

# HTLV-II in blood donors at the Blood Center Net of Ceará – HEMOCE

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## SUMMARY

**Objective:** To identify HTLV-II prevalence in blood donors at the Blood Center Net of Ceará (*Hemorrede do Ceará* - HEMOCE) and epidemiological aspects of positive cases. **Methods:** Cases considered positive were surveyed from data bases through the immunoenzymatic method ELISA and confirmed by Western Blot from 2001 to 2008. In this period, 679,610 blood samples from voluntary donors were tested. **Results:** From all donors, 164 samples were actually positive in both tests; of these, 33 (20.1%) were typed as HTLV-II, showing a prevalence of 0.006%. In positive cases, a mean age 28.2 years, and a predominantly male gender (54.5%) were observed, the race was mixed in 78.8%, most donors had Fortaleza as hometown (72.7%), with 51.5% being married/consensual union, and 33.3% reported to have completed high school education. **Conclusion:** Although HTLV-II infection is low, its presence is universal, being similar in males and females mostly in urban centers. The need of preventive measures as a way of avoiding infection spread is stressed.

**Keywords:** Anti-HTLV-II antibodies; HTLV-II infections; human T-lymphotropic virus II; blood donors; hemotherapy service.

Study conducted at Universidade Federal do Ceará, Fortaleza, CE, Brazil

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## INTRODUCTION

Blood donation is one of the noblest gestures of the human being in the struggle for life. However, measures to prevent the transmission of diseases, among which the human T-lymphotropic virus (HTLV) has its type 1 associated with the pathogenesis of the tropical spastic paraparesis/myelopathy associated with the human T-cell lymphotropic virus (TSP/HAM), is to be considered. However, HTLV-II has not been clearly associated with any disease yet<sup>1</sup>. Thus, the assessment for anti-HTLV-I/II antibodies in blood donors by hematology centers became a requirement.

The transmission of HTLV infection via blood transfusion was firstly described in 1984 in Japan<sup>2</sup>. The virus transmission may also occur through needle shared use, sexual contact and breastfeeding<sup>3,4</sup>. The first country to implant the antibody assessment for HTLV was Japan in November 1986, followed by the United States of America in January 1988, France in May 1989, Canada in 1990<sup>5-7</sup>. In Brazil, the requirement of assessing for anti-HTLV-I/II antibodies in hemotherapy services was determined by the Ordinance no. 1376 of Ministry of Health from November 19, 1993<sup>8</sup>.

HTLV (human T-cell lymphotropic virus) viruses belong to the *Retroviridae* family, genus *Deltaretrovirus*. HTLV-I was described in 1980 as the first human retrovirus<sup>9</sup>. HTLV-II was isolated in 1982 from a patient with hairy T-cell leukemia<sup>10</sup>.

HTLV infections can be found in several continents, but their distribution shows there are areas with higher endemicity, as well as peculiarities according to the HTLV type<sup>11</sup>. HTLV-II infection affects distinct and supposedly unrelated population groups, living in different geographical regions, such as North-American, Central-American and South-American natives, Central Africa Pygmies and Asian Mongol people, injectable drug users in the United States of America, in Europe and in Asian countries, such as Vietnam<sup>12</sup>.

In Brazil, the presence of HTLV-II was initially reported in native communities in the Amazon region<sup>12,13</sup> and later in Southern Brazilian natives<sup>14</sup>. More recently, the HTLV-2b presence has been detected in Brazilian Amazonia<sup>15</sup>.

The objective of this study was to identify the HTLV-II prevalence in blood donors at *Hemocentro do Estado do Ceará* and assess its epidemiology.

## METHODS

This is an epidemiological study with a data base survey of blood donor data of the blood center net in Ceará, Brazil, in cases considered HTLV-II-positive. The blood center net comprises the coordinator blood center in Fortaleza (HEMOCE) and regional blood centers located on the Northern (Sobral), Middle-Northern (Quixadá), Southern (Crato) and Middle-Southern (Iguatu) regions. The survey

period was from 2001 to 2008, taking into account donors considered able following clinical screening. As an HTLV screening test, the immunoenzymatic assay (IEA) ELISA, which detects specific virus antibodies generated from the immunologic response was used.

The test was done in the sample collected at the blood donation according to the method specified by the manufacturer (Abbot-Murex). Reactive results indicated the presence of antibodies to HTLV-I/II; the negative result ("non-reactive serum") shows an absence of the antibodies. The test reading can be inconclusive.

Donors with definite reactive or inconclusive results by ELISA were invited to return for a new sample collection (second sample) and the test would be rerun. In the case of a positive or inconclusive test, the confirmatory Western blot (W.b 2.4) serum test was run; this test is also used in the differentiation between HTLV-I and II viruses. The tests were performed by using kits Genelabs Diagnostics (Singapore - Malaysia).

HTLV-II prevalence was identified, and the epidemiological data of positive cases was tabulated for statistical analysis by using the software SPSS.

The study was evaluated and approved by the Research Ethics Committee of the *Universidade Federal do Ceará* under the Protocol COMEPE no. 39/10, March 25, 2010.

## RESULTS

From 2001 to 2008, 679,610 donor blood samples were serologically assessed for HTLV-I/II at the Blood Center Net of Ceará; the samples were collected at the blood donation (first sample), with 351 (0.05%) testing positive or inconclusive by the ELISA test and thus, the subjects were invited to come to the Blood Center for a new sample collection (second sample), with the ELISA test being rerun. Among donors invited for a second sample collection, 289 (82.3%) attended and 62 (17.7%) did not.

By analyzing the second sample, 229 of the 289 (72.2%) tested positive or inconclusive and were referred for a Western blot confirmatory test, with the following results being achieved: 27 (11.8%) negative results, 38 (16.6%) undetermined results, and 164 (71.6%) positive results. A reading of "bands" in the 164 positive samples showed: HTLV-I-114 (69.5%), HTLV-II 33 (20.1%), HTLV I and II 7 (4.3%) (dualinfection) and untyped 10 (6.1%). Thus, HTLV-II prevalence in the total of donors was 0.006%.

The donors with a positive test only for HTLV-II comprised: 18 (54.5%) males and 15 females (45,5%). Regarding the race, 2 (6.1%) were Caucasian, 26 (78.8%) were mixed and 5 were Afro-descendent. Twenty-four (72.7%) were from Fortaleza, while 9 (27.3%) were from other towns in the state of Ceará. Regarding the marital status, the distribution was as follows: 17 (51.5%) married/consensual union, 12 (36.4%) were single, and other status

had 4 (12.1%) reports. Eleven donors (33.3%) reported a complete high school education, 7 (21.2%) had complete elementary school education, 1 (3%) had incomplete high school education, 2 (6.1%) incomplete higher education and no donors had a complete university education. The age of the group with HTLV-II ranged from 19 to 56 years, with a mean age of higher 8.2 (SD = 11.2) (Table 1). The seven patients with HTLV-I and II were five males and two females, five of a mixed race, four from Fortaleza, three married people, one with a complete high school education and none with a higher education either complete or incomplete (Table 1). The age of the group having HTLV-I and II ranged from 22 to 54 years, with a mean of 37.2 (DP = 12.2) years. HTLV-II prevalence for males was 0.0033% and 0.0041% for females.

## DISCUSSION

HTLV-II is endemic in native groups in Americas and in intravenous drug users in North and South Americas, Europe and Southeast of Asia<sup>12</sup>. It is considered a New World virus coming from Asia to Americas via migration of infected populations through the Bering Strait between 10,000 and 40,000 years ago<sup>16</sup>.

In Brazil, the virus was investigated in 26 native communities living in six Northern and Northeastern States (Amapá, Roraima, Amazonas, Rondônia, Pará e Maranhão) with seroepidemiological and retrospective studies in 1,382 serum samples tested by an immunoenzymatic assay, and positive cases underwent the Western Blot 2.4 (Genelabs Diagnostics [Singapore, Malaysia]) test to con-

firm and differentiate between the viruses I and II. In three of these tribes, five positive samples for HTLV-I were identified and, in 17, positive cases for HTLV-II were found, showing Brazilian Amazonia represents an endemic area of HTLV-II<sup>17</sup>. In 1996, in a study conducted in blood donors in the State of Pará, HTLV-II was detected in an urban area, with higher virus prevalence in females<sup>18</sup>.

In Ceará, samples of 250,326 blood donors were analyzed at HEMOCE from 1997 to 2000 by using screening tests through ELISA and confirmatory tests with Western Blot, with 261 (0.10%) positive samples being found, 182 (69.7%) type I, 59 (22.6%) type II and 9 (3.4%) were coinfecting (I and II). HTLV-II prevalence in the total of donors was 0.27%. Considering only the screening test by the ELISA method in 340,059 donors from 1995 to 2000, 0.67% of reactive samples were found<sup>19</sup>. In the current sample, which was enlarged in time and number, a significantly lower value was found ( $p < 0.001$ ). In four Bahia towns<sup>20</sup>, HTLV-II was not found, the same occurring in Monterrey, Mexico<sup>21</sup> and in Arequipa, Peru<sup>22</sup>. The knowledge of the seroprevalence, mainly for HTLV-II, among young women allows a better planning in public health programs, considering breastfeeding by infected mothers has a high mother-infant transmission rate<sup>4,23-26</sup>.

HTLV-II has a different pathogenesis from HTLV-I; however, it has been associated with myelopathic conditions<sup>27,28</sup>, requiring a special attention upon looking for HTLV-II-specific clinical manifestations<sup>17</sup>. However, there are coinfection cases, as in the current study, where 4.3% of infected patients had both virus types.

**Table 1** – Characteristics of blood donors at the Blood Center Net of Ceará, with positive results for HTLV type II and HTLV type I following the confirmatory test by Western Blot

Characteristics	Type II		Type I and II		Total	
	n	%	n	%	n	%
Gender						
Male	18	54.5	05	71.4	23	57.5
Female	15	45.5	02	28.6	07	42.5
Racial group						
Caucasian	02	6.1	01	14.3	03	7.5
Mixed	26	78.8	05	71.4	31	77.5
Afro-descendent	05	15.2	01	14.3	06	15.0
Marital status						
Single	12	36.4	03	42.9	15	37.5
Married/consensual union	17	51.5	03	42.9	20	50.0
Others	04	12.1	01	14.2	05	12.5
Education						
Incomplete elementary school	10	30.3	03	42.9	13	32.5
Complete elementary school	07	21.2	03	42.9	10	25.0
Incomplete high school	01	3.0	00	00	01	2.5
Complete high school	11	33.3	01	14.3	12	30.0
Incomplete higher education	02	6.1	00	00	02	5.0
Higher education	00	0.0	00	00	00	00
No Information	02	6.1	00	00	02	5.0

This study has the database retrospective survey as a limitation, which, even with a well-defined protocol appropriately filled most of the time, led to a number of investigation losses. Recent result report<sup>29</sup> of a prospective multicenter study evaluates the impact of the retroviral infection on survival and death cause in blood donors diagnosed with HTLV at the donation and followed for a mean time of 15.9 years. A significant HTLV-II association with all death causes and mortality from cancer was observed, suggesting biological effects of HTLV-II coinfection with other carcinogenic viruses, socioeconomic criteria or other factors influence the neoplasm arising.

## CONCLUSION

The current study data shows the presence of HTLV-II is universal in the State of Ceará and that there is a coinfection occurrence (I + II). The prevalence is 0.006% and the distribution is similar among males and females, with most of them coming from an urban center and having a high school education. Despite the low prevalence, the public health policy involving blood transfusion must be stimulated as a multidisciplinary effort by identifying the cases and preventing the virus spread, specifically among women due to the risk of transmission through breastfeeding.

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