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## RESEARCH COMMUNICATION

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# Lack of HTLV-I Carriers in the Sami, an Ethnic Group Living in the Arctic Area in Norway

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### Abstract

The Sami is an ethnic group with ill-defined genetic origins, living in the northern areas of the Scandinavian Peninsula and Russia. Distinct from other European populations in culture and language, they are generally deemed to be remote from the Caucasian lineage. In order to ascertain whether the Sami are genetically linked to Asiatic Mongoloids, we investigated serological markers of human T-cell leukemia virus type I (HTLV-I) infection. Particle agglutination tests for serum HTLV-I antibody were performed for 400 Sami living in Finnmark, the northernmost county of Norway, and in 380 Caucasians (or Norse) in the same region, using serum samples collected for the purpose of studying cardiovascular disease among Northland people in 1974-75. One sample from a Sami showed a tentatively positive reaction, and 4 sera from Sami and 4 from Norse individuals exhibited non-specific agglutination. However, none of the 9 sera showed a positive result in western blotting for HTLV-I proteins, namely, gp46, p53, p24, and p19. Since HTLV-I is distributed most prevalently among northern and southwestern Japanese in Asia and Andeans in South America, the absence of HTLV-I in the Sami might suggest their genetic remoteness from these ethnic groups.

**Key Words:** HTLV-I - prevalence - Sami people - Norway

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### Introduction

Human T-cell leukemia virus type I (HTLV-I) and adult T-cell leukemia (ATL) are prevalent in Southwestern Japan (Kyushu and Shikoku) and northern Japan (Tohoku and Hokkaido), while they are less frequent in the central region of the country (Tajima et al., 1990). The main reason for this peculiar clustering of HTLV-I in Japan is thought to be linked to the history of early human migration (Tajima et al., 2003). Previous anthropological studies suggested that several waves of ancestral founders migrated from the Asian continent to the Japanese archipelago in prehistoric times (Hanihara, 1991; Omoto and Saitou, 1997). Some of their genetic subpopulations might have been associated with HTLV-I infection and the susceptibility to the carrier state

of HTLV-I and ATL manifestation (Sonoda et al., 2003).

Foci of HTLV-I have been reported also for native Andeans as well as northern Iranians, Central Africans, African descendants in the Caribbean and South America, while the type II virus (HTLV-II) is prevalent mainly in some native populations in North, Central, and South America (Tajima et al. 2003). A 1500-year-old Andean mummy and contemporary Japanese and Chileans share similar HTLV-I provirus sequences, indicating that Andean HTLV-I was carried from Asia by some genetic populations related to ancient Japanese with genetic link to the contemporary Japanese with HTLV-I (Li et al., 1999). This hypothesis is supported by the similarity in the distribution of HLA haplotypes (DRB1/DQB1) among HTLV-I carriers in Japan and the Andes. These HLA haplotypes are associated with

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low immune responsiveness to HTLV-I, indicating that its geographical distribution might be determined by historical migration of human groups with the specific HLA haplotypes susceptible to HTLV-I infection (Sonoda et al, 1996).

In the present study, our interest is focused on a unique ethnic group in the arctic region, the Sami. Although this people live in four different countries, Norway, Sweden, Finland, and Russia, they share history, culture and language, and therefore, are regarded as one group (Rasmussen, 1995). Accepted census statistics reported approximately 30,000 Sami in Norway, 15,000 in Sweden, 4,000 in Finland, and 2,000 in Russia. To date, the origins of the Sami remain unclear. In order to investigate a possible preservation of HTLV-I, we examined its prevalence in the Sami and the background population in arctic Norwegians.

## Materials

Sera and information were collected in 1974-75 by the National Mass Radiography Service, Norway, for the purpose of screening for cardiovascular risk factors together with a mass radiography for tuberculosis. The samples, which had been stored at -20°C, were the basis for our present study. Of the sera, only those from Finnmark county were used for our purpose, since the Sami are densely distributed in this region. Of 14,401 sera from Finnmark, 6,956 were defined as Norse (white Caucasian) and 2,131 as Sami. Four hundred Sami and three hundred eighty Norse randomly drawn out of these pools were the subjects of our study. The age at collection ranged from 20 to 49 years. The criterion for an ethnic Sami was a positive answer to the question: Are two or more of your grandparents of Sami origin? The criterion for Norse was answering NO to the two questions: Are two or more of your grandparents of Sami origin? and Are two or more of your grandparents of Finnish origin?

## Ethics

To perform the present study, we obtained permission in Norway from 1) the Medical Ethics Committee, 2) the Data Inspectorate, 3) the owner of the serum samples, 4) the National Institute of Health, who is the owner of the information about ethnicity, 5) the Sosial og helsedirektoratet. Further, we advertised about the study project in 5 newspapers in Norwegian and in Lappish to get passive consent from general people in the targeted areas. We also obtained the permission from the ethical committee of Aichi Cancer Center.

## Methods

HTLV-I infection was serologically screened using a commercial test kit (SERODIA HTLV-I, FUJIREBIO Inc., Tokyo, Japan) based on passive particle-agglutination (Fujiyama et al., 1995). According to the manufacturer's instruction, serum showing a negative reaction with unsensitized particles (final serum dilution, 1:8) but

agglutination with sensitized particles (final serum dilution, 1:16 or more) can be regarded as positive. Serum showing positive agglutination with both unsensitized and sensitized particles was regarded as giving a non-specific reaction. The sera that gave positive or non-specific reactions were subjected to western blotting using a commercial test kit (PROBLOT HTLV-I, FUJIREBIO Inc.), to detect antibodies specific to HTLV-I proteins including p19, p24, p53, and gp46 (Fujiyama et al. 1995). Samples with positive binding to both gp46 and at least one of p19, p24, and p53 were regarded as positive.

## Results

### Particle Agglutination

Results of particle agglutination tests for HTLV-I antibodies of the sera from Sami and Norse are summarized in Table 1. Only one serum, namely #3, from a Sami showed a positive reaction, and this was weak (16-fold). The tentatively positive serum and 8 sera (namely #1, 2, 4-9) that showed non-specific agglutination were subjected to western blotting. Non-specific agglutination was observed in the sera from both Sami (#1,2, 6, 9) and Norse (#4, 5, 7, 8).

### Western Blotting

As shown in Fig. 1, the only sample that gave a tentatively positive result in particle agglutination, or sample #3, showed a relatively strong reaction with p19 and p24, but not gp46. Although reactions with p19 or p24 were also observed with the other sera, no sample fulfilled the criteria for positive antibody specific to HTLV-I.

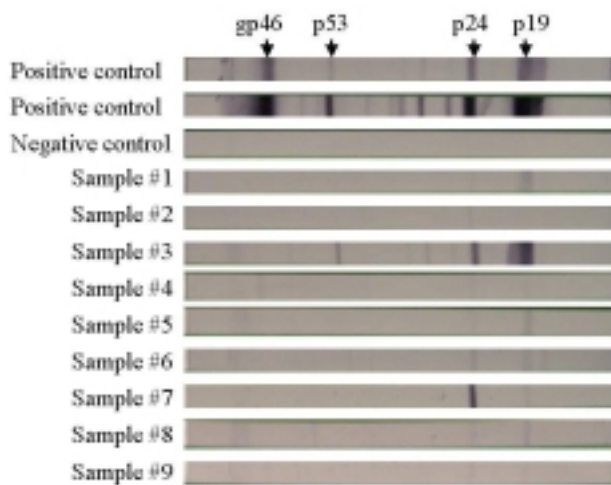
## Discussion

The two ethnic groups studied here, Sami and Norse (white Caucasian), are thought to have been present in Norway since 1000-2000 years B.C.(Selnes et al., 2002). Ancestors of the Sami lived in eastern and northern parts of Norway as hunters, nomads (reindeer keepers) and fishermen, as seasonally determined, speaking a language related to the present Sami and Finnish languages, interacting with people in northern Sweden, Finland, and Russia. On

**Table 1. Results of Particle Agglutination Test for HTLV-I Antibody in the Sami and the Norse.**

	Sami	Norse
Positive agglutination	1	0
Negative agglutination	394	375
Non-specific agglutination*	5	4
Not examined**	0	1
Total	400	380

\*Agglutination occurred with both unsensitized and sensitized particles. \*\*because of small sample volume.



**Figure 1. Western Blots for HTLV-I Proteins.**

The samples #1-3, 6, 9 were from Sami, and the remainder from Norse. Note that the sample #3 (tentatively positive in particle agglutination) showed a strong reaction to p19. Moderate reactions for p24 are apparent with Samples #3 and #7.

the other hand, the Norse are related to the people who immigrated from southern Sweden and Denmark, living in the south and west parts of Norway as farmers, speaking an Indo-European language.

The Sami are known to be distinct in the genetic makeup from other European ethnic groups (Sikstrom- Nylander, 1990; Beckman et al., 1993), and the anthropological relation to Aleuts, or the native inhabitants of the present Aleutian islands, has been claimed (Hanihara, 1979). Hence, the genetic comparison between Sami and Asiatic Mongoloid groups is of interest.

As to the genetic origin of the Japanese, at least two major waves of human migration to Japan have been hypothesized (Hanihara, 1991; Omoto, Saitou, 1997; Bannai et al, 2000; Hatta et al., 1999). One involved upper Paleolithic populations of East Asia, thought to have close relations to the ancestors of the Ainu (the aborigines in Hokkaido in northern Japan), the Ryukyuan (aborigines in southwestern Japan), and native Americans. The second wave was the migration of Neolithic populations of northeastern Asia, thought to be linked to the central Japanese, the Koreans, and the people living in the northeastern China. Foci of HTLV-I are known to be distributed in the north and southwest of Japan and in the Andes, which might indicate that HTLV-I is carried in association with the migration of the upper Paleolithic populations of East Asia (Tajima and Takezaki, 2003).

A previous study reported the presence of HTLV-I infection in Swedish Lapps and the people living near the Swedish-Finnish border (Robert-Guroff et al., 1985). The authors used an ELISA method for serum HTLV-I antibody, and the specificity of the ELISA was examined by competitive inhibition by adding p24 protein of HTLV-I in the ELISA. In our western blotting study, however, all the positive reactions to p24 protein were found to be of non-

specific nature, which indicates that the inhibition by p24 in the ELISA cannot rule out non-specific reaction.

Our study showed that the Sami in North Scandinavian areas do not possess HTLV-I. A possible interpretation of this result is that any genetic relation of the Sami to the Asiatic Mongoloid group, if one exists, would involve Neolithic rather than Upper Paleolithic populations. Another possible interpretation is that the Sami have mixed genetically with other ethnic groups lacking HTLV-I. More comprehensive information is necessary to reach better understanding of the genetic relationship of the arctic minority groups with Asiatic Mongoloids and associated neoplasia.

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