

## Original Report

# Human T-Cell Lymphotropic Virus Type I Infection among Japanese Immigrants in Peru

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## ABSTRACT

**Objective:** A prospective study was conducted to determine the prevalence of human T-cell lymphotropic virus type I (HTLV-I) infection among healthy Japanese migrants and their descendants in Peru.

**Methods:** A total of 407 persons were enrolled at the Peruvian-Japanese Medical Center in Lima during routine visits for health evaluations. Each study volunteer was interviewed to obtain clinical and epidemiologic data, and a blood sample was obtained for HTLV-I testing. Sera samples were initially tested for antibody by enzyme-linked immunosorbent assay (ELISA). All ELISA reactive sera were further tested by Western Blot assay, and the results were recorded in accordance with the manufacturer's recommendations.

**Results:** Among the 407 study volunteers, HTLV-I infection was demonstrated in 6.8% (19/280) of females and 3.2% (4/127) of males. Infection rates significantly increased with age, with 28.5% of volunteers over 80 years of age being positive ( $P < 0.05$ ). The migrants from Japan had the highest infection rate (15.8%), whereas none of the second generation volunteers were positive ( $P < 0.05$ ). The incidence among those with ancestors from Okinawa was 9.3%, and for those with ancestors from the central zone of Japan, 1.2% ( $P < 0.05$ ).

**Conclusions:** These data indicated that HTLV-I infection rates were highest among the older volunteers from Okinawa and Kyushu, and that evidence of infection was not found among their offspring.

**Key Words:** HTLV-I, Japanese immigrants, Peru

Int J Infect Dis 1996; 1:75-77.

Since human T-cell lymphotropic virus type I (HTLV-I) was first recognized as a retrovirus,<sup>1,2</sup> studies have shown

that the virus is endemic in some regions of the world, especially in the southwest region of Japan, in the Caribbean, and in some African countries.<sup>3-5</sup> In South America, HTLV-I infection has been detected among human populations in Colombia, Brazil, Chile, and Peru.<sup>6-9</sup> This virus is transmitted by sexual intercourse, whole blood transfusion, and maternal breast-feeding, and recent reports suggest that environmental factors also may play a role in transmission.<sup>10</sup>

When HTLV-I was introduced into Latin America is unknown. Zaninovic suggested that the virus may have arrived with infected Asian migrants 10,000 years ago.<sup>11</sup> Other authors have suggested that the virus may have been introduced with African slaves transported to the Caribbean 300 years ago, and then to Venezuela, Colombia, and Peru,<sup>3</sup> or more recently with Japanese immigrants to some Latin-American countries, such as Peru.<sup>12</sup>

The migrant Japanese population arrived in Peru 100 years ago, and settled primarily in and on the outskirts of Lima. Initially, marriage occurred only among the Japanese population, but later Peruvians and other immigrants intermarried.<sup>13,14</sup> The ancestors were mainly from Okinawa and Kyushu Island, the regions in Japan where HTLV-I infection rates were highest.<sup>15</sup> These immigrants are known as the Nikkei population to identify their Japanese ancestry.

The objective of this study was to evaluate the prevalence of HTLV-I infection among healthy Nikkei individuals in Lima, Peru.

## SUBJECTS AND METHODS

This study was carried out from September 1993 to March 1994 and included volunteers from the Nikkei population as well as Japanese migrants who attended the Peruvian-Japanese Medical Center in Lima for routine health evaluations. Subjects with chronic neurologic lesions as well as those with malignancies were excluded. Written informed consent was obtained from each volunteer, or from parents of minor subjects.

Patients were interviewed to obtain clinical and epidemiologic data, mainly about their origin, blood transfusions, tattoos, or needle injections; no questions were asked about sexual behavior. A blood sample was obtained from each volunteer and tested by an enzyme

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Received: May 14, 1996; Accepted: July 1, 1996.

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-linked immunosorbent assay (ELISA) for HTLV-I (Gentic Systems, Seattle, WA). All ELISA reactive sera were further tested by Western Blot assay (Cambridge Biotech, Worcester, MA). Results were recorded in accordance with the manufacturer's recommendations.

Category variables were tested using Fisher's exact test or chi-square  $2 \times 2$  or  $2 \times n$  as it corresponds; chi-square for trend was used to evaluate difference in prevalent rates by age groups. A level of significance less than 0.05 was considered to be significant.

## RESULTS

Among the 407 volunteers, 280 were females and 127 were males; age ranged from 7 to 92 years. These volunteers included 82 migrants and 247 first, and 78 second generation Japanese. Assay results indicated that 6.8% (19/280) of the females and 3.2% (4/127) of the males were infected with HTLV-I. Infection rates increased significantly with age, with a rate of 28.5% (6/21) among the volunteers who were more than 80 years of age,  $P < 0.05$  (Table 1).

Analysis by generation showed that HTLV-I infection rates were 15.8% among migrants from Japan, whereas none of the second generation Peruvian Japanese (grandchildren) were positive. Thus, the rate was significantly greater among the Japanese migrants,  $P < 0.05$  (Table 2).

The majority of the study subjects ( $n = 215$ ) were from Okinawa, an island in the southern area of Japan. Of these, 20 (9.3%) were HTLV-I positive. In contrast, infection was demonstrated in only 3.0% (2/65) of the volunteers from Kyushu Island, located in southern Japan, and in 1.2% (1/83) from the central region of Japan (Table 3).

## DISCUSSION

Human T-cell lymphotropic virus type I is an important disease in some areas of the world, especially in the southern region of Japan, where an association between HTLV-I infection and adult T-cell leukemia/lymphoma (ATL) has been observed.<sup>16</sup> Additionally, an association

**Table 1.** HTLV-I Infection Rates among Healthy Nikkei Persons in Lima, Peru

	Positive
Sex	
Male	4/127 (3.2%)
Female	19/280 (6.8%)
Age (yr)	
<20	0/34
21-40	0/57
41-60	5/135 (3.7%)*
61-80	12/160 (7.5%)
>80	6/21 (28.5%)

\* $P < 0.0004$ .

**Table 2.** HTLV-I Infection Rates among Healthy Nikkei Persons in Lima, Peru, by Generations

Generation	Positive (%)
Born in Japan	13/82 (15.8)
First generation	10/247 (4.0)*
Second generation	0/78

\* $P = 0.00001$ .

between HTLV-I and myelopathy (HAM) was observed in the same regions where ATL was originally described.<sup>17</sup> Although HTLV-I infection is endemic in these southern regions of Japan, infection has not been well documented in the northern region of the country.

It has been suggested that HTLV-I might have been introduced into Peru by Japanese immigrants.<sup>12</sup> However, the results of this study failed to support continued transmission of this virus among indigenous generations of Japanese. Similar observations were reported from Hawaii, where the HTLV-I infection rates declined substantially among indigenous generations of Japanese.<sup>18</sup> In addition, infection rates decreased from 17% among Japanese immigrants to 4 to 7% in the next generation, in Bolivia. As observed in this study, the seropositivity was high, especially in adults who came from Okinawa.<sup>19</sup>

Recent reports suggest that the route of HTLV-I transmission may be related to environmental factors. For example, high rates of infection were found among neighbors of index cases.<sup>9</sup> Although conclusive evidence of transmission via environmental factors remain to be confirmed, further studies are warranted in view of the observation that HTLV-I is found primarily in the tropical regions of the world.

In Peru, sexual transmission does not appear to account for HTLV-I infection in healthy people of Cusco and Quillabamba,<sup>20</sup> thus presenting opportunities to consider other possible routes of transmission. This ethnic group in Cusco is Quechua, the descendants of the Inca Empire, who did not have any contact with the Japanese or with the black population located on the coast of Peru. The virus may have been introduced to Peru by the first Asian migrants 10,000 years ago, or it may have arrived with African slaves in the 17th Century, or Japanese immigrants in the 19th Century. As a result, HTLV-I may have then spread to the Quechua as well as other ethnic

**Table 3.** HTLV-I Infection Rates among Healthy Nikkei Persons according to the Origin of Their Ancestors

Origin of Ancestors	Positive
Okinawa	20/215 (9.3%)*
Island of Kyushu	2/65 (3.0%)
Kumamoto	0/32
Fukuoka	0/25
Kagoshima	2/8 (25.0%)
Hiroshima	0/27
Fukushima	0/17
Other regions	1/83 (1.2%)

\* $P = 0.01$ .

groups in Peru. Further studies of the nucleotide sequences of HTLV-I are needed to clarify the possible origin of this virus in Peru.

Studies conducted on female sex workers in Peru, showed a high prevalence of HTLV-I infection among workers in Callao, Lima, and Cusco, and that the rates were associated with the number of sexual partners through time.<sup>20,21</sup> These groups are different from the patients in this study.

Sonoda and co-workers suggested that in Japan, the low risk of developing myelopathy among HTLV-I infected persons may be related to genetic factors.<sup>22</sup> In contrast, the incidence of myelopathy in countries such as Colombia, Chile, Brazil, and Peru may be as high as 1 in every 70 to 100 HTLV-I-infected patients.<sup>5-7,23-26</sup> This high frequency could be explained as a genetic susceptibility of the population, according to Sonoda's proposal.

The prevalence of tropical spastic paraparesis observed in Latin America in comparison with the rate in the population of South Japan warrants further investigation.

The study of the HTLV-I infection has become more important recently in relation to the AIDS epidemic, since it has been shown that the presence of a coinfection of the two retroviruses (HIV and HTLV-I) in a patient indicates a poor prognosis.<sup>27</sup>

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