JOURNAL OF CLINICAL MICROBIOLOGY, July 2002, p. 2387–2391 Vol. 40, No. 7
0095-1137/02/$04.00+0 DOI: 10.1128/JCM.40.7.2387–2391.2002
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Sensitivity of the Procleix HIV-1/HCV Assay for Detection of Human Immunodeficiency Virus Type 1 and Hepatitis C Virus RNA in a High-Risk Population

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Received 14 August 2001/Returned for modification 11 November 2001/Accepted 22 April 2002

The Procleix HIV-1/HCV Assay is a high-throughput nucleic acid test for the simultaneous detection of human immunodeficiency virus type 1 (HIV-1) and hepatitis C virus (HCV) RNA during blood donor screening. This study evaluated the clinical sensitivity of the Procleix assay and assessed the assay's ability to identify HIV-1- and HCV-infected individuals undetected by standard serologic tests. Plasma samples were obtained prospectively from 539 individuals at high risk for HIV-1 and HCV infection at seven clinics affiliated with Johns Hopkins University. Samples were tested in the Procleix HIV-1/HCV Assay and, if reactive, were then tested in the Procleix HIV-1 and HCV discriminatory assays to differentiate the source of viral RNA positivity. Of these 539 subjects, 287 (53.2%) tested reactive in the Procleix HIV-1/HCV Assay. In discriminatory assay testing, 12 of 287 subjects (4.2%) were reactive for HIV-1 RNA only, 260 (90.6%) were reactive for HCV RNA only, and 11 (3.8%) were coinfected with HIV-1 and HCV. The clinical sensitivity for samples tested neat was 100% for HIV-1 and 99.3% for HCV. Three subjects with Procleix HCV reactive/seronegative results seroconverted upon follow-up and were confirmed as Procleix HCV yield cases. The Procleix HIV-1/HCV Assay is a highly sensitive test that detects ongoing and early HIV-1 and HCV infection in a significant number of subjects at high risk for these diseases. Confirmation of Procleix yield cases upon follow-up demonstrated the ability of the Procleix HIV-1/HCV Assay to detect the presence of HIV-1 and HCV in blood earlier than standard serologic tests.

The Procleix HIV-1/HCV Assay is a nucleic acid test (NAT) for the simultaneous detection of human immunodeficiency virus type 1 (HIV-1) and hepatitis C virus (HCV) RNA in plasma. Samples that are reactive in this assay are then tested with the Procleix HIV-1 and HCV discriminatory assays to confirm the type(s) of viral RNA present. The Procleix assay has been implemented for blood screening in the United States under an Investigational New Drug application, as well as in Europe and Australia as a licensed test. Routine blood screening for detection of HIV-1 and HCV RNA with the Procleix HIV-1/HCV Assay has improved the safety of the blood supply by allowing early detection of HIV-1 and HCV. Compared to serologic tests, the Procleix assay is intended to improve the safety of the blood supply by detecting virally reactive, seronegative donations.

The clinical specificity of the Procleix HIV-1/HCV Assay has been evaluated in a prospective study with blood donations throughout the United States (data have been submitted to the Food and Drug Administration). Because the prevalence of individuals infected with HIV-1 and/or HCV is very low in the current blood donor population, the clinical sensitivity of the assay is difficult to estimate with samples from this population. Previously described clinical sensitivity studies have used commercially obtained known positive samples and seroconversion panels (11). The present study determined the clinical sensitivity of the assay with prospectively collected plasma samples from 539 individuals at high risk for HIV-1 and/or HCV infection.

The routes of transmission of the etiologic agent of AIDS and related conditions, including sexual contact, drug injection, transfusion of infected blood and blood products, and mother to infant transmission, have now been well documented. The need for blood screening to prevent transfusion-borne infections is emphasized by studies suggesting that receipt of a single unit of blood from an individual infected with HIV-1 is highly likely to transmit the virus to the recipient (2, 3, 5).

As with other sexually transmitted diseases, the likelihood of sexual transmission of infection with HIV-1 is related to the number of sexual partners and to sexual practices. Sexually transmitted diseases caused by agents other than HIV-1 can facilitate HIV-1 infection (5, 7). Risk factors for HIV-1 infection among individuals who inject drugs include high frequency of needle sharing and injection, as well as high prevalence of infection in the geographic area (5).

HCV was discovered in the context of blood transfusion, although current donor and donation screening practices have greatly reduced the importance of transfusion as an avenue of HCV transmission (3, 4, 6). Most new HCV infections in the United States affect individuals who inject drugs. Such individuals acquire the infection rapidly, and within 6 to 12 months up to 80% of a given population of injection drug users may be

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infected (6). Additional risk factors for HCV infection include multiple sexual partners, sexual and household contact with hepatitis C, and occupational exposure to blood and/or hemodialysis fluids (4, 6).

MATERIALS AND METHODS

Subject selection. Subjects at high risk for HIV and HCV infection (n = 548) were enrolled at seven clinics affiliated with Johns Hopkins University in the Baltimore, Md., area. The following is the breakdown of clinic type and enrollment; Supporting Hospitals Abroad with Resources and Equipment (homosexual men's clinic; n = 56 subjects), AIDS service (n = 61), AIDS Linked to Intravenous Experience (injection drug use; n = 301), transfusion medicine (n = 3), Reach (AIDS and injection drug use; n = 94), hepatitis (n = 10) and Johns Hopkins University Hospital (n = 23). Risk factors were defined as hemodialysis and transfusion, intravenous drug use, occupational exposure, male homosexual activity, unprotected sex outside a monogamous relationship, and sex with a partner known to be positive for HIV and/or HCV and/or any other sexually transmitted disease. Subject demographics and risk factors were recorded on patient information forms at the time of enrollment.

Data from nine subjects were excluded from the analysis for the following reasons: withdrawn by site prior to Procleix testing and lab data collection (n = 2); withdrawal from the study because of antiviral medication (n = 1); lack of matching subject and laboratory records (n = 4); and lack of Procleix assay results (n = 2). The study analysis used data from the remaining 539 subjects, all of whom gave informed consent to participate in the study.

Sample collection. Plasma was collected in 7-ml EDTA Vacutainers and stored in accordance with Procleix HIV-1/HCV Assay package insert specifications prior to testing. The specifications state that plasma may be stored for up to 72 h from the time of the draw at <25°C; temperatures not to exceed 30°C are acceptable for no more than 24 h. Specimens may be stored an additional 5 days at 2 to 8°C following centrifugation. Plasma separated from the cells may be stored for longer periods of time at <−20°C before testing. Plasma was aliquoted into separate tubes for laboratory testing. All serology testing and specimen handling were performed in accordance with the manufacturer's package insert specifications, as indicated below.

Serology testing. Standard serologic tests were performed on all plasma samples, in accordance with the manufacturer's package insert specifications, to test for the presence of HIV antibody (recombinant lymphadenopathy-associated virus enzyme immunoassay [EIA] HIV-1; Genetic Systems, Redmond, Wash.), HIV-1 p24 antigen (HIV-1 p24 antigen assay; Beckman Coulter, Fullerton, Calif.), and HCV antibody (HCV EIA 2.0; Abbott Laboratories, Abbott Park, Ill.). A sample was considered HIV and/or HCV seropositive if HIV and/or HCV EIA results were repeat reactive and confirmed with the appropriate supplemental serologic test. Samples that were EIA repeat reactive and supplemental serology indeterminate were considered sero-indeterminate and treated comparably to seropositive samples. Supplemental serology tests included HIV Western blot (Organon Teknika, Durham, N.C.), HIV-1 p24 antigen neutralization (HIV-1 p24 antigen assay; Beckman Coulter), and HCV recombinant immunoblot assay (HCV recombinant immunoblot assay 3.0; Chiron Corporation, Emeryville, Calif.).

Procleix assay results that did not agree with antibody and/or antigen test results were considered discordant and subjected to further testing with an appropriate alternative NAT. The alternative NATs used were the Amplicor HIV-1 Monitor Test Ultrasensitive Procedure (Roche Diagnostics, Branchburg, N.J.) for HIV-1 and the COBAS Amplicor HCV test, version 2.0 (Roche Diagnostics, Branchburg, N.J.) for HCV. The latter test was performed at Blood Centers of the Pacific (San Francisco, Calif.). Blood Centers of the Pacific developed and validated a sample processing procedure to concentrate the sample prior to testing in the Amplicor HCV assay. Subjects yielding discordant Procleix and serologic results were enrolled in a follow-up study.

Complete laboratory test results were available for 473 of the 539 evaluable subjects whose data were included in the analysis. Sample quantities not sufficient (QNS) for testing were responsible for most of the unavailable results.

Procleix testing. The Procleix HIV-1/HCV Assay involves three main steps which take place in a single tube: sample preparation with target capture, HIV-1 and HCV RNA target amplification by transcription-mediated amplification (8), and detection of the amplification products (amplicons) by the hybridization protection assay (1).

An internal control is added to each reaction to verify the specimen processing, amplification, and detection steps. The internal control signal in each tube is discriminated from the HIV-1/HCV signal by differential kinetics of light emission from probes with different labels (9). Specimens found to be reactive in the Procleix HIV-1/HCV multiplex assay are subsequently tested in the HIV-1 and HCV discriminatory assays to determine if they are reactive for HIV-1, HCV, or both. The discriminatory assays utilize the same three main steps as the Procleix HIV-1/HCV Assay (target capture, transcription-mediated amplification, and hybridization protection assay), and the same basic assay procedure is followed. In the discriminatory assays, HIV-1-specific and HCV-specific probe reagents are used in place of the HIV-1/HCV probe reagent.

Plasma samples from high-risk subjects were tested, both neat and diluted 1:16, with the Procleix HIV-1/HCV Assay. Since blood screening with NAT routinely involves the testing of 16-member pools, each sample was diluted 16-fold in order to evaluate the effect of sample dilution on assay sensitivity. Samples were diluted in normal human plasma that had yielded negative test results for HIV-1 and HCV RNA, HIV and HCV antibody, and HIV-1 p24 antigen. Samples that were nonreactive in the Procleix HIV-1/HCV Assay underwent no further Procleix assay testing. Samples that were reactive (neat and diluted) in the Procleix HIV-1/HCV Assay were then tested with the Procleix HIV-1 and HCV discriminatory assays. Approximately equal numbers of samples were tested with each of three clinical reagent lots.

TABLE 1. Subject risk factors for HIV-1/HCV infection

Risk factor[a]	No. of subjects	% of subjects
IVDU	167	31.0
Male homosexual activity	56	10.4
Unprotected sex outside a monogamous relationship (unprotected sex)	41	7.6
Occupational exposure	17	3.2
Sex with a partner positive for HIV-1 and/or HCV and/or having any other sexually transmitted disease (positive partner)	7	1.3
Transfusion	6	1.1
Other[b]	8	1.5
IVDU + unprotected sex	137	25.4
IVDU + unprotected sex + positive partner	43	8.0
IVDU + another factor(s)	44	8.2
Multiple factors other than IVDU	13	2.4

[a] IVDU, intravenous drug use.
[b] Inhaled drug use; pelvic inflammatory disease; sharing drug paraphernalia.

RESULTS

Subject demographics and risk factors. Demographic data on 539 subjects were included in the analysis. The mean age was 40 years and ranged from 17 to 73 years. Males constituted 67.5% of the subjects. Most subjects (98.5%) were born in the United States. The majority of subjects (72.4%) were black, non-Hispanic, with most of the remaining subjects (22.3%) being white, non-Hispanic. Intravenous drug use was the most common risk factor in this study population, with 72.6% of the subjects identifying intravenous drug use as at least one risk factor. Intravenous drug use was the single risk factor for 31.0% of subjects and one of multiple risk factors for another 41.6% of subjects. The subjects' risk factors are identified in Table 1.

Clinical sensitivity of the Procleix assay with samples from high-risk subjects. Of the 539 subjects, 287 (53.2%) had plasma that was reactive when tested neat in the Procleix HIV-1/HCV Assay (Table 2). Discriminatory assay testing revealed that 12 of the 287 (4.2%) were reactive for HIV-1 RNA only, 260 (90.6%) were reactive for HCV RNA only, and 11 (3.8%) were coinfected with both viruses. Plasma from four subjects was reactive in the Procleix HIV-1/HCV Assay but nonreactive in both discriminatory assays. Cross-contamina-

TABLE 2. Procleix assay results

Assay	Reactivity	No. (%) of samples
HIV-1/HCV (n = 539)	Nonreactive	252 (46.8)
	Reactive	287 (53.2)
Discriminatory (n = 287)	Reactive for HIV-1 only	12 (4.2)
	Reactive for HCV only	260 (90.6)
	Reactive for HIV-1 and HCV	11 (3.8)
	Nonreactive for HIV-1 and HCV	4 (1.4)

tion during a Procleix assay run could have caused these samples to give false-positive results in the Procleix HIV-1/HCV Assay. A total of 67.3% of subjects who used injection drugs had HCV RNA in their plasma, compared to 5.4% of subjects with other risk factors (Table 3).

HIV-1 analysis. Comparison of Procleix assay results with HIV serology and alternative HIV-1 NAT results was performed on 530 samples tested neat and 520 samples diluted 1:16 prior to testing in the Procleix assay. There was 100% sensitivity (23 of 23) for detection of HIV-1 with the Procleix HIV-1/HCV and HIV-1 discriminatory assays in specimens tested neat and 100% (23 of 23) sensitivity with the Procleix HIV-1/HCV Assay in specimens diluted 1:16 (Table 4). Of the 23 Procleix HIV-1/HCV-reactive samples, 22 were HIV-1 seropositive. The remaining sample was HIV-1 EIA nonreactive, p24 antigen reactive, and HIV-1 alternative NAT positive (Table 5). Based on concordant NAT (Procleix and an alternative NAT test) and p24 antigen results, the sample was considered a true positive. Of the 23 HIV-1 Procleix reactive specimens, 11 were copositive for HCV (Table 2).

There were no Procleix HIV-1 false-positives compared to the results obtained by serology. A total of 501 Procleix nonreactive samples were seronegative, and another three Procleix nonreactive samples were HIV-1 seropositive but HIV-1 alternative NAT negative. An additional nine samples were HIV-1/HCV reactive but were either not tested or were invalid in the HIV-1 discriminatory assay. Of these nine samples, eight were confirmed reactive in the HCV discriminatory assay, and the remaining sample was not tested in the discriminatory assays. Seven of the nine were HCV seropositive, one was HCV EIA repeat reactive but QNS for the recombinant immunoblot assay, and one was HCV seronegative. All nine samples tested HIV antibody negative.

HCV analysis. Comparison of the Procleix assay with HCV serology and alternative HCV NAT results was performed on 520 samples tested neat and 508 samples diluted 1:16 prior to testing in the Procleix assay. The clinical sensitivity of the Procleix HIV-1/HCV Assay and the HCV discriminatory assay for samples tested neat was 99.3% (266 of 268, Table 4). Comparison of Procleix HIV-1/HCV Assay, HCV serologic, and alternative NAT results showed that the clinical sensitivity of the Procleix HIV-1/HCV Assay with diluted samples was 98.1% (254 of 259, Table 4).

TABLE 3. Relationship between Procleix assay results and subjects' risk factors

Risk factor	No. of subjects	No. (%) with Procleix assay result:		
		HIV-1 reactive only	HCV reactive only	HIV-1 and HCV reactive
Intravenous drug use	391	3 (0.8)	252 (64.5)	11 (2.8)
Other	148	9 (6.1)	8 (5.4)	0 (0.0)

TABLE 4. Overall sensitivity of the Procleix HIV-1/HCV Assay in a high-risk population[a]

Virus	Specimen	No. of specimens			Sensitivity (%) 95% C.I.
		Total	TP	FN	
HIV	Neat	530	23	0	100.0 (85.2–100.0)
	Dilute 1:16	520	23	0	100.0 (85.2–100.0)
HCV	Neat	520	266	2	99.3 (97.3–99.9)
	Dilute 1:16	508	254	5	98.1 (95.6–99.4)

[a] True-positives (TP) were Procleix HIV-1/HCV reactive and discriminated and seropositive or sero-indeterminate or alternative NAT reactive. False-negatives (FN) were Procleix HIV-1/HCV nonreactive and either seropositive or sero-indeterminate with alternative NAT results. C.I., confidence interval.

One specimen was nonreactive when tested both neat and diluted in the Procleix HIV-1/HCV Assay but was HCV seropositive and HCV alternative-NAT reactive. This sample was considered a Procleix false-negative based on the combination of serologic and alternative NAT results. Two samples were Procleix reactive when tested neat but were nonreactive in the Procleix assay when diluted 1:16, consistent with samples with a low viral load. The reactive results on the samples tested neat were considered Procleix true-positives. There were 44 HCV seropositive and 1 sero-indeterminate sample that were nonreactive in the Procleix assay (Table 5). Of these 44 samples, 37 were tested with the HCV alternative NAT. Thirty-four of the 37 were HCV alternative NAT negative, 2 yielded results in the PCR grey zone and were QNS for further testing, and one sample was HCV alternative-NAT positive. The 36 subjects that were NAT nonreactive (and grey zone) likely represent subjects who have resolved HCV infection.

Follow-up testing of subjects with discordant test results. A follow-up study was undertaken to clarify discordant results at index and to identify subjects who seroconverted. Subject fol-

TABLE 5. Procleix results versus HIV and HCV serology results

Virus	Serology result	No. (%) of specimens with Procleix result:	
		Reactive	Nonreactive
HIV	EIA repeat reactive, Western blot positive	22 (88.0)	3[a] (12.0)
	Seronegative	1[b] (0.2)	501 (99.8)
HCV[c]	RIBA positive	265 (85.8)	44[d] (14.2)
	RIBA indeterminate	0 (0.0)	1[e] (100)
	RIBA negative	0 (0.0)	1 (100)
	Seronegative	6[f] (2.7)	216 (97.3)

[a] All three tested alternative NAT negative.
[b] Yield specimen, p24 antigen positive and alternative NAT reactive.
[c] All HCV specimens were EIA repeat reactive. RIBA, recombinant immunoblot assay.
[d] Of 37 tested with alternative NAT, 34 were negative (likely resolved infection), 2 were equivocal, and 1 was positive.
[e] Alternative NAT negative.
[f] Yield: three of these later seroconverted, and the other three were false-positive results due to contamination.

low-up plasma samples were collected at 84 to 194 days after the index (initial) bleed. Follow-up samples were collected and tested as described previously, except that testing of diluted samples in the Procleix HIV-1/HCV Assay was not performed.

Of the 539 high-risk subjects evaluated for the purpose of estimating the clinical sensitivity of the Procleix assay, 55 subjects had discordant results between the Procleix assay and serologic testing. Thirty-two of these subjects were enrolled in the follow-up study, while the remaining 23 were lost to follow-up and declined to participate.

HIV-1 follow up: Procleix nonreactive/seropositive samples. Three index samples were HIV-1 seropositive by Western blot analysis but Procleix HIV-1/HCV Assay and alternate HIV NAT nonreactive. One subject was enrolled in the follow-up study. The follow-up sample tested seropositive for HIV-1 and HCV, Procleix HCV reactive, Procleix HIV-1 nonreactive, and QNS for HIV alternative NAT. The final Procleix interpretation after follow-up remained true-negative, due to the agreement between the two NAT tests at index.

HIV-1 follow-up: Procleix nonreactive/p24 antigen-reactive samples. Two index specimens were Procleix HIV-1/HCV Assay nonreactive, HIV EIA nonreactive, and p24 antigen reactive in singlet. Repeat p24 antigen test results were not available, and the neutralization test was not performed. Both index samples tested HIV alternative NAT nonreactive, in agreement with the Procleix results. One subject was entered into the follow-up study. The follow-up sample was again HIV antibody nonreactive but QNS for all other testing. The Procleix results were considered true negatives.

HCV follow-up: Procleix HCV reactive/seronegative samples. A total of six index samples yielded reactive Procleix HIV-1/HCV Assay and HCV discriminatory assay results but were seronegative. At index, three of these six samples had HCV alternative NAT results in agreement with Procleix results, and the remaining three samples were QNS for alternative NAT.

Upon follow-up, three of the six samples at index testing Procleix HCV reactive but seronegative (one HCV alternative NAT positive and two QNS for alternative NAT) were found to be Procleix HIV-1/HCV Assay nonreactive, alternative NAT negative, and seronegative. All three of these index samples were considered Procleix false-positive, likely due to a contaminated NAT tube and intra-assay contamination.

For the other three index specimens testing HCV Procleix reactive/seronegative, follow-up bleeds yielded reactive Procleix and alternative NAT results in agreement with Procleix results observed at index. HCV serologic test results were also positive on follow-up, indicating the donor had seroconverted between the index and follow-up bleeds. The index Procleix results for these three samples were interpreted as true positive. One of these samples demonstrated fluctuating viral load during the seroconversion period, in that the first follow-up bleed at 123 days was Procleix and alternative NAT nonreactive. During the second follow-up bleed at 151 days, the subject was seropositive and reactive in both Procleix and alternative NAT.

HCV follow-up: Procleix nonreactive/seropositive and sero-indeterminate samples. At index, a total of 44 HCV-seropositive samples and one HCV-sero-indeterminate sample yielded Procleix HIV-1/HCV Assay nonreactive and Procleix HCV discriminatory assay nonreactive results when tested neat (Table 5). Twenty-five of these subjects were enrolled in the follow-up study. Upon follow-up, 22 of the 25 subjects again tested Procleix nonreactive and seropositive. The Procleix result for 21 of these 22 specimens was considered true negative because the follow-up HCV alternative NAT result was either negative (n = 18), grey zone (n = 2), or invalid (n = 1). These cases likely represent individuals with resolved infections. One of the 22 specimens had a positive follow-up HCV alternative NAT result and thus was considered Procleix false negative at index.

Of the remaining three Procleix nonreactive/HCV-seropositive index specimens, upon follow-up, one sample was reactive in the Procleix HIV-1/HCV and HCV discriminatory assays, seropositive, and QNS for alternative NAT. Since the follow-up Procleix result could not be confirmed by alternative NAT and did not aid in the interpretation of the index results, the Procleix result at index was considered uninterpretable. Another follow-up specimen tested Procleix HIV-1/HCV reactive and again HCV seropositive, but was QNS for Procleix discriminatory testing and alternative NAT testing. Again the Procleix result at index was considered uninterpretable. The remaining sample was QNS for both Procleix and alternative NAT at follow-up. The index Procleix nonreactive result was considered true negative due to the agreement at index with the alternative HCV NAT result.

HCV follow-up: Procleix neat reactive, dilute nonreactive/seropositive sample. Two HCV-seropositive specimens were Procleix HIV-1/HCV Assay and HCV discriminatory assay reactive when tested neat but nonreactive when diluted 1:16. One subject was enrolled in follow-up and was again found to be Procleix reactive and HCV seropositive. The neat index Procleix interpretation for this sample was true positive, and the dilute index Procleix interpretation was false negative.

Clinical sensitivity determinations. Sensitivity estimates for the Procleix HIV-1/HCV Assay compared to serology and alternative NAT for detection of HIV-1 in this high-risk population was 100% (23 to 23) in both neat and 1:16 diluted samples. The HCV sensitivity estimate in neat samples was 99.3% (266 of 268) and in diluted samples was 98.1% (254 of 259, Table 4).

DISCUSSION

The Procleix HIV-1/HCV Assay, a novel nucleic acid test for simultaneous detection of HIV-1 and HCV, has been used for blood screening under an IND since April 1999. Because of the low prevalence of HIV-1 and HCV infection in the blood donor population, determination of the assay clinical sensitivity in this population is difficult. Accordingly, to estimate the Procleix assay clinical sensitivity, the assay was used to test prospectively collected plasma samples from a population at high risk for HIV-1 and HCV infection. The principal risk factors in this population, including intravenous drug use, male homosexual activity, multiple sexual partners, and sex with high-risk partners, were comparable to those described previously in studies of the epidemiology of HIV-1 and HCV infection (4, 5, 6, 7, 10). A total of 72.6% of the study subjects were intravenous drug users.

Of 539 subjects included in the data analysis, over half (n =

287, 53.2%) had plasma that was reactive in the Procleix HIV-1/HCV Assay. Subsequent testing with the Procleix discriminatory assays showed the presence of HIV-1 RNA in 12 subjects (4.2%), HCV RNA in 260 (90.6%), and both types of viral RNA in 11 (3.8%). In the study population, the prevalence of HIV-1 infection, HCV infection, and coinfection was 2.2% (12 of 539), 48.2% (260 of 539), and 2.0% (11 of 539), respectively. Intravenous drug use was strongly associated with HCV infection; 64.5% of subjects who used intravenous drugs were infected with HCV, compared to 5.4% of subjects with other risk factors. Previous investigation has shown that HCV infection may occur in up to 80% of a given population of intravenous drug users (6).

This study demonstrated that the Procleix assay is a highly sensitive test for detection of HIV-1 and HCV in subjects at high risk for these infections. Comparison of results from the Procleix assay, HIV serologic tests, and an alternative HIV-1 NAT indicated 100% clinical sensitivity of the Procleix HIV-1/HCV Assay and HIV-1 discriminatory assay for detection of HIV-1. Sensitivity of the Procleix HIV-1/HCV Assay was not affected when plasma samples were diluted 1:16 with negative human plasma to represent dilution of individual samples during pooling for blood screening.

When the results of the Procleix assay, HCV serologic tests, and an alternative HCV NAT were compared, the Procleix HIV-1/HCV Assay and HCV discriminatory assay showed 99.3% sensitivity for HCV. Follow-up enrollment and testing confirmed seroconversion in three HCV yield cases that were seronegative but Procleix reactive at index. The identification of these subjects demonstrates the ability of the Procleix assay to detect viral infections in advance of conventional serologic screening and prevent transfusion of infected blood products during the preseroconversion window period.

ACKNOWLEDGMENTS

We thank Terry Henderson, Lisette Johnson, Scott Barnett, Ellen Taylor, and Stephanie Strathdee for assistance with laboratory testing and specimen handling and gratefully acknowledge the statistical analyses provided by Songbai Wang. Judith Lazar provided excellent technical writing assistance.

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