

Abstract

HIV-1 is characterized by an unusually high degree of genetic variation. The majority of HIV-1 isolates cluster in the M (major) group, whereas fewer are belonged to the O (outlier) and the N (new) groups. The group M virus are further divided into ten subtypes, A through J. The aims of this study were to develop a peptide enzyme immunoassay (P-EIA) for HIV-1 subtyping and to study the trends of the distribution of HIV-1 subtypes in different high-risk populations in Taiwan. Furthermore, virological markers related with sexual transmission of HIV-1 will be studied in the married couples cohort.

An EIA plate which contain 8 synthetic peptides from 6 HIV-1 subtypes, A, B, C, D, E, G, was developed for subtyping. Each serum sample was diluted at 1:100 and aliquoted into different wells on the same lane of the EIA plate for subtyping. In total, from 1994 to 1998, 802 male and 72 female HIV-1 infected persons participated in this study, which represent 45.3% and 52.6%, respectively of the total male and female HIV-1 reported cases in Taiwan. The HIV-1 subtypes were determined using P-EIA and complemented with gene sequencing and phylogenetic tree analysis. The results showed that among male individuals infected with HIV-1, 550 (68.2%) were infected with subtype B, and 238 (29.5%) were infected with subtype E. However, female cases were mainly infected with none-B subtypes : 2 (2.8%) with subtype A, 10 (13.9%) with subtype B, 4 (5.6%) with subtype C, 52 (72.2%) with subtype E and 2 (2.8%) with subtype G.

In addition, 15 of 22 (68.2%) intravenous drug users (IVDUs) were infected with subtype B and 7 (31.8%) were infected with subtype E. Among 18 male heterosexual IVDUs, 5 of 6 (83.3%) with subtype E and 1 of 11 (9.1%) with subtype B had histories of sexual contact with prostitutes. The difference of the rates was statistically significant

($p < 0.05$). Therefore, sexual transmission was an important risk factor for male IVDUs infected with HIV-1 subtype E in Taiwan.

In terms of the trends of HIV-1 infection in Taiwan, the ages of people infected with HIV-1 became younger. The proportion of the HIV-1 infected cases aged below 19 years old was 2% in 1995-1996, and it increased to 6% in 1997-1998. In addition, the distribution of HIV-1 subtypes by year has showed that in 1997-1998, the number of subtype E infection surpassed the number of subtype B infection in the heterosexual population. Although subtype B was still the dominant subtype in the male bisexuals and homosexuals, the increase of subtype E in both populations in recent years cannot be neglected.

In the cohort, among 52 HIV-1 infected married men, 14 of 33 (42.4%) with subtype E had transmitted HIV-1 to their spouses, while only 1 of 17 (5.9%) men with subtype B had transmitted HIV-1 to their wives ($p = 0.0055$). Furthermore, among 17 males who had transmitted HIV-1 to their spouses, 11 (64.7%) had anti-Tat antibody, which was significantly higher than that (25.7%, 9/35) of the men who did not transmitted HIV-1 to their wives ($p = 0.019$). On the contrary, the anti-Vpu antibody positive rates among those two groups mentioned above were 17.7% (3/17) and 42.9% (15/35), respectively ($p = 0.0044$). Logistic regression analyses showed that the odds ratios of sexual transmission of HIV-1 were 3.9, 4.4, and 18, respectively for males who had subtype E infection, anti-Tat antibody, or both variables.

In conclusion, P-EIA is a rapid and reliable method for HIV-1 subtyping. It is useful for the survey of the trend of HIV-1 subtypes in different high-risk populations. Both subtype and anti-Tat antibody were found to be serologic markers related with sexual transmission of HIV-1 infection. This study may provide useful information for the future control of the AIDS epidemic and for the development of HIV-1 vaccine.