Human T-cell lymphotropic virus type II in Guaraní Indians, Southern Brazil

Vírus linfotrópico de células T-humanas do tipo II em Índios Guaraní, Sul do Brasil

Abstract

Human T-cell lymphotropic virus type II (HTLV-II) is found in many New World Indian groups on the American continent. In Brazil, HTLV-II has been found among urban residents and Indians in the Amazon region, in the North. Guaraní Indians in the South of Brazil were studied for HTLV-I/II infection. Among 52 individuals, three (5.76%) showed positive anti-HTLV-II antibodies (enzyme-linked immunosorbent assay and Western blot). This preliminary report is the first seroepidemiological study showing HTLV-II infection among Indians in the South of Brazil.

HTLV-II; HTLV-II Infections; South American Indians; Seroepidemiologic Studies

Marcio Menna-Barreto 1,2
Ana Ligia Bender 1
Sandro L. Bonatto 3
Loreta B. Freitas 4
Francisco M. Salzano 4
Luiza T. Tsuneta 5
Maria Luiza Petzl-Erler 5

Human T-cell lymphotropic virus types I and II (HTLV-I and HTLV-II) are retroviruses belonging to the deltaretrovirus genus. HTLV-I is prevalent worldwide and HTLV-II occurs among Native American populations, in sub-Saharan Africans (Pygmies), as well as among intravenous drug users (IDUs) in Europe and the United States 1.

High HTLV-II infection prevalence rates have been found in several Amerindian groups. Table 1 shows the data from outside Brazil. Twenty-eight prevalence rates are listed, and although in about two-thirds the numbers are below 10.0%, particularly high frequencies (greater than 30.0%) have been observed in the Guahibo of Colombia, the Chorote and Chulupi of the Chaco region, and the Alacaluf of southern Chile.

The vast majority of Native Indians in southern South America live in Brazil, Paraguay, Argentina, and Chile. In South America, only Uruguay has no remaining indigenous population. Many South Amerindians live in the remote jungle of the Amazon basin in the North, such as the Kayapó and the Krahó 1,2. Native tribes from northern Brazil are known to have endemic HTLV-II infection seroprevalence, and Table 2 presents relevant figures. As before, some two-thirds show values below 10.0%, but the Kayapó have a particularly high frequency (32.0%-33.0%).

The Guaraní Indians inhabit extensive areas of Paraguay, Bolivia, and Argentina. The
### Table 1

Seroprevalence of HTLV-II among Amerindians (outside Brazil).

| Country       | Region          | Tribe                  | Number of subjects | HTLV-II positive subjects n | Author* |
|---------------|-----------------|------------------------|--------------------|----------------------------|---------|
| Canada        | British Columbia| Nuu-Chah-Nulth         | 494                | 8                          | 1.6     | 4       |
| United States | Florida         | Seminole               | 106                | 14                         | 13.2    | 5       |
|               | Seminole        |                        | 46                 | 11                         | 23.9    | 6       |
| Mexico        | Yucatan         | Maya                   | 25                 | 1                          | 4.0     | 7       |
| Panama        | Changuinola     | Guaymi                 | 317                | 25                         | 7.9     | 8       |
|               |                 |                        | 3,686              | 352                        | 9.5     | 9       |
| Colombia      | Orinoco         | Guahibo                | 92                 | 29                         | 31.5    | 10      |
|               |                 | Guahibo                |                     |                             |         |         |
|               | Guajira         | Wayuu                  | 123                | 5                          | 4.1     | 12      |
|               |                  |                        | 1,014              | 7                          | 0.7     | 13      |
|               | Andes           | Inga                   | 155                | 1                          | 0.6     | 13      |
|               |                  |                        | Tunebo             | 40                         | 2       | 5.0     | 14      |
| Venezuela     | Southwest       | Guahibo                | 166                | 41                         | 24.7    | 15      |
|               | Southwest       | Pumé (Yaruro)          | 210                | 12                         | 5.7     | 16      |
| Peru          | Amazon          | Boca Colorada          | 22                 | 1                          | 4.5     | 17      |
|               |                 | Galilea                | 42                 | 1                          | 2.8     | 17      |
| Argentina     | Gran Chaco      | Toba                   | 222                | 22                         | 9.9     | 18      |
|               |                  |                        | 105                | 23                         | 21.9    | 19      |
|               |                  |                        | 2,051              | 62                         | 3.0     | 20      |
|               |                  |                        | Whichi             | 244                        | 28      | 11.5    | 20      |
|               |                  |                        | Chorote            | 171                        | 61      | 35.7    | 20      |
|               |                  |                        | Mapuche            | 94                         | 2       | 2.1     | 20      |
| Paraguay      | Gran Chaco      | Angaité                | 21                 | 1                          | 4.8     | 21      |
|               |                  | Chulupi                | 94                 | 32                         | 34.0    | 20      |
|               |                  | Lengua                 | 49                 | 5                          | 10.2    | 20      |
|               |                  | Ayoreo                 | 51                 | 2                          | 3.9     | 20      |
|               |                  | Chaco                  | 146                | 24                         | 16.4    | 22      |
| Chile         |                 | Alacaluf               | 23                 | 8                          | 34.8    | 23      |
|               |                 | Yahgan                 | 22                 | 2                          | 9.1     | 23      |

* Numbering as given in the references.

### Table 2

Seroprevalence of HTLV-II among Brazilian Amerindians.

| Region     | Ethnic group | Linguistic group | Number of subjects | HTLV-II positive subjects n | Author* |
|------------|--------------|------------------|--------------------|----------------------------|---------|
| Amazon     | Kayapó       | Jê                | 264                | 88                         | 33.3    | 24      |
|            |              |                  | 207                | 67                         | 32.4    | 2       |
|            | Krahum       | Jê                | 172                | 21                         | 12.2    | 24      |
|            | Mundurukú    | Tupí              | 161                | 13                         | 8.1     | 2       |
|            | Arára (Laranjal) | Karib        | 44                 | 5                          | 11.4    | 2       |
|            | Tiriyó       | Karib             | 26                 | 4                          | 15.4    | 2       |
|            | Xikrin       | Karib             | 206                | 31                         | 15.0    | 25      |
|            | Parakanã     | Tupí              | 89                 | 2                          | 2.2     | 25      |
|            |              |                  | 52                 | 1                          | 1.9     | 2       |
|            | Galibí       | Karib             | 148                | 3                          | 2.0     | 2       |
|            | Wayampí      | Tupí-Guaraná      | 71                 | 1                          | 1.4     | 2       |
|            | Wayána-Apalai| Karib             | 50                 | 1                          | 2.0     | 2       |
|            | Yanomámi     | Yanomámi          | 102                | 4                          | 3.9     | 2       |
|            | Cinta-Larga  | Tupí              | 50                 | 1                          | 2.0     | 2       |
|            | Karittâna    | Arikém            | 50                 | 2                          | 4.0     | 2       |
|            | Yamamadi     | Arawã             | 36                 | 2                          | 5.6     | 2       |
| South      | Guaraná      | Tupí-Guaraná      | 52                 | 3                          | 5.8     | **      |

* Numbering as given in the references;
** This paper.
Guaraní and Kaingáng are the two most numerous tribes in southern Brazil. Culturally, the Guaraní and Kaingáng are quite different, beginning with their languages, which are mutually unintelligible. The Kaingáng language belongs to the Jê family, while Guaraní is classified in the Tupí-Guaraní family. Both have been living in southern Brazil and neighboring countries for centuries and have been in contact with non-Indians since colonial times. Nevertheless, intermixture with neo-Brazilians is not high, mainly due to the fact that they generally live on reservations especially established for them. About 3,000 Guaraní Indians, scattered over 27 localities, presently live in Southern Brazil. Of these, two-thirds speak the Mbyá dialect and one-third the Nandeva dialect.

The present sample was obtained among Guaraní Mbyá-speaking subjects living in Rio das Cobras, Laranjeiras do Sul, State of Paraná (25°20’S, 52°30’O) in the South of Brazil (Figure 1). The total Guaraní population on this reservation was estimated as 418. Blood from 100 individuals was collected with anticoagulant and refrigerated as quickly as possible. At the laboratory in Curitiba, red cells and plasma were separated, and the latter was immediately frozen at -20°C. Afterwards, aliquots were sent under refrigeration to Porto Alegre and kept frozen there since 1988.

In 2001, plasma samples remaining from 52 individuals (28 women and 24 men) were screened for HTLV-I/II by an enzyme-linked immunosorbent assay (Murex HTLV-I+II, GE80/81, United Kingdom) and positive samples were further studied by Western blot (HTLV blot 2.4, Genelabs Diagnostics, Singapore). The three positive samples (2 males and 1 female) were typed as HTLV-II according to the manufacturer’s instructions, showing a prevalence of 5.76%. Unfortunately there are no cells available to perform molecular studies.

Southern Brazil is geographically and ethnically closely related to the North of Argentina and South of Paraguay, both being areas well-recognized as endemic for HTLV-II. To our knowledge, this is the first study demonstrating HTLV-I/II infection among Amerindians from the South of Brazil, suggesting the Guaraní as an endemic group for these viruses. Further studies will focus on molecular and phylogenetic analyses in a larger number of samples.
Contributors

M. Menna-Barreto conceived and wrote the manuscript. F. M. Salzano and S. L. Bonatto were the research supervisors and performed a critical review of the manuscript. A. L. Bender performed the laboratory work. L. B. Freitas, L. T. Tsuneto, and M. L. Petzl-Erler collaborated in the field work, sample processing and storage.

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References

1. Hall WW, Ishak R, Zhu SW, Novoa P, Eiraku N, Takahashi H, et al. Human T lymphotropic virus, type II (HTLV-II): epidemiology, molecular properties, and clinical features of infection. J Acquir Immune Defic Syndr Hum Retrovirol 1996; 13 Suppl 1:S204-14.
2. Ishak R, Harrington Jr. W, Azevedo V, Eiraku N, Ishak M, Guerreiro J, et al. Identification of human T cell lymphotropic virus type IIa infection in the Kayapo, an indigenous population of Brazil. AIDS Res Hum Retroviruses 1995; 11:813-21.
3. Salzano FM, Callegari-Jacques SM, Weimer TA, Franco MHP, Hutz MH, Petzl-Erler ML. Electrophoretic protein polymorphisms in Kaingang and Guarani Indians of southern Brazil. Am J Hum Biol 1997; 9:505-12.
4. Peters AA, Coulthart MB, Oger JJ, Waters DJ, Crandall KA, Baumgartner AA, et al. HTLV type I/II in British Columbia Amerindians: a seroprevalence study and sequence characterization of an HTLV type IIa isolate. AIDS Res Hum Retroviruses 2000; 16:883-92.
5. Levine PH, Jacobson S, Elliott R, Cavallero A, Colclough G, Dorry C, et al. HTLV-II infection in Florida Indians. AIDS Res Hum Retroviruses 1993; 9:123-7.
6. Lowis G, Sheremata WA, Wickman PR, Dube S, Dube DK, Poiesz BJ. HTLV-II risk factors in Native Americans in Florida. Neuroepidemiology 1999; 18:37-47.
7. Gongora-Biachi RA, Lal RB, Rudolph DL, Castro-Sansores C, Gonzales-Martinez P, Pavia-Ruz N. Low prevalence of HTLV-II in Mayan Indians in the Yucatan peninsula, Mexico. Arch Med Res 1997; 28:555-8.
8. Pardi D, Switzer WM, Hadlock KG, Kaplan JE, Lal RB, Folks TM. Complete nucleotide sequence of an Amerindian human T-cell lymphotropic virus type II (HTLV-II) isolate: identification of a variant HTLV-II subtype b from a Guaymi Indian. J Virol 1993; 67:4659-64.
9. Vitek CR, Gracia FI, Giusti R, Fukuda K, Green DB, Castillo LC, et al. Evidence for sexual and mother-to-child transmission of human T lymphotropic virus type II among Guaymi Indians, Panama. J Infect Dis 1995; 171:1022-6.
10. Fujiyama C, Fujiyoshi T, Miura T, Yashiki S, Matsumoto D, Zaninovic V, et al. A new endemic focus of human T lymphotropic virus type II in Mayan Indians in the Andes of Ecuador. J Infect Dis 1995; 171:1022-6.
11. Miura T, Yamashita M, Zaninovic V, Cartier L, Takehisa I, Igarashi T, et al. Molecular phylogeny of human T-cell leukemia virus type I and II of Amerindians in Colombia and Chile. J Mol Evol 1997; 44 Suppl 1:S76-82.
12. Zaninovic V, Sanzon F, Lopez F, Velandia G, Blank A, Blank M, et al. Geographic independence of HTLV-I and HTLV-II foci in the Andes, the Atlantic Coast, and the Orinoco of Colombia. AIDS Res Hum Retroviruses 1994; 10:97-101.
Colombia. J Acquir Immune Defic Syndr Hum Retrovirol 1999; 20:102-3.
14. Duenas-Barajas E, Bernal JE, Vaught DR, Nerurkar VR, Sarmiento P, Yanagihara R, et al. Human retroviruses in Amerindians of Colombia: high prevalence of human T cell lymphotropic virus type II infection among the Tunebo Indians. Am J Trop Med Hyg 1993; 49:657-63.
15. Leon-Ponte M, Noya O, Blanco N, Echeverria-de-Perez G. Highly endemic human T-lymphotropic virus type II (HTLV-II) infection in a Venezuelan Guahibo Amerindian group. J Acquir Immune Defic Syndr Hum Retrovirol 1996; 13:281-6.
16. Perez GE, Leon-Ponte M, Noya O, Botto C, Gallo D, Blanco N. First description of endemic HTLV-II infection among Venezuelan Amerindians. J Acquir Immune Defic Syndr Hum Retrovirol 1993; 6:1368-72.
17. Medeot S, Nates S, Recalde A, Gallego S, Maturano E, Giordano M, et al. Prevalence of antibody to human T cell lymphotropic virus types I/II among aboriginal groups inhabiting northern Argentina and the Amazon region of Peru. Am J Trop Med Hyg 1999; 60:623-9.
18. Bouzas M, Zapio I, Quirelas S, Gorvein D, Pandita A, Rey J, et al. HTLV type I and HTLV type II infection among Indians and natives from Argentina. AIDS Res Hum Retroviruses 1994; 10:1567-71.
19. Biglione M, Vidan O, Mahieux R, de Colombo M, de Basualdo M, Bonnet M, et al. Seroepidemiological and molecular studies of human T cell lymphotropic virus type II, subtype b, in isolated groups of Mataco and Tobas Indians of northern Argentina. AIDS Res Hum Retroviruses 1999; 15:407-17.
20. Ferrer JE, Esteban E, Dube S, Basombrio MA, Segovia A, Peralta-Ramos M, et al. Endemic infection with human T cell leukemia/lymphoma virus type IIB in Argentinean and Paraguayan Indians: epidemiology and molecular characterization. J Infect Dis 1996; 174:944-53.
21. De Cabral MB, Vera ME, Samudio M, Arias AR, Cabello A, Moreno R, et al. HTLV-I/II antibodies among three different Indian groups from Paraguay. J Acquir Immune Defic Syndr Hum Retrovirol 1998; 19:548-9.
22. Fujiyoshi T, Li HC, Lou H, Yashiki S, Karino S, Zanitovic V, et al. Characteristic distribution of HTLV type I and HTLV type II carriers among native ethnic groups in South America. AIDS Res Hum Retroviruses 1999; 15:1235-9.
23. Fujiyoshi T, Yashiki S, Fujiyama C, Kuwayama M, Miyashita H, Ohnishi H, et al. Ethnic segregation of HTLV-I and HTLV-II carriers among South American Native Indians. Int J Cancer 1995; 63:510-5.
24. Maloney EM, Biggar RJ, Neel JV, Taylor ME, Hahn BH, Shaw GM, et al. Endemic human T cell lymphotropic virus type II infection among isolated Brazilian Amerindians. J Infect Dis 1992; 166:100-7.
25. Gabbai AA, Bordin JO, Vieira Filho PB, Kuroda A, Oliveira ASB, Cruz MV, et al. Selectivity of human T lymphotropic virus type-1 (HTLV-1) and HTLV-2 infection among different populations in Brazil. Am J Trop Med Hyg 1993; 49:664-71.

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