Evaluation of Confirmatory Testing for HTLV-1 in Pregnant Women in Nagasaki: Comparison of CLIA, LIA, and PCR Results

APCCMI2025 BANGKOK

RES-109

Kaori Ishihara[1], Fujiko Mitsumoto-Kaseida[1.2], Maiko Yoshida[1], Daisuke Sasaki[1], Kosuke Kosai[1.2], Hiroo Hasegawa[1.2], Katsunori Yanagihara[1.2]

1 Department of Laboratory medicine, Nagasaki University Hospital

2 Department of Laboratory medicine, Nagasaki University Graduate School of Biomedical Sciences

Background

Human T-cell leukemia virus type 1 (HTLV-1), a retrovirus causes adult T-cell leukemia (ATL), is primarily transmitted by breastfeeding. Nagasaki Prefecture, a high-prevalence region in Japan, has established HTLV-1 screening program for pregnant women since the 1980s. HTLV-1 infection is diagnosed both positive screening antibody test and positive confirming test by line immunoassay (LIA) or polymerase chain reaction (PCR)(Figure 1). In Nagasaki prefecture, all confirmatory test (both LIA and PCR) is centralized at Nagasaki University Hospital and both LIA and PCR are routinely performed. This study involved a comparison between screening antibody test outcomes and confirmatory test results.

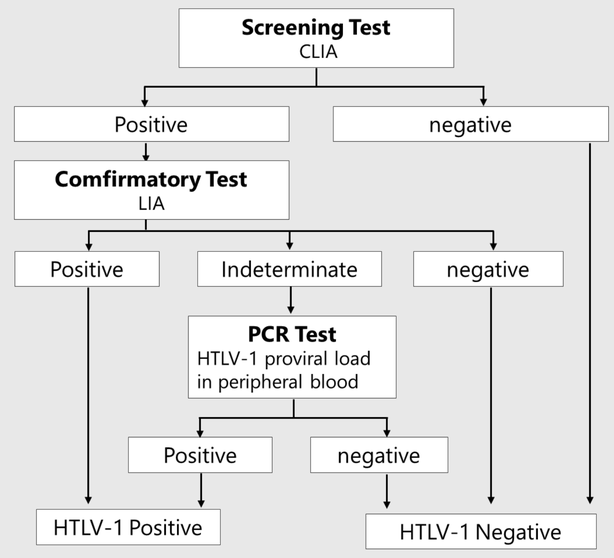


Figure 1. Flowchart for the Diagnosis of HTLV-1 Infection in Japan

Methods

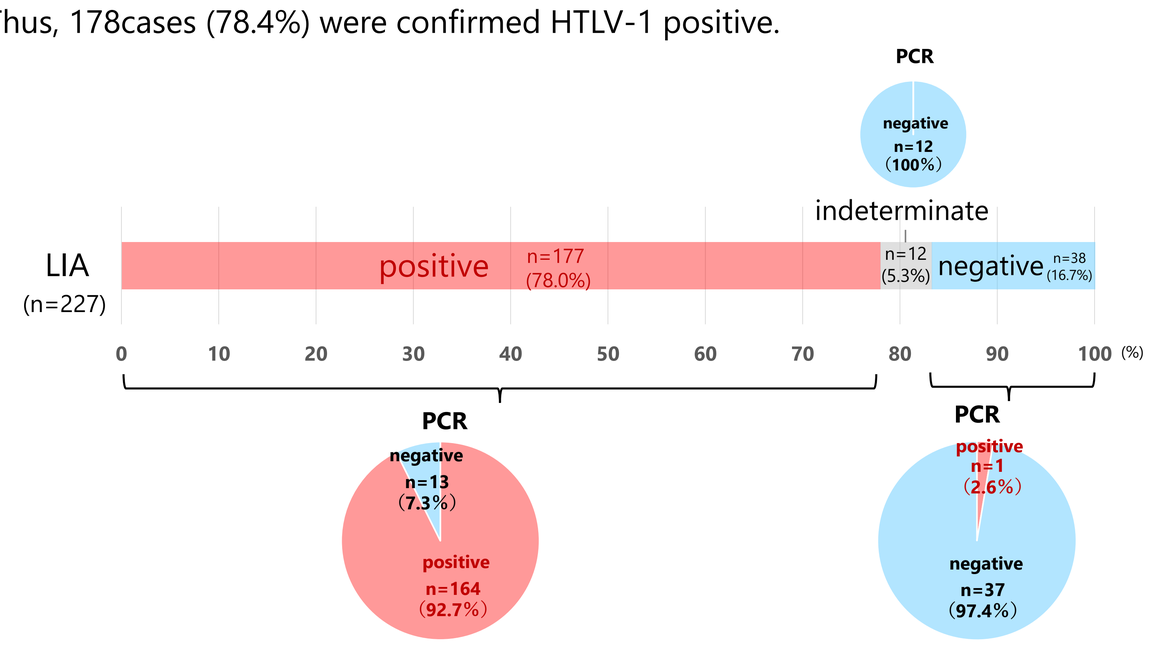
We retrospectively analyzed 227 pregnant women with positive screening results also tested confirmatory test (both LIA and PCR) from April 2019 to March 2025. Anti-HTLV-1 antibody was measured by a chemiluminescent immunoassay (CLIA) as the initial screening test (Table1).

Table 1. Reagents, Instruments, and Manufacturers: CLIA, LIA, and PCR

Method	Reagent	Instrument	Manufacturer
CLIA	HTLV Abbott	Alinity i System	Abbott Japan
LIA	INNO-LIA HTLV	—	Fujirebio
PCR	LightCycler® 480 Probes Master	LightCycler® 480	Roche Diagnostics

Results

Of the 227 cases, 177 (78.0%) were LIA-positive, and 12 (5.3%) were indeterminate, all of which were PCR-negative. One LIA-negative case was PCR-positive(Figure 2). Thus, 178cases (78.4%) were confirmed HTLV-1 positive.



PCR alone is **insufficient** to detect all HTLV-1 infections

current diagnostic protocol:
no PCR performed when LIA is negative
→ **Risk of missing HTLV-1 infections**

Figure 2. Summary of LIA and PCR Results

Higher CLIA values are associated with a higher probability of HTLV positivity.

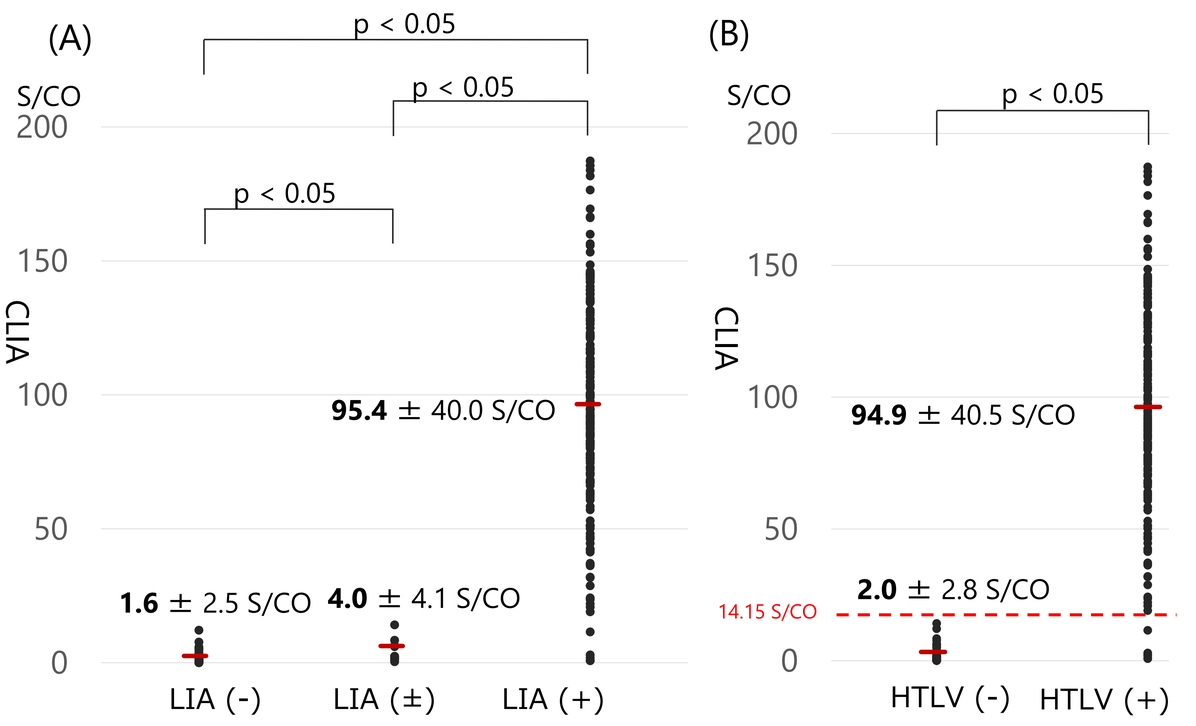


Figure 3. Comparison of the results by CLIA vs LIA and CLIA vs final result

(A) Comparison of the results by CLIA vs LIA :177 of LIA positive, 12 of indeterminate and 38 of negative groups.
(B) Comparison of the results by CLIA vs final result :178 of HTLV positive and 49 of negative groups.
Either LIA or PCR positive group means HTLV-positive.
The values are presented as mean ± SD, and statistical significance was calculated using the t-test.

CLIA values were significantly higher in PCR-positive cases, however, their correlation with proviral load was weak.(Figure 4).

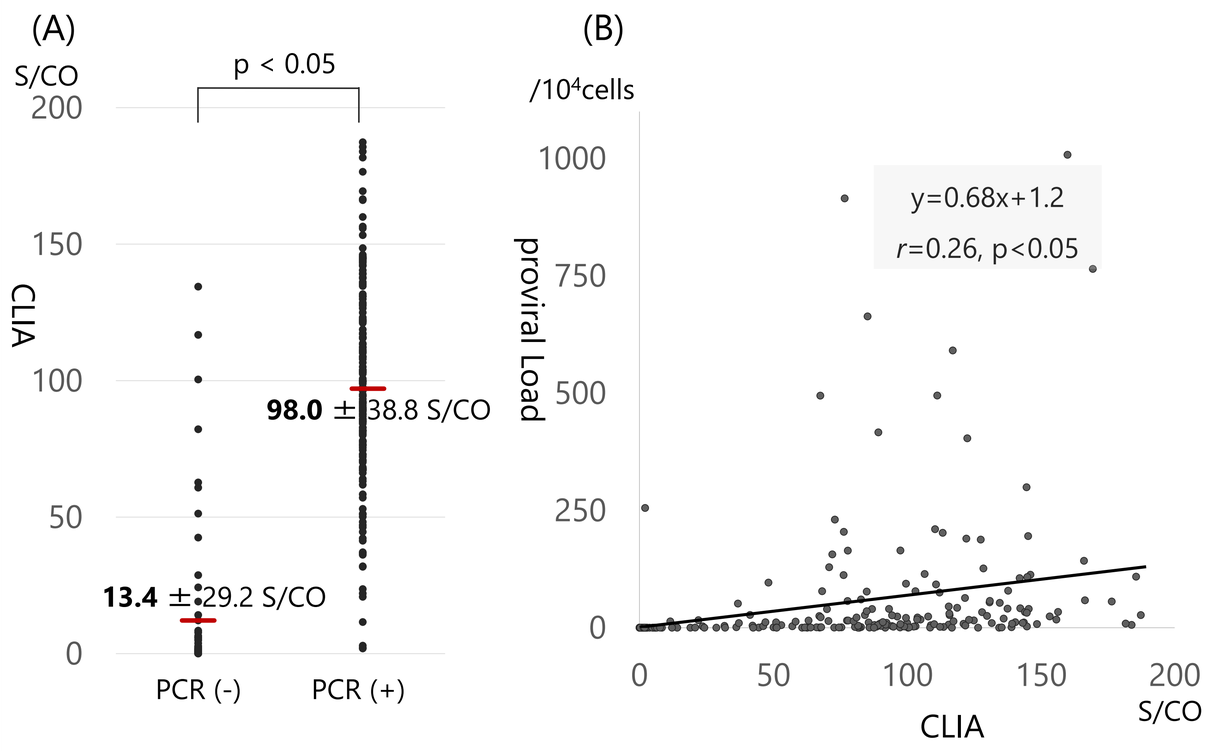


Figure 4. Comparison of the results by CLIA vs PCR and CLIA values vs HTLV-1 proviral Load

(A)Comparison of the results by CLIA vs PCR : 165 of PCR positive and 62 of negative group.
The values are presented as mean ± SD, and statistical significance was calculated using the t-test.
(B)Comparison of CLIA values vs HTLV-1 proviral load.
r : Pearson's correlation coefficient, statistical significance was calculated using the t-test.

Discussion

- The greater sensitivity of LIA compared to PCR may be attributable to the tendency to migration of the HTLV-1 genome into tissues, resulting in a reduced viral burden in peripheral blood lymphocytes, or to the presence of mutations or deletions within the HTLV-1 genome.
- We observed one case that was negative by LIA but positive by PCR, indicating that relying solely on LIA, which is based on visual assessment of line intensity, may fail to identify all HTLV-1 carriers.
- Several studies have reported that the high maternal HTLV-1 proviral load is a risk factor for mother-to-child transmission, and PCR testing is also considered important[1)2)].

Conclusion

High CLIA values are predictive of confirmatory test positivity. Using LIA alone as a confirmatory test may miss HTLV-1 carriers.

Combining LIA and PCR is essential for accurate diagnosis and prevention of mother-to-child transmission.

References

1) Ureta-Vidal A, et al. Mother-to-child transmission of human T-cell-leukemia/lymphoma virus type I: implication of high antiviral antibody titer and high proviral load in carrier mothers. Int J Cancer. 1999 Sep 9;82(6):832-6.
2)Paiva AM , et al. Risk factors associated with HTLV-1 vertical transmission in Brazil: longer breastfeeding, higher maternal proviral load and previous HTLV-1-infected offspring. Sci Rep. 2018 May 17;8(1):7742.