Evaluation of the (Gen-Probe) Aptima HIV-1 RT Quantitative Assay on HIV-1 Subtypes

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BACKGROUND

The Hologic Aptima HIV-1 Quant Dx Test, currently under development for use on the Gen-Probe PanVeris™ Platform, is designed to quantify HIV-1 viral RNA in plasma from HIV-1 infected individuals. The assay is intended for use in clinical monitoring of viremic response to antiretroviral treatments as monitored by changes in plasma HIV-1 RNA levels. The highly complex genetic diversity of HIV-1 virus presents a challenge to developers of HIV-1 nucleic acid tests, as each manufacturer targets different regions of the viral genome and uses a variety of multiplex approaches to allow detection of all subtypes. The performance of the Aptima HIV-1 Quant Dx was evaluated using a comprehensive panel of cultured virus and plasma samples collected worldwide and compared to that of two FDA cleared assay platforms: the Roche COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 v2.0 and the Abbott RealTime HIV-1 tests. Basematrix to approximately 1E4 copies/ml for testing, and the results of each of the HIV-1 subtypes A, B, C, D, CRF01_AE and CRF02_AG at dilutions ranging from 1E2 to 1E6 copies/ml. Plasma specimens were diluted in

METHODS

Study Design: The performance of the Hologic Aptima HIV-1 Quant Dx on the Panther system was assessed for precision, accuracy, linear dynamic range and Lower Limit of Detection (LLD). The ability of the assay to accurately quantify HIV-1 subtypes was evaluated on 171 well-characterized HIV-1 cultured virus obtained from Walter Reed Army Institute of Research (WRAIR) (Brown et al., 2005); EQAPOOL (Manak et al., 2010); PanVeris HIV-1 Panel (Droeger et al., 2002) and a CRF02_AG isolate at 7 concentrations with 30 replicates tested at each concentration. Probit Analysis of the data calculates the LLOD at 3.1 copies/ml at the 50% level and 15 copies/mL at the 95% level (Figure 2).

RESULTS

Subtype Specificity: A total of 171 HIV-1 culture isolates and 105 clinical specimens from 33 countries representing all the major Group M and Group O HIV-1 subtypes were tested for each subtype, with various recombinants grouped by category. Rec = recombinants.

Subtype B

The fully automated assay is easy to use with up to 120 samples tested in under four hours. The Hologic Aptima HIV-1 Quantitative Assay on HIV-1 Subtypes.

Table 1. Geographic Distribution of HIV-1 Subtypes Tested.

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The Hologic Aptima HIV-1 Quant Dx Test performed on the automated Panther System demonstrated excellent precision, sensitivity and linear dynamic range.

The Hologic Aptima HIV-1 Quant Dx having 99.8% sensitivity for all clinical specimens and complex recombinants. The HMB Group O viral isolates were also quantified well by all three tests.

The fully automated assay is easy to use with up to 120 samples tested in under four hours. The use of hypolipidic reagents improves reagent stability which is useful when shipping to temperature challenging settings.

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Figure 1. Linearity and Subtype Performance of the Hologic Aptima HIV-1 RNA Qual Dx Assay.

Figure 2. Lower Limit of Detection (LLD).

Figure 3. Box-and-Whisker Plot of the Log Differences in HIV-1 Viral RNA Quantitation with respect to the Hologic Aptima HIV-1 Quant DX Assay. Log differences of the HIV-1 RNA concentrations between the Hologic Aptima HIV-1 Quant Dx and the Abbott RealTime Test were calculated.

Figure 4. Proportional Sensitivity of the Hologic Aptima HIV-1 Quant Dx Test. For each subtype, with various recombinants grouped by category. Rec = recombinants.

Figure 5. Proportional Specificity of the Hologic Aptima HIV-1 Quant Dx Test. For each subtype, with various recombinants grouped by category. Rec = recombinants.

Figure 6. Proportional Efficiency of the Hologic Aptima HIV-1 Quant Dx Test. For each subtype, with various recombinants grouped by category. Rec = recombinants.

Figure 7. Proportional Accuracy of the Hologic Aptima HIV-1 Quant Dx Test. For each subtype, with various recombinants grouped by category. Rec = recombinants.

Figure 8. Proportional Lower Limit of Detection (LLD) of the Hologic Aptima HIV-1 Quant Dx Test. For each subtype, with various recombinants grouped by category. Rec = recombinants.