

Comparison of HIV antibody profiles in intravenous drug users and individuals infected by the sexual route

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Abstract

HIV-1 antibody patterns in two groups, those infected by the intravenous route (IV drug users) and those infected by the sexual route (prostitutes, male homosexuals and sexually transmitted disease patients) were compared using the Western blot technique. A total of 160 cases were studied. The intravenous drug user (IVDU) group appeared to respond to fewer antibody markers than the sexually infected group, the difference being significant for markers p31, p51, p55, p66, gp41 and gp120. Furthermore, a higher proportion (63%) of the sexually infected group carried antibodies to all Western blot markers as compared to the IVDU group (49%).

Key words: HIV, drug abuse, sexual disease.

INTRODUCTION

Diagnosis of human immunodeficiency virus (HIV) infection is based on the detection of HIV antibodies in patients' serum. Antibodies to HIV usually develop four to eight weeks after exposure to the virus and the patient may remain asymptomatic for an indefinite period of time after infection.^{1,2}

Most HIV antibody tests, e.g. enzyme immunoassays (EIA), are specific and highly sensitive. Being highly sensitive, these assays are prone to false reactive results, especially in areas of low prevalence for HIV infection and in low risk groups such as blood donors.³ Supplementary tests, often based on the Western blot (WB), are used to eliminate such false positive results of screening tests.

A major advantage of the WB is that it defines the antibody profile to specific viral proteins. The patterns of antibody reactivity in persistent HIV infection have been studied in various high risk groups including homosexual men, haemophiliacs and intravenous drug abusers.^{4,5,6}

The objective of this study was to compare HIV antibody patterns determined by the Western blot technique in those infected by the intravenous route, namely, intravenous drug users (IVDU) and those infected by the sexual route i.e. male homosexuals, prostitutes and individuals with a sexually transmitted disease (STD).

MATERIALS AND METHODS

Subjects

The serum samples were selected from samples received at the National AIDS Reference Laboratory (NARL) for HIV screening and confirmation from designated HIV screening centres throughout Malaysia during the years 1991 and 1992.

Sera from subjects that fulfilled the following criteria were included in the study:

1. Positive in the HIV screening tests
2. Positive by the Western blot test
3. Asymptomatic i.e. healthy subjects with no signs and symptoms associated with HIV infections
4. Documented case history

The subjects were assigned, according to their case histories to either of two groups, i.e. the IVDU group or the group consisting of subjects who were infected sexually. Case histories were obtained from medical officers' reports and patient's questionnaire forms regarding sexual partners and history of drug abuse. The IVDU group were inmates of drug rehabilitation centres and the sexually infected group comprised of prostitutes, homosexuals and STD patients with no history of drug abuse. A total of 160 subjects, 80 from each group: were selected for this study.

Screening assays

Fresh serum samples were screened for antibody to HIV-I using the particle agglutination assay (Serodia, Fujirchio Inc.) and the Wellcozyme HIV recombinant ELISA technique. The exact methods for each assay, described in detail in the manufacturers' product instructions, were followed rigidly.

Western blot assay

All sera which recorded positive by the screening assays were reconfirmed by the HIV-1 Western blot IgG assay (Diagnostic Biotechnology, Singapore), performed according to manufacturers' instructions. WB positive and negative controls were included in each assay.

A specimen was considered to be W 5 positive if any two of the following four antibody bands were observed: the envelope (ENV) glycoprotein bands gp120, gp160, gp41 and core (GAG) protein band p24 (CDC criteria).

Statistical analysis

The Chi-square (X^2) test was used to determine the significance of difference in the proportion of antibody markers in the two groups.

RESULTS

The proportion of sera reactive for the different HIV antibodies in the two different high risk groups studied are summarised in Table 1.

The viral proteins recognized by human positive reference sera by the Western blot technique were gp120, gp160, gp41, p66, p55, p51, p31, p24 and p17.

The frequency with which antibodies to the varinus markers were detected in the two groups studied were as follows: p24, gp160 > gp120 > gp41 > p51, p66, p17 > P31, p55.

In both high risk groups studied, the antibody to the major core protein p24 and envelope precursor gp160 were detected in all cases. This is not surprising since the presence of these two markers are included in the criteria for selection of WB positive cases in our study. The other markers including transmembrane protein gp41 which is also included in the selection criteria for WB positive cases was less apparent.

The antibody response patterns differed in the two groups in that the IVDU group appeared to respond to fewer markers than the sexually infected group. This difference was significant for the markers p55, p31, p51, p66, gp41 and gp120 (X^2 , (0.01) > 6.635) (Table 1). Further-

more, a higher (63%) proportion (50/80) of the sexually infected group carried antibodies to all WH markers as compared to 49% (39/80) in the IVDU group.

The pattern of antibody reactivity of the sera from the two groups studied are presented in Fig. 1.

DISCUSSION

Using Western blot technique, we have analysed HIV antibody patterns in two important high risk groups in Malaysia, namely, IVDU and another group comprising male homosexuals, prostitutes and STD patients whose infection was by the sexual route.

The most antigenic protein was the GAG core protein p24 and the envelope protein gp160. Antibodies to these proteins were detected in 100 percent of sera. Although this is due to the method of selection of subjects for the study, antibody to GAG gene encoded protein p24 has been reported to predominate in early asymptomatic HIV infection, followed closely by antibodies against ENV gene products.^{7*}

Our data shows significant differences in patterns of antibody reactivity in the two groups. Antibody markers other than p24 and gp160

TABLE 1: Reactivity of sera to specific viral antigens determined by the Western blot technique for two HIV infected groups.

Western blot antibody	Intravenous drug users (n=80)	Sexual transmission (n=80)
	No. (%)	No. (%)
G p17	60 (75)	57 (71)
A #p24	80 (100)	80 (100)
G p55*	44 (55)	47 (58)
P p31*	48 (60)	71 (89)
O p51*	54 (68)	74 (93)
L p66*	53 (66)	75 (94)
E #gp41*	59 (74)	77 (96)
N #gp120*	68 (85)	80 (100)
V #gp160	80 (100)	80 (100)

* Differences are significant with $X^2_1(0.01) > 6.635$

Antibodies to markers which were used to select patients for the study.

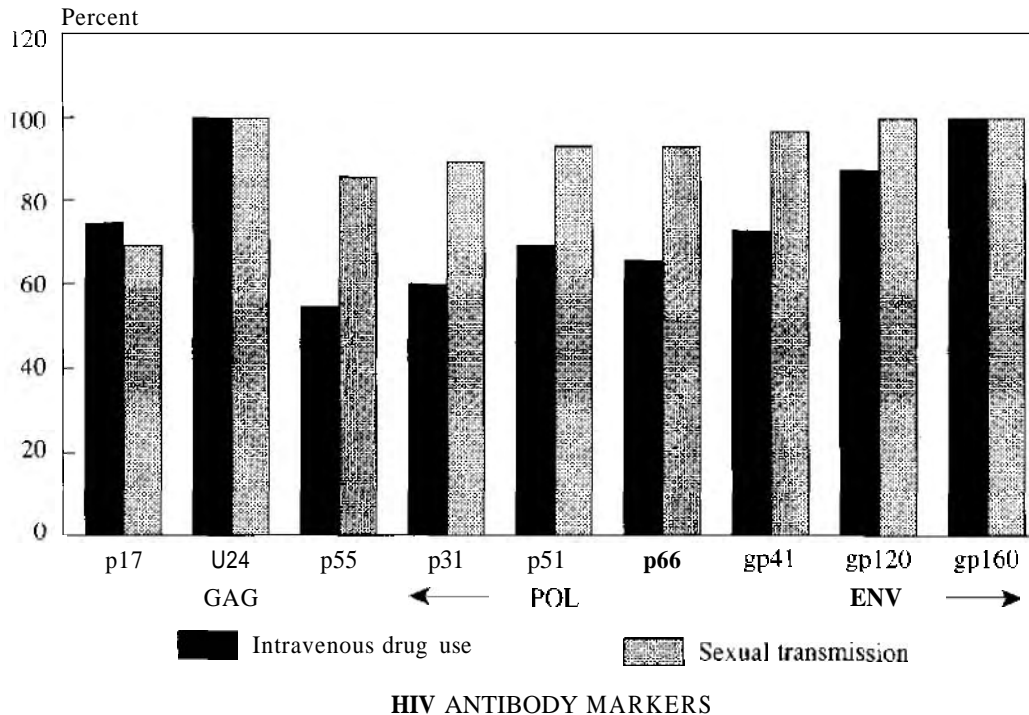


FIG. 1: Spectrum of Western blot antibodies in HIV infected IVDU and individuals infected by the sexual route (% of total sera analysed).

occur less frequently in the IVDU compared to the other group whose transmission of HIV was by the sexual route. This could be attributed to a number of factors including individual variation in antibody responses, variation in antigenicity of the infectious agent, dose and route of infection or the progression of the disease. Franchini *et al*⁹ have reported that the spectrum of antibody elicited in infected individuals does not seem to correlate with disease stages. After acute infection with HIV, individuals tend to progressively acquire antibody to all HIV antigens. This would appear to reflect a continual expression of virus *in vivo*, with a greater likelihood of exposure to each antigen with increasing time after infection. However, in individuals progressing to AIDS, anti core antibodies, anti p24 and anti p17 reactivity has been shown to decline.¹⁰

Prior studies of HIV infection in intravenous drug abusers have shown that HIV infection was brought about by repeated exposures to small amounts of contaminated blood through the common practice of sharing contaminated injection equipment. Seroconversion was related directly to the number of injections and number

of days of use.^{9,11} The varying antibody profiles in IVDU may be a result of circulating antigen-antibody complexes. Several studies have reported effective methods for dissociating HIV antigen-antibody complexes in HIV antibody positive subjects.^{12,13} In order to test this hypothesis it may be necessary to pretreat sera in IVDU to dissociate any antigen-antibody complexes and determine the true antibody pattern.

Our data, although taken at one point in time, demonstrate a significant difference in antibody patterns between the two infected groups and indicate that more extensive longitudinal studies over a period of time may be necessary to determine if the observed variations in the antibody pattern have underlying biological significance.

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