TRANSMISSION OF ADULT T-CELL LEUKEMIA RETROVIRUS (HTLV-I) FROM MOTHER TO CHILD: COMPARISON OF BOTTLE- WITH BREAST-FED BABIES

Yoshiya Ando,*1 Shiro Nakano,*1 Kensuke Saito,*1 Ikuko Shimamoto,*1 Motohiko Ichio,*1 Takenori Toyama*2 and Yorio Hinuma*3
*1Department of Obstetrics and Gynecology, Nara Medical University, 840 Shijo-cho, Kashihara, Nara 634, *2Toyama Obstetrical and Gynecological Clinic, Ginowan, Okinawa 901-22 and *3Institute for Virus Research, Kyoto University, Kyoto 606

HTLV-I is commonly believed to be transmitted from HTLV-I seropositive mothers to infants via breast milk. In 11 of 24 breast-fed infants born to HTLV-I seropositive mothers, HTLV-I antigen-positive cells were detected in peripheral blood samples obtained 12 months after birth. In sharp contrast, they were detected in only one of 11 bottle-fed infants of HTLV-I seropositive mothers. Thus bottle-feeding appears to be an effective method to avoid HTLV-I transmission from HTLV-I seropositive mothers to infants.

Key words: Adult T-cell leukemia — HTLV-I infection — Bottle-feeding

A human retrovirus, adult T-cell leukemia virus (ATLV), isolated in Japan1-3 is known to be the same kind of retrovirus as the human T-cell lymphotropic virus type I (HTLV-I)4 isolated in the USA.5 This retrovirus is etiologically responsible for adult T-cell leukemia (ATL) which is endemic in the southwestern part of Japan.6,7 Many healthy adults in the ATL-endemic areas are anti-HTLV-I positive (HTLV-I seropositive),8 and have HTLV-I-carrying T-cells in their peripheral blood.8-10 A seroepidemiological study has shown familial clustering of HTLV-I seropositive individuals, suggesting that the virus spreads among family members.11 Kinoshita et al.12 and Nakano et al.13,14 reported that HTLV-I antigen-positive cells are present among the mononuclear cells in breast milk of HTLV-I seropositive mothers and that breastfeeding by these mothers may result in HTLV-I infection of their infants. If the main route of virus transmission from mother to child is breast milk, the transmission rate should be lower in bottle-fed babies than in breast-fed babies. In the present studies, we examined whether this is the case.

Healthy mothers and their infants were examined in Okinawa, where ATL and its virus are endemic.14 In this study, 151 HTLV-I seropositive subjects (6.8%) were found among 2232 healthy pregnant individuals screened in the three-year period from 1983 to 1985. Follow-up studies were made on 35 of these HTLV-I seropositive women and their infants. Peripheral blood samples from mothers and infants were collected periodically and examined for HTLV-I antigen-positive cells.

HTLV-I antigen-positive cells were identified as described previously.14 That is, mononuclear cells separated by Ficoll-Conray gradient centrifugation from peripheral or cord blood of mothers or infants were suspended in RPMI-1640 medium supplemented with 20% fetal calf serum and 500 IU/ml IL-2 and cultured for 4 weeks in wells of 2cm diameter at a density of 1×10⁶ cells/ml/well. Each sample was cultured in 5 to 8 wells. Half the medium was replaced twice a week. After cultivation, the cells were harvested, smeared on slides, fixed in acetone, and treated with mouse monoclonal antibody to p19 of HTLV-I.15 After incubation at 37° for 30 min, the slides were washed with phosphate-buffered saline and treated with FITC-conjugated anti-mouse IgG (Cappel Lab., Pa.). After further incubation and washing in the same way as after the first reaction, the preparations were mounted, then immunofluorescent cells were counted and their percentage was calculated.

Blood samples obtained from 24 breast-fed infants and 11 bottle-fed infants of HTLV-I
seropositive mothers were examined for HTLV-I antigen-positive cells. HTLV-I antigen-positive cells were detected after delivery in the peripheral blood of all 35 HTLV-I seropositive mothers. Viral antigen-positive cells were not detected in blood samples from any of the 35 infants at birth (cord blood) or 1, 3 or 6 months after birth. However, later HTLV-I antigen-positive cells became detectable in some infants, as in the cases reported previously. The results obtained at 12 months after birth are summarized in Table I. HTLV-I antigen-positive cells were found in 11 of 24 breast-fed infants (46%), but in only one of 11 bottle-fed infants (9%). This one case suggests that there is some other transmission route(s) from mother to child besides breast milk. The seroconversion rate in the first 12 months of life was very low (data not shown), as reported previously, but this does not exclude the possibility of infection at a later date. Further work, including follow-up studies are necessary on this aspect.

We conclude from this study that HTLV-I infection from mother to infant occurs mainly via breast milk, not via the placenta during pregnancy or delivery, and that bottle-feeding is an effective way of avoiding this route of transmission.

Yamato et al. suggested that heating breast milk at 56°C for 30 min should eliminate the possibility of HTLV-I infection. We have reported that freeze-thawing of milk is also effective for removing HTLV-I-infected cells. All the above results support our suggesting that infants born to HTLV-I carrier mothers should be fed with either HTLV-I-free milk, properly treated milk or artificial nourishment.

This work was supported by a Grant-in-Aid for Cancer Research from the Ministry of Education, Science and Culture.

(Received Oct. 9, 1986/Accepted March 5, 1987)

<table>
<thead>
<tr>
<th>Infant group</th>
<th>No. of infants examined</th>
<th>No. of infants with the following percentages of virus antigen-positive cells 12 months after birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast-fed</td>
<td>24</td>
<td>0.0</td>
</tr>
<tr>
<td>Bottle-fed</td>
<td>11</td>
<td>15</td>
</tr>
</tbody>
</table>

Table I. Effects of Breast- and Bottle-feeding on the Frequencies of Appearance of HTLV-I Antigen-positive Cells during in vitro Culture of Peripheral Blood Samples of Infants Born to Virus Carrier Mothers

a) 0 represents less than 0.1%.

REFERENCES


