Evaluation of the Xpert® HIV-1 Qual Assay and Xpert® HIV-1 Viral Load Assay

Jeanne A. Jordan, PhD, HCLD(ABB)
Professor
The George Washington University
School of Public Health

Evaluation of the Xpert® HIV-1 Viral Load Assay*^

JA Jordan[1], AHB Wu[2], K Templeton[3], JC Plantier[4]

[1]GWU SPH, Washington, DC, [2]UCSF, San Francisco, CA, [3]NHS Lothian, Edinburgh, UK, [4]Rouen University Hospital, Rouen Cedex, France

Xpert® HIV-1 Viral Load Evaluation:

Unique features of this assay:

- Single target – 3' end of the 5' LTR
- Accepts fresh and frozen plasma
- Uses both a low & high IQC, traceable to WHO international standard

Demographics:

724 eligible subjects
205 (28.3%) females & 519 (71.7%) males
Average age 44.5 ± 11.3 years (range 18-83 yr)

Inclusion Criteria:

- Clinician ordered HIV-1 Viral Load (VL)
- ≥18 years of age
- Known ART status
- Plasma same freeze/thaw cycle

Exclusion Criteria:

- Previously enrolled in study
- Specimen not properly collected

Results:

Assay Performance:

Overall rate of assay success was 96.9%
Linear range: 40-10^7 copies/mL (cp/mL)
Validated across Group M subtypes, Groups N & O

Specificity in HIV-1 sero-negative blood band donors:

100% specificity;
109/109 were HIV-1 negative,
95% CI: 96.7-100.0

Results:

All Eligible Specimens by Result Classification

		Abbott RealTime-HIV-1 Assay			
		HIV Detected ≥40 cp/mL	HIV Detected <40 cp/mL	HIV Not Detected	Total
Xpert HIV-1 VL	HIV Detected ≥40 cp/mL	390	2	1	393
	HIV Detected <40 cp/mL	87	38	50	175
	HIV Not Detected	17	25	114	156
	Total	494	65	165	724

Concordance=74.9%

Consecutive Specimens Collected Without Bias by Result Classification

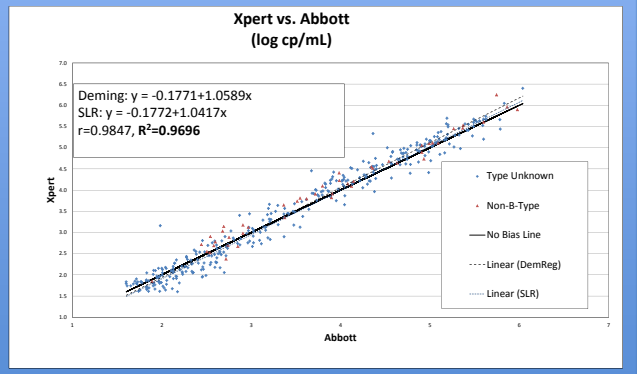
		Abbott RealTime-HIV-1 Assay			
		HIV Detected ≥40 cp/mL	HIV Detected <40 cp/mL	HIV Not Detected	Total
Xpert HIV-1 VL	HIV Detected >40 cp/mL	97	2	1	100
	HIV Detected <40 cp/mL	24	34	50	108
	HIV Not Detected	4	18	110	132
	Total	125	54	161	340

Concordance=70.9%

Specimens with HIV-1 VL Results for Either Assay Not Quantified by the Other:

No. Specimens	Xpert (cp/mL)	Abbott (cp/mL)	Values (cp/mL)
4	Not Detected	>40	Abbott: 43, 44, 44, 81
2	>40	Detected <40	Xpert: 40, 43
1	>40	Not Detected	Xpert: 51
24	Detected <40	>40	Abbott: 40-167 (median 64)

Regression Analysis



R^2=0.9696, *Type unknown: US & European specimens thought to be B subtype

SUMMARY:

Good overall agreement between Xpert® HIV-1 VL and Abbott RealTime HIV-1 Assays

- Slightly lower quantification with Xpert® at low end
- Slightly higher overall detection rate with Xpert®

Xpert® allows flexibility for testing both frozen & fresh plasma specimens
Xpert® allows for HIV-1 VL testing nearer the patient reducing TAT and loss to follow up

*CE-IVD mark for *in vitro* diagnostic use. ^For Investigational Use Only in the U.S.

Acknowledgement: Cepheid Inc. supported HIV-1 VL Study

Evaluation of the Xpert® HIV-1 Qual Assay*^

JA Jordan[1], S Carmona[5], A Tiam[6], J Safrit[7]
[1]GWU SPH, Washington, DC, [5]NHLS, Johannesburg, S. Africa, [6]NHS, Lesotho, [7]EGPAF, Lesotho

Xpert® HIV-1 Qualitative Evaluation:

Age Distribution:

Category	N	%
~6 weeks - 18 months	258	62.2
>18 months - 7years	29	7.0
>7 years	128	30.8
Total	**415**	**100**

Demographics:

415 eligible subjects;
223 (53.6%) females, 186 (44.8%) males
505 specimens tested: 106 WB + 399 DBS

Results:

Whole Blood		Roche HIV-1 Qual - DBS		
		POS	NEG	Total
Xpert HIV-1 Qual - WB	POS	54	1[a]	55
	NEG	1[b]	50	51
	Total	55	51	106

WB Concordance: 104/106 (98.1%)
PPA: 98.2% (95% CI: 90.3-100)
NPA: 98.0% (95% CI: 89.6-100)

[a]Upon retesting, specimen was Xpert POS / comparator POS.
[b]Upon retesting, specimen was Xpert NEG / comparator POS.

DBS		Roche HIV-1 Qual - DBS		
		POS	NEG	Total
Xpert HIV-1 Qual - DBS	POS	194	3[a]	197
	NEG	9[b]	193	202
	Total	203	196	399

DBS Concordance: 387/399 (97.0%)
PPA: 95.6% (95% CI: 91.8-98)
NPA: 98.5% (95% CI: 95.6-99.7)

[a]Upon retesting, 1 of 3 specimens was Xpert NEG / comparator NEG, and 2 of 3 specimens were Xpert POS/comparator POS.
[b]Upon retesting, 5 of 9 specimens were Xpert POS / comparator POS, 3 of 9 specimens were Xpert NEG/comparator POS, and 1 of 9 was Xpert NEG/comparator NEG.

Whole Blood Workflow

1. Collect ≥100 µl whole blood and transfer to EDTA microtainer tube or lavender tube
2. Use the 1mL pipette to transfer 0.75 mL sample reagent into the cartridge
3. Use the transfer pipette to transfer 100 µl whole blood into the cartridge
4. Scan cartridge barcode
5. Load into GX and close door

DBS Workflow

1. Collect DBS with 60-70 µl whole blood per spot
2. Transfer one DBS into the sample reagent bottle and mix. Incubate in Thermomixer at 56°C, 500 rpm for 15 min
3. Transfer all liquid into chamber 3 with the 1 mL transfer pipette
4. Scan cartridge barcode
5. Load into GX and close door

Specificity in HIV-1 sero-negative adult blood donors:

100% specificity; 1014/1014 were HIV-1 negative, 95% CI: 99.6-100.0

- 512 WB and 502 DBS specimens were analyzed

SUMMARY:

Excellent agreement between the Xpert® and Roche HIV-1 Qual assays

Xpert® HIV-1 Qual is applicable for near patient testing with results available in under 2 hours, with the potential for immediate confirmatory testing for:

- Early infant diagnosis
- Screening of high-risk sero-negative adults

*CE-IVD mark for *in vitro* diagnostic use. ^Not available in the U.S.

Acknowledgement: Cepheid Inc. supported the HIV-1 Qual Study

- **Potential Applications**
  - Reference Laboratories
  - Hospitals
  - Urgent Clinics
  - Physician Offices
  - Antenatal Clinics
  - Non-for-Profit Community Care Centers
  - Mobile Clinics/ Vans
  - Outreach Programs
  - In-Home Testing

San Francisco AIDS Foundation Mobile HIV Testing
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Desmond Tutu Tester Truck
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US Ambassador and EGPAF Mozambique Mobile Clinic
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- **Improve Patient Care:** *Same day results support better clinical decisions and may reduce loss to follow up*
- **Increase Efficiency:** *Rapid results enable immediate intervention to save lives at birth and earlier adjustments to appropriate therapy*
- **Strengthen Communities:** *Quick decisions can help reduce morbidity or mortality in HIV-infected infants and reduce drug resistance*