NEUROPSYCHOLOGICAL FUNCTIONING IN HIV-POSITIVE AFRICAN-AMERICAN WOMEN WITH A HISTORY OF DRUG USE

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This preliminary investigation examined neuropsychological performance in a sample of human immunodeficiency virus (HIV)-positive and HIV-negative African-American women with a history of drug use. The study population was comprised of 10 HIV-negative, 9 asymptomatic HIV-positive, 13 symptomatic HIV-positive, and 10 acquired immunodeficiency virus (AIDS) patients. A neuropsychological battery designed to assess attention, psychomotor processing, verbal memory, and visual memory was administered to participants.

No evidence of HIV-related cognitive impairment was found in patients in the early stages of HIV infection. Multivariate analyses of variance revealed significant deficits in psychomotor processing and verbal recall in persons with AIDS. These individuals showed greater difficulty in tasks requiring maintained attention and performed poorly on measures of immediate and delayed verbal recall. In contrast, HIV status was not related to visual memory, verbal recognition, or the number of errors made during a verbal recall task. The pattern of cognitive deficits observed in persons with AIDS resembles that commonly associated with subcortical pathology. The cognitive deficits observed were not related to depression or recentness of drug use. (*J Natl Med Assoc.* 1998;90:665-674.)

Key words: AIDS ◆ HIV ◆ neuropsychological impairment ◆ drug users ◆ African-American women

There has been an increasing need to assess the cognitive effects of human immunodeficiency virus (HIV) in populations currently underrepresented in neuropsychological studies. White homosexual males are the predominant participants in studies investigating the impact of HIV on cognition. Consequently, the results of these studies may not be generalizable to women, ethnic minorities, and drug users.

In HIV-positive drug users, cognitive deficits may be related to the toxic effects of psychoactive drugs on the brain, the immunosuppressive effects of certain drugs, or increased viral replication.[1-3] Recreational drug use has been found to significantly interact with HIV infection, resulting in diminished overall neuropsychological functioning in seropositive subjects.[1] Other investigations reveal no significant differences in the cognitive performance of asymptomatic HIV-positive and HIV-negative intravenous drug users[4] and no significant decline in cognitive performance prior to clinical evidence of AIDS, unless dementia is present.[5] Consistent with the latter findings, Bono et al[6] found no differences in cognition between asymptomatic and seronegative

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IV drug users at baseline or follow-up in the absence of clinical changes. Other studies have found HIV-related cognitive impairment in symptomatic, but not asymptomatic drug users.[7,8]

Because of the increasing number of women being infected with HIV and the disproportionately high number of racial and ethnic minorities with HIV/AIDS, there is an increasing need for their inclusion in HIV research, particularly as it relates to neuropsychological functioning. The information gained from this type of research may improve our understanding of the neuropsychological sequelae of HIV infection and may lead to the development of effective treatment plans for special populations with HIV/AIDS.

It has been found that HIV-infected women report more psychological symptoms than HIV-infected men[9,10] and that women's early signs of HIV infection often are overlooked and underrecognized when compared with men's symptoms.[11] In addition, the majority of HIV-infected women have a history of IV drug abuse and show deeper psychological distress than homosexual or bisexual HIV-infected patients or patients infected through other means.[12] This suggests that HIV may affect women differently than men.

Depression is an important consideration when investigating neuropsychological performance in HIV-positive individuals because depression itself may affect neuropsychological performance. While transient distress is common in individuals with HIV/AIDS, clinical depression is not the norm. The majority of studies have demonstrated that neuropsychological abnormalities observed in the early stages of HIV infection are separate from and cannot be attributed to depression.[13-15]

Grant et al[16] found that although symptoms of depression and neuropsychological impairment were more common in HIV-infected individuals, there appeared to be no systematic relationship between depression and neuropsychological impairment. Because women with substance abuse problems typically have lower self-esteem, are more anxious and depressed, and have less social support,[17] it is reasonable to assume that HIV-infected women may present with a high degree of depressive symptoms and that this could manifest in increased cognitive impairment.

The physical symptoms of depression and neuropsychological impairment may combine to overestimate the severity of depression in HIV-positive individuals.[18,19] This is largely due to the overlap of HIV-related symptoms and the somatic symptoms of depression (eg, weight loss and poor sleep patterns). It has been suggested that cognitive-affective symptoms of depression may be better predictors of the severity of depression in persons with HIV/AIDS and that somatic symptoms may reflect advanced disease stages not diagnostic of depression.[14,20]

In assessing ethnic minorities, neurocognitive impairments may be overestimated due largely to the use of inappropriate normative standards on neuropsychological measures.[21,22] Because African-American performance is typically evaluated against white American normative standards, there is a tendency for neuropsychological tests to overdiagnose organic impairment in neurologically intact African Americans.[21] Miller et al[22] found that HIV-positive African Americans showed more impairment on neuropsychological measures than HIV-positive whites. When African-American norms were applied, the percentage of HIV-positive African Americans rated as impaired declined. Another study found similar lowered neuropsychological scores in HIV-positive African-Americans versus HIV-positive white subjects.[23] Manly et al[23] found that when acculturation was controlled, these ethnic group differences were no longer significant, suggesting the vulnerability of certain neuropsychological measures to cultural differences.

This study assessed neuropsychological functioning in HIV-positive individuals with a history of drug use. Because of the lack of information concerning the effects of HIV on women and minorities, African-American women were chosen to participate in this investigation. How attention and various components of memory are affected by the disease's invasion of the central nervous system and whether neuropsychological performance is related to depression in HIV-infected women were examined. It was hypothesized that individuals in the later stages of HIV infection (symptomatic HIV and AIDS) would perform less well than HIV-negative controls. This is consistent with the finding that more severe stages of HIV illness were associated with poorer neuropsychological test performance.[24] No cognitive differences were expected to be found between HIV-negative and asymptomatic HIV-positive drug users. The pattern of abnormality in persons with advanced stages of HIV disease was expected to resemble a subcortical impairment.

Finally, depression was not expected to be responsible for the cognitive differences between subject groups.

MATERIALS AND METHODS

Study Population

Forty-three inner-city African-American women aged ≥18 years with a history of illicit drug use comprised the study population. Participants were referred from a local clinic in Washington, DC. This clinic provides a wide range of medical, mental health, substance abuse treatment, activities, and support services, particularly to people with HIV/AIDS.

Seropositive participants were diagnosed as HIV-positive prior to their recruitment for this study. The stage of HIV infection was determined by a physician prior to recruitment according to the Centers for Disease Control's (CDC) 1993 Revised Classification Staging.[25] All seronegative subjects were in treatment for substance abuse at the time of recruitment. Of the 43 participants recruited, 10 were HIV-negative, 10 were HIV-positive and asymptomatic (CDC category A), 13 were HIV-positive and symptomatic (CDC category B), and 10 had an AIDS diagnosis (CDC category C). One asymptomatic subject was excluded from the study because she had not used illicit drugs in the past 10 years. Therefore, the study was conducted using 9 asymptomatic individuals.

Exclusion criteria were a prior psychiatric diagnosis, a history of brain trauma, malignancy, past CNS infection, previous head injury with a loss of consciousness >1 hour, methadone-maintenance, or a primary presenting problem of alcohol abuse. Exclusion criterion were determined by chart review and self-report. The primary drugs of choice for these women were heroin and crack/cocaine.

Procedure

A brief interview was conducted initially to determine each subject's eligibility for participation, to further explain the nature of the study and the assessment process, to obtain additional demographic data, and to obtain written informed consent. In a single 60- to 90-minute session, participants completed a battery of neuropsychological tests.

The neuropsychological battery afforded the brief assessment of verbal and nonverbal information processing. All tests have been recommended as part of the National Institute of Mental Health's neuropsychological battery for the assessment of AIDS-related cognitive changes.[26]

The Beck Depression Inventory also was included in the battery.

Neuropsychological Instruments

The following neuropsychological instruments were used to assess educational exposure, attention, memory, and depression:

Vocabulary Subtest. Overall educational exposure was assessed using the vocabulary subtest of the WAIS-R.[27] This subtest is considered a good indicator of premorbid intellectual ability. However, in inner-city subjects, this test tends to artificially depress "intelligence" scores. In this population, this test is a better index of educational exposure than intelligence (P. Hawkins, personal communication, March 6, 1996).

Digit Span Subtest. This subtest of the Wechsler Adult Intelligence Scale-Revised (WAIS-R)[27] is a widely accepted measure of attention span and a good measure of immediate auditory memory. Scores for forward and backward were not collapsed into one score, as doing so may mask the different cognitive processes tapped by each task (eg, digits backward places more emphasis on mental control and symbol transformation than digits forward).

Trailmaking A and B. The Trailmaking test[28] measures attention with distraction, psychomotor processing speed, and sequential problem-solving. This test often is used as a screening measure for organic involvement and is relatively unaffected by emotional factors (eg, anxiety and depression). Trailmaking is particularly sensitive to measures of HIV-related cognitive decline in inner city, intravenous drug users.[29]

Visual Reproduction Subtest. The Visual Reproduction subtest of the Wechsler Memory Scale-Revised (WMS-R)[30] was used to measure nonverbal memory for visually-presented stimuli. This test measures immediate (Visual Reproduction I) and delayed retention (Visual Reproduction II) of geometric figures.

California Verbal Learning Test (CVLT). The CVLT was used to assess verbal memory.[31] This list-learning task has been useful in characterizing the memory deficits associated with a number of neurological and psychiatric disorders, including HIV.[32,33] It also has proved useful in differentiating Huntington's disease, a subcortical dementia,[34] from

Table 1. Demographics, Drug History, and Immunology of HIV-Negative and HIV-Positive Subjects*

	HIV-Negative (n=10)	HIV-Positive			F
		Asymptomatic (n=9)	Symptomatic (n=13)	AIDS (n=10)	
Age (years)	40.10 (6.39)	35.78 (7.64)	39.31 (7.43)	35.30 (7.17)	1.27
Years of education	11.85 (2.77)	12.83 (1.46)	11.46 (1.45)	11.60 (1.07)	1.17
Educational exposure (vocabulary, mean age-corrected score)	6.90 (1.79)	7.67 (1.22)	6.46 (2.50)	6.40 (2.17)	0.79
No. months since last use of illicit drugs	7.60 (10.36)	28.78 (28.44)	33.61 (23.95)	20.92 (24.88	2.66
No. months since last use of heroin	32.00 (37.81) (n=4)	74.40 (27.36) (n=5)	63.00 (40.44) (n=8)	28.50 (15.38) (n=6)	2.66
No. months since last use of cocaine	4.44 (2.96) (n=9)	23.47 (24.98) (n=8)	33.61 (23.95) (n=13)	22.12 (25.33) (n=1)	3.19†
Mean CD4 lymphocytes/mm^3	—	454.67 (141.02)	312.00 (153.69)	111.90 (102.55)	15.32‡

Abbreviations: HIV=human immunodeficiency virus and AIDS=acquired immunodeficiency syndrome.
*Standard deviations are given in parentheses.
†$P<.05$.
‡$P<.001$.

Alzheimer's disease, a cortical dementia.[35]

Beck Depression Inventory (BDI). The BDI[36] was used to assess the affective status of subjects. Scores on the cognitive-affective subscale (sum of the first 13 items) and the somatic performance subscale (sum of the last 8 items) were determined for each participant.

The cognitive tests used were grouped into the following domains of cognitive function: attention and psychomotor processing, verbal memory: recall, verbal memory: recognition, verbal memory: errors, and visual memory.

Data Analysis

To assess possible group differences at the outset of the study, univariate analyses of variance were used to compare HIV-negative and HIV-positive groups on demographic and immunologic variables (CD4 lymphocytes/mm^3) as well as drug history and affective status. Multivariate analyses of covariance were used to investigate differences in cognitive performance due to HIV serostatus and to examine the main and interactive effects of HIV status and drug history on attention and memory measures.

Because of the relationship between depression and neuropsychological performance, the Roy-Bargman stepdown procedure was used, whereby the affective depression score was first entered into the equation before assessing the impact of seropositivity on measures of cognition. The entire BDI score was not used because somatic subscale scores tend to overpathologize depression in individuals who are suffering from medical conditions. Significant differences between groups on the somatic depression score may suggest that degree of sickness may influence neuropsychological functioning.

While other studies have controlled for the influence of depression, the present study took an additional step by partialling out the effect of degree of "sickness" as indicated by the BDI somatic subscale score. Persons with AIDS are typically more sick than individuals in the pre-AIDS stages of HIV infection. Similarly, seropositive subjects are expected to be "more sick" than seronegative individuals. By controlling for degree of sickness, the possibility that malaise associated with illness is responsible for cognitive deficits is considerably reduced. Therefore, all of the multivariate analyses were run with the Beck somatic subscale score as a dependent variable.

In addition, Roy-Bargman stepdown F tests were

Table 2. Affective Status as Measured by Beck Depression Inventory Scores of HIV-Negative and HIV-Positive Subjects*

	HIV-Negative (n=10)	HIV-Positive			
		Asymptomatic (n=10)	Symptomatic (n=13)	AIDS (n=10)	F
Total score	10.00 (7.77)	6.00 (6.30)	8.38 (8.73)	13.10 (8.97)	1.31
Affective score	8.20 (6.34)	3.78 (4.52)	5.15 (5.73)	5.60 (6.47)	0.97
Somatic score	1.80 (1.81)	2.22 (2.59)	3.23 (3.61)	7.50 (3.95)	6.77†

Abbreviations: HIV=human immunodeficiency virus and AIDS=acquired immunodeficiency syndrome.
*Standard deviations are given in parentheses.
†$P<.001$.

performed on individual cognitive test performance across groups, thus partialling out the variance attributable to the somatic score representing the extent of sickness. The Bonferroni correction was used for all multivariate analyses and Roy-Bargman stepdown F tests.

RESULTS

Subject Characteristics

Basic demographic and immunologic data are summarized in Table 1. Groups did not differ significantly in terms of age, years of education, and educational exposure (as indicated by the WAIS-R vocabulary score). There were no differences between groups regarding the number of months since the last use of heroin. However, there was a significant difference between groups in the number of months since last use of cocaine (F [3, 36]=3.19; $P<.05$. Post-hoc Tukey tests showed that the seronegative group were more recent users of cocaine than the symptomatic seropositive group ($P<.05$)

As expected, the CD4 lymphocyte count was significantly different for HIV-positive individuals (F [2, 29]=15.32; $P<.001$). Post-hoc Tukey tests comparing HIV-positive asymptomatic, HIV-positive symptomatic, and AIDS groups revealed that HIV-positive asymptomatic and symptomatic individuals had higher CD4 counts than the AIDS group ($P<.01$). There was no significant difference in the CD4 counts between asymptomatic and symptomatic individuals.

Affective Status

Table 2 summarizes the affective status of participants, as measured by scores on the BDI. There was no difference between groups in terms of overall depression and the affective component of depression. However, one-way ANOVA revealed a significant difference between groups in terms of their somatic subscale depression scores (F [3, 33]=6.77; $P<.001$. Post-hoc Tukey tests revealed that HIV-negative and both HIV-positive (asymptomatic and symptomatic) groups had lower somatic scores when compared with the AIDS group ($P<.05$).

Neuropsychological Functioning

Analyses were performed to determine whether there was an interactive effect of HIV status and recentness of drug use on neuropsychological performance. The median of the number of months since last drug use, Md=12.00, was used as the cutoff, where recent drug use was regarded as ≤ 12 months since last use, and >12 months since last use of drugs was regarded as more remote use.

Multivariate analysis of variance, with HIV stage and recentness of drug use as independent variables, was performed. Further analyses of individual cognitive tests involved individual Roy-Bargman stepdown F-tests with the Beck somatic subscale score partialled out (Table 3). No significant main effect of recentness of drug use and no significant interaction was found between HIV status and recentness of drug use in any of the cognitive domains. Only HIV status was found to be significantly related to neuropsychological performance.

Attention and Psychomotor Processing

The multivariate test (Wilk's lambda) revealed a significant main effect of HIV status on attention and psychomotor processing (F [15,80.46]=3.01; $P=.001$). Individual Roy-Bargman stepdown F tests revealed no significant main effect of HIV status on digit span (forward and backward) or Trails B.

Table 3. Effect of HIV Status and Recentness of Drug Use on Neuropsychological Performance*

		HIV-Positive			
	HIV-Negative (n=10)	Asymptomatic (n=9)	Symptomatic (n=13)	AIDS (n=10)	F†
Attention and Psychomotor Processing					
Effect of HIV status					3.01‡
Digit span forward	7.60 (3.34)	8.11 (1.62)	7.69 (2.21)	7.80 (1.87)	0.35
Digit span backward	5.70 (1.64)	6.44 (2.35)	6.00 (1.53)	4.90 (2.18)	1.68
Trails A (seconds)	31.40 (10.96)	29.33 (8.54)	38.15 (8.65)	57.10 (23.59)	4.14§
Trails B (seconds)	64.40 (17.98)	61.00 (25.17)	83.31 (25.82)	118.10 (37.63)	2.53
Effect of recentness of drug use					1.09
HIV status × recentness of drug use					1.03
Verbal Memory: Recall					
Effect of HIV status					3.00‖
CVLT (Lists 1-5)	44.00 (7.10)	50.56 (10.69)	47.46 (12.91)	27.20 (8.55)	7.48‡
Free recall short delay	10.30 (2.26)	11.33 (2.12)	10.54 (2.93)	5.40 (1.78)	6.98‡
Cued recall short delay	10.20 (1.62)	12.56 (2.50)	10.92 (3.09)	7.10 (1.55)	5.69‡
Free recall long delay	9.90 (1.73)	11.11 (2.31)	10.08 (3.64)	5.50 (2.27)	4.74‡
Cued recall long delay	10.70 (1.95)	12.67 (2.45)	11.38 (3.28)	7.00 (2.05)	4.92‡
List B	5.40 (2.12)	6.67 (3.08)	5.15 (1.57)	3.90 (1.45)	1.52
Effect of recentness of drug use					0.81
HIV status × recentness of drug use					1.57
Verbal Memory: Errors					
Effect of HIV status					2.82‡
Perseverations	6.50 (3.78)	7.44 (3.47)	7.15 (4.70)	4.80 (2.53)	0.58
Free recall intrusions	4.50 (3.89)	3.11 (2.57)	2.54 (3.20)	3.30 (2.11)	0.99
Cued recall intrusions	1.90 (1.73)	2.56 (2.24)	1.61 (2.47)	6.50 (4.09)	2.95
Effect of recentness of drug use HIV					0.56
Status × recentness of drug use					0.61

However, there was a significant difference between groups on Trails A (F [3, 32]=4.14; P<.05). Post-hoc Tukey tests revealed that the AIDS group performed significantly worse when compared with seronegative and the other seropositive groups (P<.01).

Memory: Recall and Recognition

Multivariate analysis showed a significant overall difference between groups on measures of verbal recall (F [21,78.08]=3.00; P<.001). Univariate analyses revealed a significant difference between groups on the total recall of list words on CVLT lists 1-5 (F [3,32]=7.48; P=.001), free recall with a short delay (F [3, 32]=6.98; P=.001), cued recall with a short delay (F [3, 32]=5.69; P<.01), free recall with a long delay (F [3, 32]=4.74; P<.01), and cued recall with a long delay (F [3,32]=4.92; P<.01). Post-hoc Tukey tests revealed the AIDS group to be significantly different than each of the other three groups (P<.01) on each of the former tasks. Human immunodeficiency virus status had no effect on the recall of List B.

Significant differences were found between groups on: verbal memory: errors, verbal memory:

Table 3. Effect of HIV Status and Recentness of Drug Use on Neuropsychological Performance* (continued)

	HIV-Negative (n=10)	HIV-Positive			
		Asymptomatic (n=9)	Symptomatic (n=13)	AIDS (n=10)	F†
Verbal Memory: Recognition					
Effect of HIV status					3.84‡
Recognition hits	14.30 (1.57)	14.44 (1.13)	14.23 (1.74)	11.00 (4.03)	1.73
Discriminability	91.82 (3.89)	95.71 (3.84)	92.31 (6.66)	85.23 (6.18)	3.77
Effect of recentness of drug use					0.54
HIV status × recentness of drug use					0.79
Visual Memory					
Effect of HIV status					3.47‡
Visual reproduction I	50.30 (28.11)	45.00 (32.94)	33.85 (21.21)	14.80 (24.52)	2.25
Visual reproduction II	49.30 (25.96)	37.67 (30.72)	35.16 (21.64)	16.50 (22.48)	2.09
Effect of recentness of drug use					0.10
HIV status × recentness of drug use					0.87

Abbreviations: HIV=human immunodeficiency virus, AIDS=acquired immunodeficiency syndrome, and CVLT=California Verbal Learning Test.
*Standard deviations are given in parentheses.
†Roy-Bargman stepdown *F*-tests, partialling out the Beck somatic subscale score, were conducted for each cognitive measure.
‡$P<.01$.
§$P<.05$.
‖$P<.001$.

recognition, and visual memory were due to differences between groups on their BDI somatic subscale scores. No differences were found between groups on the individual tests assessed in these domains.

DISCUSSION

This study examined neurocognitive performance in a population of African-American women with a history of substance abuse. The findings of this preliminary investigation support previous research that shows cognitive impairment in individuals with AIDS and strongly implies that this impairment is not global. Rather, HIV-related impairment in drug users appears to pertain to specific cognitive tasks. Differences in cognitive performance could not be attributed to differences in age, education, recentness of drug use, or affective status. No neuropsychological differences were found between asymptomatic HIV-positive drug users and HIV-negative drug users. These findings support other studies[37,38] that have found no significant difference between HIV-negative controls and HIV-positive individuals in the pre-AIDS stages of HIV infection.

Consistent with the present investigation, Arruda et al[39] evaluated cognitive functioning in asymptomatic HIV-positive women and found no differences in the neuropsychological test performance of asymptomatic women versus HIV-negative women. In a population of drug users, Wellman[3] found no deficits in asymptomatic seropositive drug users.

Grassi et al[40] investigated cognitive function in HIV-positive drug users, HIV-negative drug users, and HIV-negative nondrug users and found no neuropsychological differences between HIV-positive and HIV-negative drug users. However, they found that HIV-negative nondrug users scored better than HIV-positive and HIV-negative drug users, suggesting that the deficits observed were related to drug use rather than HIV status.

In a follow-up study, Grassi et al[41] compared HIV-positive drug users, HIV-positive nondrug users, and HIV-negative drug users and confirmed that both HIV seropositivity and drug abuse negatively affect cognitive function. Selnes et al[42] also found no decline in cognitive performance in asymptomatic HIV-positive IV drug users, although a mild decline in cognition was found with progression to AIDS. These findings are consistent with the results of the present study.

The hypothesis that individuals in the later stages of HIV infection would perform less well than seronegative controls was supported for persons with AIDS but not for symptomatic HIV-positive participants. No differences were found between seronegative, asymptomatic HIV-positive, and symptomatic HIV-positive participants on any of the neuropsychological measures.

Participants with AIDS showed significant deficits in psychomotor processing and verbal recall. They were considerably slower in completing Trails A, which may indicate greater difficulty in attending to stimuli. It was surprising that while the AIDS group showed deficits on Trails A, they did not show deficits on Trails B, which requires more information processing and places additional demands on cognitive flexibility. It may be that the working memory component of Trails B compensates for the inattention on Trails A. Individuals may have become more aroused by this more challenging task and subsequently may have performed better than on Trails A. Persons with AIDS also performed worse on measures of immediate and delayed recall of verbally presented stimuli, revealing deficits in the retrieval of information. Deficits were not observed in visual memory. This suggests that in this AIDS population, there may be a differential effect on the neural substrates underlying verbal memory.

In contrast to the present study's findings, Wellman[3] found that symptomatic IV drug users showed impairments on tasks requiring divided attention, memory, and graphomotor speed when compared with seronegative individuals. Furthermore, HIV-positive symptomatic subjects were found to perform significantly worse than seronegative subjects on Trails A and B. It is noteworthy that the seropositive group for the Wellman[3] study was comprised of asymptomatic (42%) and symptomatic (58%) IV drug users. Of the participants, 48% were women and only 21% were identified as African American.

Also in contrast to the results of the present study are the findings of Peavy et al,[33] who used the CVLT to examine cognitive performance in persons with HIV. These investigators reported that symptomatic HIV-positive subjects performed worse than seronegative controls on measures of recall; the performance of asymptomatic subjects fell between seronegatives and symptomatic subjects but did not differ significantly from either group. There were deficits in symptomatic subjects compared with seronegative controls on the number of words recalled on Trial 1, Trial 5, and Trials 1-5, short-delay cued recall, long delay free recall, and long-delay cued recall as well as on a measure of the degree of semantic clustering (CVLT). Differences in the gender and ethnicity of subjects may explain the discrepant findings. In the Peavy et al[33] study, IV drug abusers were excluded, all of the subjects were men, and the primary risk factor for HIV was homosexuality.

In the present investigation, the pattern of impairment observed in participants with AIDS suggested a subcortical impairment. While persons with AIDS showed deficits on immediate and delayed recall tasks, they did not show impairment when compared with seronegative and pre-AIDS subjects on the recognition task. In addition, participants with AIDS did not make more intrusion and perseveration errors than the other groups, and they performed similarly to the other groups on List B (CVLT). The recall of List B occurred after the repeated presentation of List A and therefore reflects vulnerability to proactive interference.

Patients with subcortical memory disorders typically demonstrate an impairment in recall, show normal sensitivity to proactive interference, and make significantly fewer intrusion and perseveration errors than individuals with cortical impairment. In contrast, performance on recognition remains largely intact.[24,43] The findings of this current investigation are consistent with those of Becker et al,[32] who showed that the cognitive deficits associated with HIV infection and AIDS suggest a subcortical basis of impairment.

There are many inconsistencies in the research of HIV-related cognitive decline. Lack of appropriate norms for substance abusers and minorities are partially responsible for contradictory findings in the literature. The use of different populations in various studies also may contribute to discrepant findings.

The results of this preliminary investigation

should be examined with caution because of the small sample size. Another limitation is the use of "recentness of drug use" to describe participants' drug history; other factors such as frequency of drug use and duration of use should be considered as well.

Failure to detect differences between symptomatic HIV-positive and HIV-negative individuals may be due to the poor sensitivity and specificity of neuropsychological measures in African-American populations. That is, measures may not accurately detect impairment in this population. The cognitive effects of drug use also may obscure HIV-related cognitive impairments in the early stages of HIV infection. Because drug use itself affects neuropsychological functioning, this drug use effect may be stronger than the subtle impact of HIV in early HIV infection. Finally, it has been suggested that a subgroup of HIV-positive individuals may be cognitively impaired and that neuropsychological deficits in these subgroups may be masked by the overall mean score of a whole group of HIV-positive individuals.[44]

Many of the seropositive subjects in the present study were receiving antiretroviral therapy. These medications prolong the amount of time it takes for the virus to replicate, increase CD4 cell counts, and lower the viral load. They also can positively influence performance on some neuropsychological measures.[45,46] For example, zidovudine has been shown to prevent mild cognitive impairment associated with HIV[47] and has been associated with improved cognitive performance in subjects with early symptomatic HIV infection and AIDS.[48] In the present study, medication may have had an ameliorating effect on subtle cognitive deficits in early HIV infection and thus masked differences between seronegatives and asymptomatic and symptomatic HIV-positive participants.

An important question that still needs to be answered is whether CNS abnormalities caused by prior drug use leaves individuals more vulnerable to the effects of HIV. Adding a nondrug using group would allow for the evaluation of the combined impact of drug use and HIV status on neuropsychological functioning.

CONCLUSION

The results of this study indicate that in a population of African-American women with a history of drug use, there is no evidence of cognitive impairment in the pre-AIDS stages of HIV infection. However, with progression to AIDS, cognitive deficits are evident.

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