HIV-1 Group O Infection in Cameroon, 1986–1998

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We report a survey of HIV-1 group O infection in Cameroon during 1986 to 1998. The prevalence of HIV-1/O decreased from 0.6% to 0.4%, while HIV-1/M increased from 19.2% to 31.5% from 1994 to 1998. We concluded that HIV-1/O infection is stable in Cameroon and may be declining slightly.

HIV-1 group O (HIV-1/O) was first identified in Cameroon in 1994 (1), raising concern about the emergence of a new HIV-1 variant, with implications for public health and blood safety. Anti-HIV-1/O antibodies are weakly detected by some HIV-1 screening tests (2), and the natural resistance of most HIV-1/O strains to nonnucleoside inhibitors of reverse transcriptase limits their use in preventing vertical transmission (3).

The Study

All HIV-1-positive samples stored at the Centre Pasteur from 1986 to 1991, from January 1994 to December 1995, and from July 1997 to June 1998 were systematically tested to differentiate HIV-1/M and HIV-1/O infections by using a group-specific, synthetic peptide-based enzyme immunoassay with high reliability (4). The Centre Pasteur is the public health national reference laboratory and a reference center for HIV confirmation in Cameroon.

We compared data from two main regions (encompassing more than 47% of the country's population) on opposite sides of Cameroon. We chose these regions because they differ in environment (rain forest in the central region and grasslands in the north) and sociocultural characteristics (mostly Christians in the central region and Muslims in the north). Data from other regions were insufficient, especially for the total number of samples tested, to be included in our analysis.

We tested all samples (18,921) collected in 1994-95 and 1997-98 in the north and central regions and referred by physicians to our laboratory for HIV screening or sent by collaborating laboratories for confirmation of HIV-positive results. The 4,722 samples confirmed as HIV-1 positive were further differentiated into groups M and O (Table 1).

ELAVIA Mixt (Sanofi Diagnostics Pasteur, Marnes La Coquette, France) was used as the screening enzyme-linked immunosorbent assay (ELISA). Positive samples were further tested with Enzygnost HIV1/2 (Behring, Marburg, Germany), and subsequently, Western blot (LAV blot, Sanofi Diagnostics Pasteur) was systematically performed. After January 1992, GeneElavia Mixt from Sanofi Diagnostics Pasteur was used as the screening ELISA, followed by the above-mentioned assays until July 1993, when Wellcozyme HIV-1 recombinant (Murex, Dartford, UK) began to be used as the confirmatory second reagent. Samples giving discordant results were further tested by Enzygnost HIV1/2 and Western blot.

Table 1. Trends in HIV-1/O and /M positivity in two major regions of Cameroon, 1994–1998

Periods	Total tested	Positive (%)	HIV-1/M (%)	HIV-1/O (%)
Central region				
1994-95	6,008	908 (15.1)	859 (14.3)	49 (0.8)
1997-98	5,470	1,823 (33.3)	1,800 (32.9)	23 (0.4)
Total	11,478	2,731 (23.8)	2,659 (23.2)	72 (0.6)
Northern region				
1994-95	4,818	1,231 (25.6)	1,215 (25.2)	16 (0.3)
1997-98	2,625	760 (29.0)	750 (28.6)	10 (0.4)
Total	7,443	1,991 (26.7)	1,965 (26.4)	26 (0.3)

Data from stored samples indicate a substantial drop in the relative frequency of HIV-1/O (Table 2). The apparent relative frequencies of HIV-1/M and HIV-1/O varied significantly from 1986 to 1998, with an increase in HIV-1/M and decrease in HIV-1/O infections (chi square for trend = 297.52; $p<10^{-8}$). To determine whether the observed decrease of HIV-1/O is absolute or relative, we averaged the number of positive samples by the total number of sera tested.

Pooled results from the two regions show that the prevalence of HIV-1/M was significantly higher in 1997-98 than in 1994-95 (2,550 [31.5%] of 8,095] versus 2,074 [19.2%] of 10,826). The odds ratio (OR) (1.94; 95% confidence intervals [CI] 1.81-2.08) is highly significant ($p<10^{-7}$). The prevalence of

Table 2. Differentiation into group M and O of HIV-1 positive samples, 1986–1998

Periods	No. of samples	HIV-1/M (%)	HIV-1/O (%)
1986-1988	301	239 (79.4)	62 (20.6)
1989-1991	625	571 (91.4)	54 (8.6)
1994-1995	2,458	2,376 (96.7)	82 (3.3)
1997-1998	4,160	4,100 (98.6)	60 (1.4)
Total	7,544	7,286 (96.6)	258 (3.4)

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HIV-1/O was lower in the second period, but not significantly: 33 (0.4%) of 8,095 versus 65 (3%) of 2,139 (OR 0.68; 95% CI [0.44-1.05]; p=0.07). Data were then analyzed separately by region. In the central region, HIV-1/O infections declined significantly, from 49 (0.8%) of 6,008 to 23 (0.4%) of 5,470 (OR 0.51; p=0.008) (Table 1).

HIV-1/O infections did not change significantly in the north from 1994-95 to 1997-98: 16 (0.3%) of 4,818 to 10 (0.4%) of 2,625 (OR 1.15; p=0.7) (Table 1). In both regions, a significant increase of HIV-1/M was observed from 1994 to 1998. The prevalence of HIV-1/M infections almost doubled in the central region during that period (OR 2.94; $p<10^{-7}$).

Conclusions

Our data show a decline of HIV-1/O in HIV-1-positive samples from 1986 to 1998. Refined analysis for a defined time (1994 to 1998) in two major Cameroonian regions shows stable prevalence of HIV-1/O infections in the north and a decrease in the central region, contrasting with a concomitant dramatic increase in HIV-1/M in both regions. These trends suggest that HIV-1/O may have decreased fitness compared with group M HIV. Experimental studies are in progress to corroborate these epidemiologic observations.

We checked for the possibility of sampling biases, especially for the period 1986 to 1988, when the apparent relative frequency of HIV-1/O was the highest. We found no differences in recruitment. Moreover, the same diagnostic algorithm was used from 1986 to December 1991.

Our 12-year survey demonstrates that HIV-1/O infection was not emerging at the time it was first described (1). Moreover, as the first well-documented case of HIV infection in the world was in a patient infected in 1966 with an HIV-1/O virus (5) and HIV-1/O viruses seem as pathogenic as HIV-1/M (Saimot AG et al., unpubl. data) understanding why this variant remains stable or is even declining merits further study.

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