize the effectiveness of medical and pharmacological treatments; and 5) minimize health care costs. The tools nutritionists use include assessment, education, and counseling. The nutrition assessment for HIV disease gathers information about medical and nutrition history, medications, current labs, anthropometrics, psychosocial and socioeconomic factors, and clinical appearance. Nutrition education and counseling should address diet quality, food safety, symptom management, food

and medication interactions, exercise, and smoking cessation. Evaluation of the living environment, food security, including access to preparation and storage, and functional status will also inform education and counseling strategies to improve nutritional status.

Psychological implications include self-esteem, stigmatization, and adherence to medication regimens. Clinical implications included neck pain, respiratory difficulties, pain associated with breast enlargement, and reflux disease. Assessment of morphological changes come from patient self-reporting, clinical observation, and anthropometric measurements (weight changes, waist circumference, skin fold measurement), and imaging such as DEXA, CT, or MRI.

In conclusion, nutrition plays an important role in HIV disease progression. Poor nutrition, especially diets high in saturated fat, low in fiber, and obesity are increasingly common in HIV-infected patients in the resource-rich areas. There is increased risk for

cardiovascular disease with HIV infection, and therefore, attention should be given to modifiable risk factors such as dietary intake and quality should be made. Goals for nutrition interventions and education should be as individualized as possible.

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