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HTLV-I Infection in the Tropics — a Natural Model of Disease

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Introduction

The discovery in 1980 of the first human retrovirus (1), the human T-lymphotropic virus type 1 (HTLV-I), inaugurated a new era in human pathology. Two conditions were promptly associated with this retroviral infection (2): adult T-cell leukemia/lymphoma (ATLL) and tropical spastic paraparesis (TSP). Thus, this discovery solved a longlasting enigma in tropical medicine, the cause of tropical myeloneuropathies (TMNs).

TMNs are a group of disorders characterized by funicular lesions of the spinal cord accompanied by axonal, predominantly sensory, peripheral neuropathy occurring with high prevalence in tropical and subtropical regions (3). Since first reported in 1888 by STRACHAN in Jamaica (4), multiple etiologies have been postulated for these conditions including malnutrition, vitamin deficiencies, cyanide intoxication from excessive cassava consumption, *Lathyrus sativus* toxicity, and treponemal infections, among others (5).

However, even after these causes were excluded, large number of patients remained for whom the etiology of their neurological deficits remained of mysterious origin. In 1982, CATOVSKY et al. in London (6), reported the first cases of ATLL in migrant black Indians, and VYTH-DREESE and DE VRIES reported another case in a black patient from Surinam (7), raising the possibility of a focus of ATLL in the Caribbean. A high prevalence of antibodies to HTLV-I was soon documented in these islands. In 1982, an oncology research team from Lyon, France, began a survey of hematological malignancies in Martinique. Prof. Jean-Claude Vernant, who had diagnosed in Fort-de-France a large number of patients with *myélite martiniquaise,* insisted to have these patients tested for HTLV-I demonstrating for the first time that in addition to its lymphotropic nature, HTLV-I was also associated to neurologic lesions (8). Shortly thereafter, these findings were confirmed in Japan (9), and other areas of the world including the Caribbean, Latin America and the Seychelles islands (10).

Epidemiological Aspects

HTLV-I seroprevalence appears to be higher in tropical and subtropical islands. The main foci of infection are the Caribbean, the Seychelles islands, Melanesia and Southwestern Japan. However, it also occurs inland in Western Africa and South America. Table 1 summarizes HTLV-I seroprevalence in several regions of the world. This geographic distribution indicates the presence of ethnic groups at risk and some degree of long-term isolation of these populations.

The racial distribution affects predominantly two ethnic groups, blacks of African origin and descendants of the Old Japanese (Jomon people). However, infection of Melanesians and mixed-whites from Chile has also been documented. The source of infection in these last two groups is unknown, but the genetic variation in the genome of the Melanesian isolates indicates an ancient origin. Initial reports of high seroprevalence rates of HTLV infection among Amerindians were later confirmed to be due to infection with HTLV-II. This is also true of most drug-addicts in North America and Europe (12).

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Table 1:

Geographic variations in HTLV-I seroprevalence.

Geographic Area	Sero-preval. (%)
AFRICA	
Egypt	0.3
Morocco	0.6
Nigeria	2.0
South Africa	3.9
Seychelles	6.3
Ghana	8.1
Uganda	8.2
Sudan	9.2
Gabon	9.5
Tanzania	9.9
Ivory Coast	20.2
ASIA	
Japan (Central)	0.8
Japan (Kyushu)	8.0
Korea (Seoul)	0.3
China	0.0
Thailand (Bangkok)	0.1
Philippines	0.0
Iran (Mashadi Jews)	11.5
OCEANIA	
Polynesia	0.0
Australia	0.2
Papua New Guinea	0.7
Micronesia (8 islands)	0.8
Solomon	1.3
Australian Aborigines	5.8
North Melanesia	13.9
Vanuatu Melanesian	19.4
CARIBBEAN	
Puerto Rico	0.0
Cuba	1.0
Jamaica	3.3
Barbados	4.3
Martinique	4.4
Dominican Republic	5.2
Trinidad (blacks)	7.0
(hindu)	1.4
(white)	0.0
AMERICA	
Colombia (Andes)	0.0
(Pac.blacks)	7.5
Chile	1.3
Bolivia (Okinawans)	16.2
(Amerindians)	4.9
Brasil (Blood don.)	0.4
USA (Blood don.)	0.0
Panama (whites)	2.7
(black)	4.5
(mestizo)	5.5

Natural transmission occurs mainly by breast feeding. Infected mothers eliminate virus in lymphocytes in colostrum and milk, thereby infecting the offspring in 15 - 22% of the cases. Sexual transmission from infected males to females occurs with high efficiency (61%), while positive women only infect the male partner in 0.4% of the cases. Transmission of the retrovirus by blood transfusion is an important mechanism in endemic areas with seroprevalences of 5 - 10%. The main problem is the fact that myelitis may follow transfusion of HTLV-I infected blood or blood products within a period ranging from 6 months to 8 years. Between 13 and 20% of all cases of TSP have a prior history of blood transfusion (12).

Differences between HTLV-I infection in Japan and the Tropics

There appear to be no major differences in the pattern of transmission of HTLV-I in the tropics when compared to Japan. The relatively high frequency of breast feeding in both areas is probably the main factor responsible for the maintenance of endemic infection. However, black cultures in the tropics have a more polygamous family structure which increases the likelihood that one infected male will transmit the infection to multiple women.

No major clinical differences have been reported in the pattern of presentation of ATLL in Japan and the Caribbean. The same is true for TSP and currently the WHO recommendation is to consider TSP and the Japanese HTLV-I-associated myelopathy (HAM) as the same condition, denominated HAM/TSP. However, there are major differences in the attack rate for ATLL and TSP. In fact, the risk of developing TSP among HTLV-I carriers is much higher in the tropics than in Japan (tab. 2), while the risk of development of ATLL in the tropics seems relatively low. The reasons for these striking differences remain unknown but include possible genetic or environmental factors such as diet or the adjuvant effect of other infections prevalent in the tropics.

Areas for future research

HTLV-I-associated diseases offer a potentially productive field for future research in tropical neurology. In addition to the differences in risk of myelopathy between tropical and temperate regions, other areas of interest include clinical forms such as those presenting with anterior horn cell involvement, polymyositis, as well as forms with systemic involvement including pulmonary alveolitis, sicca syndrome, arthritis, and uveitis, resembling connective tissue diseases. The challenge of the natural models of disease in the tropics remains open for future study.

Summary

The worldwide seroprevalence is presented both for tropical and northern countries. Differences in geographical distribution and transmission modes are discussed. Tropical spastic paraparesis (TSP) and adult T cell leukemia/lymphoma (ATLL) are the hitherto known clinical manifestations of HTLV-I infection. The risks of a HTLV-I seropositive carrier to develop one of these two diseases-entities is different within tropical countries, the difference is even more definite when seroprevalence rates in the tropics are compared to Japan or the United States of America.

Key words

HTLV-I, tropical spastic paraparesis, adult T cell leukemia/lymphoma.

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Table 2:

Geographic variations in attack rates for TSP among HTLV-I carriers.

Geographic Area	TSP prev. per 100,000	Attack Rate per N^A carriers
Okinawa (Japan)	2.8	1 : 8000
Kagoshima (Japan)	8.6	1 : 1464
Jamaica	12	1 : 400
Martinique (FWI)	22	1 : 170
Tumaco (Colombia)	98	1 : 30

Zusammenfassung

HTLV-I Infektion in den Tropen

Die HTLV-I Seroprävalenz wird sowohl für ausgewählte tropische als auch sogenannte nördliche Länder dargestellt. Geographische und Transmissions-Unterschiedlichkeiten werden diskutiert. Die tropische spastische Paraparese (TSP) und die adulte Form der T-Zell-Leukämie/Lymphom (ATLL) stellen die derzeit bekannten klinischen Manifestationsvarianten einer HTLV-I-Infektion dar. Das Risiko eines HTLV-I seropositiven "Carriers", an einer dieser beiden klinischen Krankheitsentitäten zu erkranken, ist innerhalb der tropischen Länder völlig unterschiedlich; insgesamt jedoch in den Tropen höher als in Japan oder in den USA.

Schlüsselwörter HTLV-I, tropische spastische Paraparese, adulte T-Zell-Leukämie/Lymphom.

References

1. POIESZ, B. J., RUSCETTI, F. W., GAZDAR, A. F., BUNN, P. A., MINNA, J. D., GALLO, R. C. (1980): Detection and isolation of type-C retrovirus particles from fresh and cultured lymphocytes of a patient with cutaneous T-cell lymphoma. Proc. Natl. Acad. Sci. USA, 4715-7419.
2. ROMÁN, G. C., ROMÁN, L. N., OSAME, M. (1990): Human T-lymphotropic virus type I neurotropism. Prog. Med. Virol. 37, 190-210.
3. ROMÁN, G. C., SPENCER, P. S., SCHOENBERG, B. S. (1985): Tropical myeloneuropathies: The hidden endemias. Neurology 35, 1158-1170.
4. STRACHAN, H. (1888): Malarial multiple peripheral neuritis. Sajou's Ann. Univ. Med. Sci. 1, 139-141.
5. ROMÁN, G. C. (1993): Tropical Myeloneuropathies. In: Peripheral Neuropathy. Dyck P. J., Thomas, P. K., Griffin, J. W., Low, P. A., Poduslo, J. F. ed. Third edition, WB Saunders Company, Philadelphia 1322-1331.
6. CATOVSKY, D., GREAVES, M. F., ROSE, M., GALTON, D. A. G., GOOLDEN, A. W. G., McCLUSKEY, D. R., WHITE, J. M., LAMPERT, I., BOURIKAS, G., IRELAND, R., BROWNELL, A. I., BRIDGES, J. M., BLATTNER, W. A., GALLO, R. C. (1982): Adult T-cell lymphoma-leukaemia in Blacks from the West Indies. Lancet 1, 639-642.
7. VYTH-DREESE, F., DE VRIES, J. E. (1982): Human T-cell leukaemia virus in lymphocytes from a T-cell leukaemia patient from Surinam. Lancet 2, 993-994.
8. GESSAIN, A., BARIN, F., VERNANT, J-C., GOUT, O., MAURS, L., CALENDER, A., DE THÉ, G. (1985): Antibodies to human T-lymphotropic virus type-I in patients with tropical spastic paraparesis. Lancet 2, 407-410.
9. OSAME, M., USUKU, K., IZUMO, S., IJICHI, N., AMITANI, H., IGATA, A., MATSUMOTO, M., TARA, M. (1986): HTLV-I-associated myelopathy: a new clinical entity. Lancet 1, 1031-1032.
10. ROMÁN, G. C. (1989): Tropical spastic paraparesis and HTLV-I myelitis. Handbook Clinical Neurology 12 (56), 525-542.
11. CDC (1993): Guidelines for counseling persons infected with human T-lymphotropic virus type I (HTLV-I) and type II (HTLV-II). Ann. Intern. Med. 118, 448-454.
12. GESSAIN, A., GOUT, O. (1992): Chronic myelopathy associated with human T-lymphotropic virus type I (HTLV-I). Ann. Int. Med. 117, 933-946.

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