The Internet Journal of Academic Physician Assistants
Volume 2 Number 2

Body Dysmorphic Disorder In An Adolescent Male Secondary to HIV-related Lipodystrophy: A Case Study

K Kirksey, B Goodroad, E Butensky, M Holt-Ashley

Citation

K Kirksey, B Goodroad, E Butensky, M Holt-Ashley. *Body Dysmorphic Disorder In An Adolescent Male Secondary to HIV-related Lipodystrophy: A Case Study*. The Internet Journal of Academic Physician Assistants. 1999 Volume 2 Number 2.

Abstract

This article presents a case study of a 17-year-old male with acquired immunodeficiency syndrome (AIDS), experiencing significant body changes secondary to human immunodeficiency virus (HIV) treatment. These physical changes led to dysfunctional preoccupation with his appearance and suicidal behavior, and he was eventually diagnosed with body dysmorphic disorder (BDD). This paper reviews the concepts of BDD and metabolic changes, with particular emphasis on lipodystrophic changes related to HIV medications. Sociodemographic characteristics, clinical manifestations, and treatment modalities with special focus on the role of the nurse practitioner in recognizing and managing these conditions are presented.

Acknowledgements:The first three authors were supported during the preparation of manuscript by the National Institute of Nursing Research, NIH, HIV/AIDS Nursing Care and Prevention (T32 NRO7081), William Holzemer, RN, PhD, FAAN, Project Director. Thank you to Dr. William Holzemer and Dr. Eli Haugen Bunch for their thoughtful review and editorial assistance in the preparation of this article. Thank you to Jason W. Mowery, RN, BSN for his contributions to an earlier draft of this paper.

INTRODUCTION

Adolescence is challenging to even physically and emotionally healthy young adults. Physical changes occurring during this period of development add significant life stressors. For the teenager with human immunodeficiency virus (HIV) disease, these problems are dramatically compounded. This article presents a case study of a 17-year-old male with acquired immunodeficiency syndrome (AIDS), experiencing significant body changes (fat redistribution known as lipodystrophy) associated with HIV treatment. These physical alterations led to dysfunctional preoccupation with his appearance and suicidal behavior, and he was diagnosed with body dysmorphic disorder (BDD). This article reviews the concepts of BDD and lipodystrophy, related sociodemographic characteristics, clinical manifestations, and treatment modalities, with special emphasis on the role of the nurse practitioner in recognizing and managing these conditions.

CASE STUDY

A young man named Alex (pseudonym) was admitted to the emergency department (ED) unresponsive with labored breathing. A male friend who accompanied him stated, “about a half hour ago, Alex threw up and it looked like blood.” Triage assessment revealed pallor, respiratory distress, diaphoresis and cool skin. Vital signs were: temperature 37.8 C, heart rate 134 beats/minute, respirations 34 per minute, and blood pressure 88/48 mm Hg. Usual emergency protocols were performed, including nasotracheal intubation and ventilator support. During intubation, the physician noted that the patient’s breath smelled like gasoline. Upon further questioning, it was determined that he had attempted suicide by drinking gasoline siphoned from a lawnmower. His friend noted that Alex “was coughing so hard” after ingesting the liquid.

The patient’s mother, Janet (pseudonym), arrived thirty minutes after he was admitted to the ED. She shared that her son had been diagnosed HIV positive 13 months ago and had “really been down lately.” She indicated that he had been taking Combivir TM (lamivudine/zidovudine) and Crixivan TM (indinavir) for twelve months. She also reported that he had an undetectable viral load (< 50 copies/ml) and CD4 lymphocyte count of 370 mm3 at his last visit to his nurse practitioner. Janet noted that he had been especially upset about the changes that were occurring in his body. Upon

examination, it became apparent that Alex had signs of lipodystrophy, including loss of facial fat, the presence of a dorsocervical fat pad ("buffalo hump"), thin extremities, accumulation of fat in the abdomen, and loss of gluteal fat.

The ED staff learned that two months before this admission, Alex had overdosed on thirty ValiumTM (diazepam) tablets resulting in stomach lavage, a two-day hospital stay, and subsequent outpatient counseling. Two weeks prior to this admission, Alex had stopped going to counseling. Following stabilization in the ED, Alex was transferred to the Intensive Care Unit. He greatly improved over the next twenty-four hours. By the second hospital day, he had been extubated and was in no apparent respiratory distress. When asked questions regarding the circumstances leading to his admission, Alex suddenly began sobbing uncontrollably. He stated, "I just don't know if I can take this anymore. Why didn't you just let me die? I've got AIDS. I feel so ugly. I just want to die and I can't even do that right." After sitting with Alex until he regained his composure, a discussion ensued regarding his feelings and emotions leading to his suicide attempt.

Alex realized that he has been gay for as long as he could remember. He became sexually active at 13 years of age and believes he contracted HIV at about the age of 15. He stated, "I'm ok with being gay, but not with what's going on with my body." Prior to starting HIV treatment, Alex was a popular and handsome young man. He had been on the swim team at school and had been physically fit until recently. Alex had what many would describe as a "male model" face. He made A's and B's in school until a few months ago. Recently, he had become preoccupied with his gaunt facial features and significant abdominal weight gain. He stated that he frequently looked in the mirror and became sad and cried about how his body had changed. He noted that he often spent several hours a day looking at himself and dwelling on what he described as a "monster." Toward the end of the conversation, Alex admitted that he planned to try to kill himself again. He stated that "no one will ever want to be with me because I look so gross."

BODY DYSMORPHIC DISORDER

Body Dysmorphic Disorder (BDD) is a preoccupation with a defect in appearance, whether imagined or actual.[1] The disorder was first described over a century ago by an Italian psychiatrist and only added to the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) in 1987.[2] Generally, the male-to-female ratio of BDD is one-to-one. The majority of the patients (75%) have never been married.[3]

Often, health care providers mistakenly identify symptoms of BDD as an obsessive-compulsive disorder (OCD). Phillips, Gunderson, Mallya, McElroy and Carter1 conducted a survey to determine the similarities and differences between BDD (n = 53) and OCD (n = 5), in those persons with both disorders (n = 33). These researchers also assessed the rate of BDD among 62 subjects initially diagnosed with OCD. Nine (14.5%) of the subjects with OCD had co-morbid BDD. No significant difference was found between the two groups in terms of gender. Subjects with BDD were less likely to be married and more likely to have had suicidal ideation or a suicide attempt because of their disorder. Albertini and Phillips4 noted that this bodily preoccupation usually begins in adolescence. However, there is a paucity of literature regarding the phenomenon of BDD in young people. Phillips, Atala, and Albertini5 postulated several reasons for this lack of study in children and adolescents. The authors concluded that the clinical manifestations of BDD are often unknown or under-recognized by clinicians. Another reason for underreporting is the child's often-secretive preoccupation with appearance. Because of reluctance to disclose, BDD is often in advanced stages by the time diagnosis is made. Phillips, Atala, and Albertini5 also noted that BDD is likely more prevalent in adolescents than realized and that it can cause significant impairment in functioning and distress to these individuals. Depression and suicide are frequent complications of BDD.[6] Other manifestations commonly seen in persons with BDD are presented in Table 1.

In one of the few reported studies conducted with children and adolescents with BDD, researchers found that common concerns by the participants focused on the skin (61%) and hair (55%).[4] Other authors concur that the body parts most often perceived as defective are hair and complexion.2 Albertini and Phillips noted that 94% of the subjects had impaired social functioning and 85% had impaired job or academic functioning. They also found that nine percent of the young people reported psychiatric hospitalizations and 21% had attempted suicide. These characteristics were consistent with the clinical manifestations exhibited by Alex.

TREATMENT OF BODY DYSMORPHIC DISORDER

Treatment for people with BDD involves accurate assessment, proper diagnosis, and adherence to a medical regimen. Although reportedly difficult to treat, selective

serotonin reuptake inhibitors (SSRIs) and cognitive-behavioral therapy have been effective for many individuals with BDD.3 Examples of SSRIs that have resulted in improvement are: ProzacTM (fluoxetine), AnafranilTM (clomipramine), LuvoxTM (fluvoxamine), ZoloftTM (sertraline) and PaxilTM (paroxetine). In contrast, monoamine oxidase inhibitors, non-SRI tricyclics, neuroleptics, and electrotherapy trials have demonstrated minimal or no effectiveness.3 Ongoing, long-term counseling is often necessary for management of this condition.

HIV MEDICATION-RELATED METABOLIC CHANGES

Protease inhibitor (PI) treatment has greatly decreased morbidity and mortality in people with HIV. However, long-term side effects are associated with taking these medications.[7,8] Metabolic, clinical, and biological alterations have been noted in people treated with highly active antiretroviral therapy (HAART), including nucleoside analogue reverse transcriptase inhibitors (NRTIs) and PIs. Features of these changes can be categorized into carbohydrate intolerance, plasma lipid abnormalities, and lipid distribution changes (see Table 2). Clinically, carbohydrate intolerance is evidenced through high fasting glucose levels, high fasting insulin levels, and onset, or exacerbation of, previously existing diabetes. Plasma lipid abnormalities are manifested through increases in serum cholesterol, serum triglycerides, and serum low density lipoproteins (LDL). Additionally, a lowering of serum high density lipoproteins (HDL) is frequently noted. Finally, lipid distribution changes are noted clinically as an increase in abdominal girth, increase in breast size, appearance of a buffalo hump, and loss of facial and limb fat tissue.[9] These often dramatic changes in appearance due to redistribution of fat have been termed HIV-associated lipodystrophy. Carbohydrate intolerance has been noted in people with HIV as early as a few days after starting HAART and as late as six months into therapy. Body changes seem to take longer to manifest, often occurring after a few months of HAART. Interestingly, these metabolic and clinical manifestations often occur in the presence of adequate viral reduction with antiretroviral medications.9 This fact supports the belief that this syndrome is secondary to treatments and not due to HIV infection itself. The cause of these metabolic changes associated with HIV treatment is unknown. Since lipodystrophy has been associated with hyperinsulinemia, peripheral insulin resistance, hypercholesterolemia and hypertriglyceridemia, a study was designed by Lo, Mulligan, Tai, et al to evaluate serum lipid and steroid hormone concentrations in 37 HIV-positive men on HAART. The purpose of this cross-sectional study was to determine whether dyslipidemia, peripheral loss of fatty tissue and central fat accumulation are related to steroid hormone levels. The authors noted that steroid hormone levels were significantly increased in lipodystrophy-positive subjects compared to lipodystrophy-negative subjects.[11] However, cortisol levels, often high in people who suffer similar body fat changes secondary to Cushing's Syndrome, have been noted as normal in people with HIV-associated lipodystrophy.[12,13]

Because of the relatively recent onset of this syndrome, studies have been limited primarily to cross-sectional or descriptive designs. The lack of prospective cohort studies makes approximation of the prevalence of this metabolic syndrome difficult. There are estimates that the prevalence of these body fat alterations range from less than 10% to more than 80% in people taking combination antiretroviral therapy.12, [14,15,16,17,18] A study compared body composition, body fat distribution and insulin secretion among patients taking NRTI therapy. Researchers compared body composition, body fat distribution, and insulin secretion among patients taking NRTI therapy. A cross-sectional study of forty-three HIV-infected patients taking ZeritTM (stavudine) (n = 27) or RetrovirTM (zidovudine) (n = 16) and 15 therapy-naïve HIV-infected patients (control group) was conducted. Lipodystrophy was noted in 17 (63%) of the individuals taking stavudine, and in three (18.7%) of those taking zidovudine during a second observation at 14 months. Relative risk of developing fat wasting was 1.95 in the stavudine group as compared with the zidovudine group (95% confidence interval, 1.18-3.22). Five out of 12 patients had improvement in their lipodystrophy after stavudine was discontinued. A major study conclusion was that lipodystrophy may be related to long-term NRTI therapy, particularly stavudine.[19] Lack of clear case-defining definitions for HIV-associated metabolic syndrome further complicates the estimation of prevalence and incidence data and makes a unified analysis of the literature virtually impossible. Study of the syndrome is underway and further etiologic understanding and treatment exploration will be forthcoming.[20] In the meantime, nurse practitioners caring for people with HIV must recognize and appropriately treat the metabolic complications of HIV medications.

TREATMENT OF HIV-ASSOCIATED METABOLIC

CHANGES

The diabetic complications associated with antiretroviral use are comparable to Type 2 diabetes, and should be treated similarly. Diet, exercise (if not contraindicated), and use of oral hypoglycemic agents are standards of care. If previous diabetes is exacerbated by the use of PIs, the resultant serum glucose levels may be high enough to require hospitalization and initiation of insulin therapy. Studies of specific oral hypoglycemic agents in the treatment of PI-induced glucose intolerance are lacking. However, since insulin resistance plays a significant role in carbohydrate intolerance, GlucophageTM (metformin) or other insulin sensitizers may be particularly effective.

Changes in cholesterol and triglyceride levels in patients on PI-containing HIV regimens may increase the risk for coronary artery disease (CAD).[21] Guidelines offered by the National Cholesterol Education Program (NCEP) for recognition and treatment of people with increased cardiac risk factors secondary to lipid changes have been used in patients with HIV with some success.[22] Therefore, it is appropriate to follow the NCEP guidelines to lower LDL and triglycerides, and promote increased HDL. Treatment may include use of pharmacological agents to lower serum cholesterol and triglyceride levels, and addition of an exercise program to increase HDL level.

As previously noted, lipodystrophy is a newly recognized phenomenon among people with HIV. While there has been a great deal of attention focused on this condition in the scientific community, few studies are published involving evidence-based research. Clinicians have used treatments such as exercise training, recombinant human growth hormone (rhGH), and steroids. In preliminary studies, success has been reported with these therapies.[23,24] However, efficacy of these treatments in the general population of individuals with HIV-induced lipodystrophy is speculative at best. Wanke et al23 conducted a prospective, open-label study of rhGH in ten HIV-infected patients (seven men, three women) with fat redistribution syndrome. Subjects were given 6 mg of rhGH subcutaneously each day, for 12 weeks. Mean subject age was 41.7 years, the median CD4 cell count was 247 mm3 and 50% of the participants had undetectable viral loads. The authors concluded that short-term treatment with rhGH improved the alterations in body shape that occur with lipodystrophy in people with HIV disease. However, this medication is not FDA approved for treatment of HIV-associated lipodystrophy and is not usually covered by third party payers. The drug is astronomically priced at over $30,000 per year, making its widespread use for treatment of this syndrome unlikely.

Roubenoff et al24 designed a pilot study of exercise training in ten adult males taking protease inhibitors. The researchers examined whether or not exercise training could reduce trunk fat in men with lipodystrophy. Over a 16-week period, subjects trained three days per week. The researchers assessed the subjects' total body lean and fat mass and trunk fat mass by dual-energy x-ray absorptiometry (DEXA). A significant decline in total body fat occurred, most of which was in trunk fat. Weight, lean mass and bone mineral density did not change. The authors concluded that exercise training may reduce trunk fat mass in HIV-positive men with fat redistribution. This lifestyle change seems more widely useful and a simple intervention for the nurse practitioner to recommend.

Changing the HIV medication regimen to a non-PI combination may offer some reduction in associated symptoms. Carbohydrate intolerance and plasma lipid levels seem the most affected by this change. However, fat redistribution seems less amenable to this intervention.[25] Careful consideration must be undertaken to weigh the antiretroviral benefits of a potent PI-containing regimen against metabolic complications before stopping or switching an HIV medication.

In summary, metabolic complications, including lipodystrophy, are associated with potent antiretroviral therapy. As the syndrome is not well understood, optimal treatment for these complications is not yet known. The ability to ameliorate body changes secondary to necessary HIV treatment is limited. The effects of visible body changes on the mental health of people with HIV are not yet described. Research on the psychological impact of lipodystrophy in people with HIV is imperative. The relationship between fat distribution changes, body image, and other mental health problems such as BDD needs to be explored.

CASE STUDY APPLICATION

Alex was treated with 300 mg of LuvoxTM (fluvoxamine) per day and psychotherapy with a psychiatrist. He participated in inpatient group and individual counseling sessions for five weeks. He was then discharged and continued with individual psychotherapy twice a week for two more months, and follow-up HIV care with his primary nurse practitioner. After three months of treatment, his BDD greatly improved. He reported having few negative thoughts

about his appearance, elected to participate in athletic endeavors again, and resumed social activities that he previously enjoyed.

His HIV nurse practitioner referred Alex to a clinical trial testing rhGH and exercise in the treatment of lipodystrophy. After 12 weeks on the trial, he had lost three inches of body fat in his abdomen and his arms had increased two inches in size.

ADVANCED PRACTICE NURSING ASSESSMENT AND MANAGEMENT

Managing HIV disease requires specialized education and clinical experience. Adding a psychiatric disorder, like BDD, further obscures the already complex treatment regimen. Often, mental health conditions can be managed in primary care; however, in Alex's case, he required acute psychiatric hospitalization and intervention. Nursing assessment and management of patients with BDD can best be derived from the set of clinical manifestations (see Table 1) identified by Phillips and colleagues. Table 3 summarizes the nursing assessment and management of patients with BDD. Treatment of HIV-associated metabolic changes follows standards for management of hyperglycemia/diabetes and NCEP guidelines. Medication management is complicated by potential drug interactions and requires expert HIV knowledge.

SUMMARY

Adolescence is a stressful time. With the additional variables of being gay, diagnosed with an often debilitating and potentially life-threatening disease, and significant body changes caused by medications, anxiety can be greatly exacerbated. Many advances in HIV treatment have occurred since 1996. While these therapies have decreased morbidity and mortality in people with HIV disease, significant medication side effects do exist. Alex experienced changes in body fat composition secondary to HAART and developed BDD, resulting in two suicide attempts.

Body dysmorphic disorder is a condition that likely occurs more frequently in young people than reported in the literature. Like Alex, many adolescents are reluctant to disclose their obsession with body changes because of fear that friends and family will be judgmental or not understand this preoccupation. Fortunately, Alex was successfully treated for his anxiety and for the body fat redistribution that occurred as a result of HIV medications.

Treatment regimens for young people infected with HIV can be complex. Practitioners should also consider the myriad of other situations like lipodystrophy and how these body changes impact not only physical well-being, but also the emotional health of these adolescents. Clinicians should be cognizant of mental health conditions like BDD which might be caused by HIV treatment.

Alex continued to improve at 12-month follow-up. He gained more muscle mass in his extremities and a reduction in abdominal fat. He is involved in social activities and his school performance is improving. HIV care is complex; and more needs to be considered than just the correct dosage and potential side effects of the medications. While medications have extended the quantity of life for many of these individuals, nurse practitioners can enhance the client's quality of life by early diagnosis and treatment of associated conditions like BDD.

Table 1

Clinical Manifestations Associated with Body Dysmorphic Disorder

Source: Phillips, KA, Nierenberg, AA, Brendal, G, & Fava, M. (1996). Prevalence and clinical features of body dysmorphic disorder in atypical major depression. J Nerv Ment Dis, 184(2), 125-129.

Figure 1

Table 2: Features of the Metabolic Complications Associated with HIV Therapy

Carbohydrate Distribution	Plasma Lipid	Lipid
Intolerance	Abnormalities	Changes
High fasting glucose	Increase in serum cholesterol	Increase in abdominal girth
High fasting insulin	Increase in serum triglycerides	Increase in breast size (in women)
Onset of or aggravation of existing diabetes	Increase in serum LDL	Accumulation of dorsocervical fat tissue (buffalo hump)
	Lowering of serum HDL	Loss of facial and limb fat tissue

Source: da Silva B. A., & Lowe W.L: Metabolic complications associated with antiretroviral therapy of HIV. Northwestern University Reports on HIV/AIDS; 1999;3(1): 1-12.

Table 3

Assessment and Management of Patients with BDD

Assessment

Management

ACKNOWLEDGEMENTS

The first three authors were supported during the preparation of manuscript by the National Institute of Nursing Research, NIH, HIV/AIDS Nursing Care and Prevention (T32 NRO7081), William Holzemer, RN, PhD, FAAN, Project Director. Thank you to Dr. William Holzemer and Dr. Eli Haugen Bunch for their thoughtful review and editorial assistance in the preparation of this article. Thank you to Jason W. Mowery, RN, BSN for his contributions to an earlier draft of this paper.

References

1. Phillips,K, Gunderson C, Mallya G, McElroy S, & Carter W: A comparison study of body dysmorphic disorder and obsessive-compulsive disorder. J of Clinl Psychiatry 1998;59(11):568-75.
2. Neziroglu F, Yaryura-Tobias J: A review of cognitive behavioral and pharmacological treatment of body dysmorphic disorder. Behavior Modification 1997;21(3):324-40.
3. Phillips KA: An open study of buspirone augmentation of serotonin-reuptake inhibitors in body dysmorphic disorder. Psychopharmacol Bull 1996;32:175-80.
4. Albertini R, Phillips K: Thirty-three cases of body dysmorphic disorder in children and adolescents. Journal of the American Academy of child and Adolescent Psychiatry 1999;38(4):453-9.
5. Phillips K, Atala K, & Albertini R: Case study: body dysmorphic disorder in adolescents. Journal of the American Academy of Child and Adolescent Psychiatry 1996;34(9):1216-20.
6. Hollander E, & Aronowitz B: Comorbid social anxiety and body dysmorphic disorder: managing the complicated patient. Journal of Clinical Psychiatry 1999; 60(Suppl 9):27-31.
7. Brinkman K, Smeitink J, Romjin J, Reiss P: Mitochondrial toxicity induced by nucleocide-analogue reverse-transcriptase inhibitors is a key factor in the pathogenesis of antiretroviral-therapy-related lipodystrophy. Lancet 1999;354(9184):112-15.
8. Vigouroux C, Gharakhanian S, Salhi Y, et al: Adverse metabolic disorders during highly active antiretroviral treatments (HAART) of HIV Disease. Diabetes and Metabolism 1999;25(5):383-92.
9. da Silva B. A., & Lowe W.L: Metabolic complications associated with antiretroviral therapy of HIV. Northwestern University Reports on HIV/AIDS; 1999;3(1): 1-12.
10. Zhang B, MacNaul K, Szalkowski D, et al: Inhibition of adipocyte differentiation by HIV protease inhibitors. J Clinical Endocrinology and Metabolism 1999;84(11):4274-7.
11. Lo JC, Mulligan K, Tai VW, et al: Buffalo hump in men with HIV-1 infection. Lancet 1998;351:867-870.
12. Roth VR, Angel JB, Kravcik S, et al: Development of a cervical fat pad following treatment with HIV-1 protease inhibitors. Presented at the 5th Conference on Retroviruses and Opportunisitic Infection, Chicago, 1998, abstract 411.
13. Christeff N, Melchior J, de Truchis P, et al: Lipodistrophy defined by a clinical score in HIV-infected men on highly active antiretroviral therapy: correlation between dyslipidaemia and steroid hormone alterations. AIDS 1999;13(16):2251-60.
14. Carr A, Samaras K, Burton D, et al: A syndrome of peripheral lipodystrophy hyperlipidemia and insulin resistance in patients receiving HIV-protease inhibitors. AIDS 1998;12:F51-F58.
15. Food and Drug Administration. Pubic Health Advisory Reports of diabetes and hyperglycemia in patients receiving protease inhibitors for the treatment of HIV. Washington, D.C., June 11, 1997.
16. Viraben R, Auqilina C: Indinavir-associated lipodystrophy. AIDS 1997; 12: F37-F39.
17. Kotler DP, Rosenbaum KR, Wang J, et al: Alterations in body fat distribution in HIV-infected men and women. 12th World AIDS Conference, Geneva, Switzerland, July 3-11, 1998. Abstract 32173.
18. Dong K, Flynn MM, Dickinson BP, et al: Changes in body habitus in HIV+ women after initiation of protease inhibitor therpay. 12th World AIDS Conference, Geneva, Switzerland, July 3-11,1998. Abstract 12373.
19. Saint-Marc T, Partisani M, Poizot-Martin I, et al: A syndrome of peripheral fat wasting (lipodystrophy) in patients receiving long-term nucleoside analogue therapy. AIDS 1999;13(13):1659-67.
20. Hellerstein M: Update: Treatment of HIV-associated body-composition abnormalities. HIVNEWSLINE 1999;5(4):50-59.
21. Henry K, Melroe H, Huebsch J, et al: Severe premature coronary artery disease with protease inhibitors. Lancet 1998;351: 1328.
22. Henry K, Melroe H, Huebsch J, et al: Experience with the National Cholesterol Education Program (NCEP) guidelines for identification and treatment of protease inhibitor related lipid abnormalities: results of a prospective study. Presented at the 6th Conference on Retroviruses and Opportunistic Infection, Chicago, 1999, abstract 671.
23. Wanke C, Gerrior J, Kantaros, J, et al: Recombinant human growth hormone improves the fat redistribution syndrome (lipodystrophy) in patients with HIV. AIDS 1999;13(15):2099-103.
24. Roubenoff R, Weiss L, McDermott A et al: A pilot study of exercise training to reduce trunk fat in adults with HIV-associated fat redistribution. AIDS 1999;13(11):1373-5.
25. Ruiz L, Bonjoch A, Paredes R, et al: A multi-center randomized open-label comparative trial of the clinical benefit of switching the protease inhibitor by nevirapine in HAART-experienced patients suffering lipodystrophy. Presented at the 6th Conference on Retroviruses and Opportunistic Infections, Chicago, 1999, abstract LB14.

Author Information

Kenn M Kirksey, PhD, RN, CS, CEN
Postdoctoral Fellow, Community Health Systems, School of Nursing, University of California, San Francisco

Brian K Goodroad, PhD(c), RN, CS, ANP, ACRN
Doctoral Candidate, Community Health Systems, School of Nursing, University of California, San Francisco

Ellen A Butensky, MSN, RN, CS, PNP
Predoctoral Fellow, Community Health Systems, School of Nursing, University of California, San Francisco

Mary Holt-Ashley, PhD, RN, CNAA
Vice President, Nursing, Nursing Services, Ben Taub General Hospital