South Pacific Study Vol. 15, No. 1, 1994

Seroepidemiological Study of Anti-Adult T-cell Leukemia Associated Antibodies in Western Samoa

Shinichi TERASHI[1], Motoo KITANO[2], Yasuto UCHIO[3], Hideharu KUNIYOSHI[4], Taulealea Eti ENOSA[5], Faalii ALOAINA[6] and Vaasili Faleniu ASAUA[7]

Abstract

A seroepidemiological survey of Adult T-cell Leukemia associated antigen antibodies was conducted on Western Samoan human sera in 1993.

The results showed no positive cases in all 812 samples.

Key words: Seroepidemiology, Adult T-cell Leukemia, Western Samoa

Introduction

Adult T-cell Leukemia(ATL) is related to the infection of a retrovirus named Human T-Lymphotropic Virus Type-1(HTLV-1) and is observed with a high incidence among persons born in virus endemic areas, such as southwestern Japan, the Caribbean basin and Africa. A neurological disease, named HAM/TSP (HTLV-1 Associated Myelopathy/Tropical Spastic Paraparesis) was also caused by HTLV-1(MATSUMOTO *et al.*, 1979; OSAME *et al.*, 1987)

Nearly all the patients and many of the carriers of HTLV-1 who are in a healthy condition will test positive for ATLA(anti-ATL virus associated antigen antibodies) in their sera (HINUMA *et al.*, 1981). The ATLA examination of the inhabitants in each country will help to detect and monitor incidence and transmission of the virus.

This research work was supported by a Grant-in-Aid for Cancer Research (No. 06042012) from the Ministry of Education, Sciences and Culture, Japan.

1) Kagoshima University Research Center for the South Pacific, Professor Address:1-21-24 Korimoto, Kagoshima-City, *JAPAN* 890

2) Kagoshima University, Faculty of Dentistry, Oral Pathology, Professor

3) Kagoshima University, School of Allied Medical Sciences, Chemistry, Professor

4) Kagoshima University Hospital, Faculty of Dentistry, Research Associate

5) Western Samoan National Hospital, Research Committee, Chairman

6) Western Samoan National Hospital, Superintendent

7) Western Samoan National Hospital, Chief Pathologist

Methods and Results

The human sera were collected as available samples from Western Samoan National Hospital Clinical Laboratory(Biochemical laboratory and Microbiological laboratory) and Western Samoan Blood Transfusion Section, Apia, Western Samoa.

The serological test was done by the Microtiter Technique using a gelatin particle agglutination test(Serodia HTLV-1 kit, FUJIREBIO Inc., Tokyo, Japan; IKEDA *et al.* 1984). The HTLV-1 positive range was decided over 16 units of serum samples concentration by this qualitative test.

A total of 812 samples were tested.

The results of the seroepidemiological study of ATLA in Western Samoa showed no positive cases in all samples.

The distribution of samples by sex and age are shown in Table 1. In 17 cases the ages were unknown, and in 5 cases neither the age nor sex were available.

Table 1. Distribution of Sample Material by Sex and Age

Age	Male	Female	Total
0~10	11	11	22
11~20	45	55	100
21~30	76	96	172
31~40	59	72	131
41~50	46	49	95
51~60	49	47	96
61~70	48	35	83
71~80	18	10	28
81~	7	6	13
Adult	31	19	50
Age Unknown	11	6	17
Age & Sex Unknown	(5)		5
Total	401	406	812

Discussion

The adult T-cell leukemia/lymphoma(ATL) is caused by an infection of a retrovirus of HTLV-1. Anti-ATL-associated antigen antibodies (ATLA) in human sera are detectable in most ATL patients and in a relatively high percentage of healthy individuals born in ATL-endemic areas.

Currently it is supposed that HTLV-1 is transmitted by three main routes; 1) from husband to wife by sexual transmission, 2) from mother to her babies by delivery, and 3) blood transfusions (MIYAMOTO *et al*,. 1985; TAJIMA *et al.*,1982; OKOCHI *et al.*, 1984).

In Japan, ATL-endemic areas are the southwestern regions where healthy carriers were found at a rate between 6-37 %(HINUMA *et al.*, 1982).In Okinawa, the southernmost part of Japan, 51 of 170 patients including 20 ATL patients were positive for ATLA (CLARK *et al.*, 1985).

In neighboring countries, 17 out of 2,545 individuals in Taiwan (PAN *et al.*, 1985), 17 out of 6,255 in Korea (LEE *et al.*, 1986) and 2 out of 6,884 in China (ZENG *et al.*, 1984) were reported as ATLA positive cases. Each report was composed of healthy persons and patients with various diseases. One of the two ATLA positive cases in China was a Japanese-Chinese and the other was a Chinese woman whose husband was a Japanese.

The West Indies/Caribbean basin is also known as an HTLV-1 invaded area. And many of ATL patients were black peoples born in these HTLV-1 endemic areas (CATVOSKY *et al.*, 1982; BLATTNER *et al.*, 1982; O'BRIEN *et al.*, 1983). Africa is thought to be one of the HTLV-1 endemic areas(GALLO, 1985; HUNSMANN *et al.*, 1983).

The incidence of ATL in the USA is sporadic. While most of the patients were black,their birth places were widespread in the United States and Latin America (JAFFE *et al.*, 1984; BLAYNEY *et al.*, 1983).

However, a few of these cases were white (JAFFE *et al.*, 1984; FOUCAR *et al.*, 1985).

Few seroepidemiological surveys have been made in Oceania. HINUMA *et al.*(1983) reported two sporadic ATLA positive cases in 182 samples of the Solomon Islands. In the other surveys no positive cases were found in the Solomon Islands nor Viti Levu (Fiji) where 72 and 156 sera, respectively were collected (MATSUMOTO *et al.*, 1983; TERASHI *et al.*, 1983).

In Truck State of the Federated States of Micronesia (FSM), no positive cases out of 57 persons were found (TERASHI *et al.*, 1986). Elsewhere in the FSM, 3 tested positive out of 154 individuals in Pohnpei (TERASHI *et al.*, 1986), and in Yap State there were 9 positive reactions out of 133 inhabitants (TERASHI *et al.*, 1987a).

In the Republic of Palau, 19 positive cases out of 176 sera were found (TERASHI *et al.*, 1987b).

An ATLA research survey in Papua New Guinea at Port Moresby, Lae and Wewak showed a range of 6.9 -30.2% positive cases (TERASHI *et al.* 1991; 1992).

The incidence of ATLA in Micronesia and Papua New Guinea, and its absence in Western Samoa, suggest certain patterns of socio-cultural interaction and early human

migrations in the Pacific Basin. Further research, however, is neaded to ascertain these relationships.

Acknowledgements

We thank Mr. Tipasa ME (Health Planning Unit, Western Samoan Health Department), Ms. Letuu SLAVEN (Principal, Medical Laboratory Technologist, Western Samoan National Hospital; W.S.N.H.), Mr. Suesue TALALELEI (Pathological Technologist,W.S.N.H.), Mr. Palauni MAUIRATU (Pathological Technologist, W.S.N.H.), Ms.T.S. MAUALA (Research Laboratory of Red Cross Blood Transfusion Section, Western Samoa) and Mr.Faapulou AUVAA (Supervisor Biochemistry Unit, W.S.N.H.) for their help in this project.

References

BLATTNER, W. A., KALYANARAMAN, V. S., ROBERT-GUROFF, M., LISTER, A., GALTON, D. A. G., SARIN, P. S., CRAWFORS, M. H., CATOVSKY, D., GREAVES, M. and GALLO, R. C. 1982. The Human Type-C Retrovirus, HTLV, in Blacks from the Caribbean Region, and Relationship to Adult T-cell Leukemia/lymphoma. Int. J. Cancer, 30: 257-264.

BLAYNEY, D. W., BLATTNER, W. A., ROBERT-GUROFF, M., JAFFE, E.S., FISHER, R.I., BUNN, Jr., P. A., PATTON, M. G., RARICK, H. R. and GALLO, R. C. 1983. The Human T-Cell Leukemia-Lymphoma Virus in the Southeastern United States. JAMA, 250: 1048-1052.

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. and GALLO, R. C. 1982. Adult T-cell Lymphoma-Leukemia in Black from the West Indies. Lancet, March 20: 639-643.

CLARK, J. W., ROBERT-GUROFF, M., IKEHARA, O., HENZAN, E. and BLATTNER, W. A. 1985. Human T-Cell Leukemia-Lymphoma Virus Type-1 and Adult T-Cell Leukemia-Lymphoma in Okinawa. Cancer Res., 45: 2849-2852.

FOUCAR, K., CARROLL, Jr., T. J., TANNOUS, R., PETERSON, L., GOEKEN, J. A., BINION, S., GAJL-PECZALSKA, J., KADIN, M. E. and YOKOYAMA, W. M. 1985. Nonendemic Adult T-Cell Leukemia/Lymphoma in the United States: Report of Two Cases and Review of the Literature. Am. J. Clin. Pathol., 83: 18-26.

GALLO, R. C. 1985. The Human T-Cell Leukemia/Lymphotropic Retroviruses(HTLV) Family: Past, Present, and Future. Cancer Res., 45(Suppl.): 4524s-4533s.

HINUMA, Y., NAGATA, K., HANAOKA, M., NAKAI, M., MASTUMOTO, M., KINOSHITA, K., SHIRAKAWA, S. and MIYOSHI, I. 1981. Adult T-cell Leukemia: Antigen in an ATL

Cell Line and Detection of Antibodies to the Antigen in Human Sera. Proc. Natl. Acad. Sci. USA, 78: 6476-6480.

HINUMA, Y., KOMODA, H., CHOSA, T., KONDO, T., KOHAKURA, M., TAKENAKA, T., KIKUCHI, M., ICHIMARU, M., YUNOKI, K., SATO, I., MATSUO. R., TAKIUCHI, Y., UCHINO, H. and HANAOKA, M. 1982. Antibodies to Adult T-cell Leukemia-Virus-Associated Antigen(ATLA) in Sera from Patients with ATL and Controls in Japan: A Nation-Wide Sero-Epidemiologic Study. Int. J. Cancer, 29: 631-635.

HINUMA, Y., CHOSA, T., KOMODA, H., MORI, I., SUZUKI, M., TAJIMA, K., PAN, I-H. and LEE, M. 1983. Sporadic Retrovirus(ATLV)-Seropositive Individuals Outside Japan. Lancet, April 9: 824-825.

HUNSMANN, G., SCHNEIDER, J., SCHMITT, J. and YAMAMOTO, N. 1983. Detection of Serum Antibodies to Adult T-cell Leukemia Virus in Non-Human Primates in People from Africa. Int. J. Cancer, 32: 329-332.

IKEDA, M., FUJINO, R., MATSUI, T., YOSHIDA, T., KOMODA, H. and IMAI, J. 1984. A New Aggulutination Test for Serum Antibodies to Adult T-cell Leukemia Virus. Gann, 75: 845-848.

JAFFE, E. S. BLATTNER, W. A., BLANNEY, D. W., BUNN, Jr., P. A., COSSMAN, J., ROBERT-GUROFF, M. and GALLO, R. C. 1984. The Pathologic Spectrum of Adult T-cell Leukemia/Lymphoma in the United States. Am. J. Surg. Pathol., 8: 263-275.

LEE, S. Y., YAMAGUCHI, K., TAKATSUKI, K., KIM, B. K., PARK, S. and LEE, M. 1986. Seroepidemiology of Human T-cell Leukemia Virus Type-I in the Republic of Korea. Jpn. J. Cancer Res.(Gann), 77: 250-254.

MATSUMOTO, M., NOMURA, K., MATSUMOTO, T., NISHIOKA, K., HANADA, S., FURUSHO, H., KIKUCHI, H., KATO, Y., UTSUNOMIYA, A., UEMATSU,T., IWAHASHI,M., HASHIMOTO, S. and YUNOKI, K. 1979. Adult T-Cell Leukemia-Lymphoma in Kagoshima District, Southwestern Japan: Clinical and Hematological Charasteristics. Jpn. J. Clin. Oncol., 9(Suppl.): 325-336.

MATSUMOTO, T., TERASHI, S. and PARKER, M. 1983. Study of Anti-Adult T-cell Leukemia Associated Antigens Antibodies in Solomon Islands.The Prompt Report 2nd Scientific Survey South Pac., (ed. NAKANO, K. et al.), :113. Kagoshima Univ. Res. Center S. Pac., Kagoshima.

MIYAMOTO, Y., YAMAGUCHI, K., NISHIMURA, H., TAKATSUKI, K., MOTOORI, T. MORIMATSU, M., YASAKA, T., OHYA, I. and KOGA, T. 1985. Familial Adult T-Cell Leukemia. Cancer, 55: 181-185.

O'BRIEN, C., LAMPERT, I. A. and CATOVSKY, D. 1983. The Histopatholgy of Adult T-cell Lymphoma/Leukemia in Blackes from the Caribbean. Histopathology, 7: 349-364.

OKOCHI K., SATO, H. and HINUMA, Y. 1984. A Retrospective Study on Transmission of Adult T Cell Virus by Blood Transfusion: Seroconversion in Recipients. Vox. Sang., 46: 245-253.

OSAME, M., MATSMOTO, M., USUKU, K., IZUMO, S., IJICHI, N., AMITANI, H., TARA, M.

and IGATA, A. 1987. Chronic Progressive Myelopathy Associated with Elevated Antibodies to Human T-Lymphotropic Virus type I and Adult T-Cell Leukemialike Cells. Ann. Neurol. 21: 117-122.

PAN, I-H., CHUNG, C-S., KOMODA, H., IMAI, J. and HINUMA, Y. 1985. Seroepidemiology of Adult T-cell Leukemia Virus in Taiwan. Jpn. J. Cancer Res. (Gann), 76: 9-11.

POIESZ, B. J., RUSCETTI, F. W., GAZDAR, A. F., BUNN, P. A., MINNA, J. D. and GALLO, R. C. 1980. Detection and Isolation of Type C Retrovirus Particles from Fresh and Cultured Lymphocites of a Patient with Cutaneous T-cell Lymphoma. Proc. Natl. Acad. Sci. USA, 77: 7415-7419.

TAJIMA, K., TOMINAGA, S., SUCHI, T., KAWAGOE, T., KOMODA, H., HINUMA, Y., ODA,T. and FUJITA, K. 1982. Epidemiological Analysis of the Distribution of Antibody to Adult T-cell Leukemia-Virus-Associated Antigen: Possible Horizontal Transmission of Adult T-cell Leukemia Virus. Gann, 73: 893-901.

TERASHI, S., MATSUMOTO, T., KHAN, W. and SINGH, H. K. 1983. Studies of Anti-Adult T-cell Leukemia Associated Antigens Antibodies and Some Hematological Findings on Healthy Adults in Viti Leve, Fiji. The Prompt Report 2nd Scient. Surv. South Pac.,(Ed. NAKANO, K. *et al.*): 108-112. Kagoshima Univ. Res. Center S. Pac., Kagoshima.

TERASHI, S., MATSUMOTO, T., KIJIMA, S., HARRIS, I.A., BARBOSA, C., ATEN, G. and KANSOU, N. 1986. Studies of Anti-Adult T-cell Leukemia Associated Antigen Antibodies and Some Hematological Findings in Inhabitants in the Federated States of Micronesia. The Prompt Report 4th Scientific Survey South Pac., (Ed. NAKANO, K. et al.): 57-64. Kagoshima Univ. Res. Center S.Pac.Kagoshima.

TERASHI, S., FIGIR, M. B., GAJDUSEK, J. T., TALLEY, B., SUMOR, E., RACHI, A., MANGARFIR, G. and DIBAY, L.G. 1987a. Study of Anti-Adult T-cell Leukemia Associated Antigen Antibodies in Inhabitants in Yap, the Federated States of Micronesia. The Prompt Report 5th Scientific Survey South Pac., (Ed. NAKANO, K. *et al.*) : 66-70. Kagoshima Univ. Res. Center S. Pac., Kagoshima.

TERASHI, S., KUMANGAI, M., POLLOI, A. H., BORJA, S., TECHECHOR, J. and TERMEETY, F. 1987b. Study of Anti-Adult T-cell Leukemia Associated Antigen Antibodies in Inhabitants of the Republic of Palau. The Prompt Report 5th Scient. Surv. South Pac., (ed. NAKANO, K. *et al.*) :62-65. Kagoshima Univ.Res. Center S. Pac., Kagoshima.

TERASHI, S., BABONA, D. and TALONU, T., 1991. Seroepidemiological Study of Anti-Adult T-cell Leukemia/Lymphoma Associated Antibodies in Papua New Guinea (1990). Kagoshima Univ. Res.Center S. Pac., (Ed. HAYASHI, M.), Occasional Papers, No. 21: 45-48.

TERASHI, S., MALLETT, J. B., YAMBUIA,G. and TALONU T.1992. Seroepidemiological Study of Anti-Adult T-cell Leukemia/Lymphoma Associated Antigen Antibodies in Lae and Wewak of Papua New Guinea (1991). Kagoshima Univ. Res. Center S. Pac., (Ed. KARAKITA, Y.), Occasional Papers, No. 23: 47-52.

ZENG, Y., LAN, X.Y., FANG, J., WANG, P. Z., WANG, Y.R., SUI, Y.F., WANG, Z.T., HU, R.J. and HINUMA, Y. 1984. HTLV Antibody in China. Lancet, April 7: 799.

(Accepted September 16, 1994)