ANALYTICAL EVALUATION OF THE ACCESS ANTI-HCV ASSAY ON THE DXI 9000 ACCESS IMMUNOASSAY ANALYZER FOR THE DETECTION OF HEPATITIS C VIRUS ANTIBODY

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BACKGROUND

Beckman Coulter, Inc. developed a fully automated anti-HCV assay using low sample volume (3 µL) on the recently CE-marked DxI 9000 ACCESS Immunoassay Analyzer. This evaluation assessed within-laboratory imprecision, reproducibility, analytical specificity, as well as method agreement with the Abbott ARCHITECT Anti-HCV assay.

METHODS

20-day imprecision and five-day reproducibility studies were performed based on CLSI EP05-A3, using contrived serum or plasma samples from pool of HCV negative or positive donors. Analytical specificity was evaluated using CLSI EP07 for cross-reactivity and interference studies. Each potential cross-reactant was represented by ten specimens and included specimens from viral infections, auto-immune diseases, non-viral liver diseases, post-vaccination patients and pregnant women. For interference studies, known concentrations of potential interferents were added to patient samples and compared to controls. A concordance study was performed between ACCESS anti-HCV assay and Abbott ARCHITECT Anti-HCV assay using samples from hospitalized patients (n=1533) and presumed HCV antibody (Ab) positive patients (n=523). Supplementary testing using immunoblot and/or HCV PCR was also performed, as necessary, to provide additional sample status information.

RESULTS

Within-laboratory imprecision and reproducibility

The ACCESS anti-HCV assay met stated claims for within-laboratory imprecision, demonstrating combined and within-site reproducibility below 0.100 S/CO SD for negative samples and below 10.0% CV for positive samples.

Analytical specificity

The ACCESS anti-HCV assay demonstrated excellent analytical specificity with 100% obtained, testing 360 samples for potential cross-reactivity. Samples containing up to 1000 mg/dL hemoglobin, 15 g/dL total protein, 43 mg/dL bilirubin, 3510 ng/mL biotin, or 37 mmol/L intralipid showed no interference.

Method agreement

Concordance analysis with the Abbott ARCHITECT Anti-HCV assay on 2056 patients showed a negative percent agreement of 98.9% (1482/1498) and a positive percent agreement of 98.7% (551/558). Six PCR-positive hospitalized patient samples were not detected by the Abbott ARCHITECT Anti-HCV assay and were detected by the ACCESS anti-HCV assay, suggesting a better sensitivity with these 6 samples compared to the Abbott ARCHITECT Anti-HCV assay.

CONCLUSION

The newly developed ACCESS anti-HCV assay for use on the DxI 9000 ACCESS Immunoassay analyzer demonstrated excellent analytical performance and demonstrated strong agreement with currently marketed anti-HCV assays.

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Table 1 – Within-Laboratory imprecision

			Repeatability (Within-Run)		Between-Run		Between-Day		Within-Laboratory	
Sample	N	Mean (S/CO)	SD (S/CO)	%CV	SD (S/CO)	%CV	SD (S/CO)	%CV	SD (S/CO)	%CV
Negative Control	80	0.07	0.004	6.5	0.002	3.0	0.000	0.0	0.005	7.1
Positive Control	80	3.07	0.129	4.2	0.125	4.1	0.044	1.4	0.185	6.0
Serum 1	120	0.08	0.004	4.9	0.002	2.7	0.000	0.0	0.004	5.6
Serum 2	120	0.80	0.036	4.4	0.015	1.9	0.026	3.3	0.047	5.8
Serum 3	120	1.26	0.062	4.9	0.056	4.4	0.015	1.2	0.085	6.7
Serum 4	120	8.73	0.423	4.8	0.350	4.0	0.000	0.0	0.549	6.3
Plasma 1	120	0.04	0.004	10.0	0.000	0.0	0.000	1.0	0.004	10.0
Plasma 2	120	0.81	0.040	4.9	0.012	1.5	0.031	3.8	0.052	6.4
Plasma 3	120	1.27	0.068	5.3	0.044	3.5	0.023	1.8	0.084	6.6
Plasma 4	120	29.26	1.630	5.6	0.888	3.0	1.231	4.2	2.227	7.6

Table 2 – Reproducibility study

			Repeatability (Within-Run)		Reproducibility	
Sample	N	Mean (S/CO)	SD (S/CO)	%CV	SD (S/CO)	%CV
Serum 1	90	0.08	0.006	7.9	0.010	13.6
Serum 2	90	0.72	0.028	3.9	0.037	5.2
Serum 3	90	1.14	0.055	4.8	0.071	6.2
Serum 4	90	7.94	0.329	4.1	0.381	4.8
Plasma 1	90	0.04	0.005	12.6	0.010	28.1
Plasma 2	90	0.74	0.067	9.0	0.072	9.7
Plasma 3	90	1.20	0.049	4.1	0.084	7.1
Plasma 4	90	26.52	1.534	5.8	1.859	7.0

Table 3 – Analytical specificity

Category	Number of samples tested	Number of Reactive samples	Number of Non-reactive samples
Epstein-Barr virus (VCA IgG or VCA IgM)	10	0	10
Cytomegalovirus (CMV IgG and/or IgM)	10	0	10
Herpes simplex virus (HSV1/2 IgG and/or IgM)	10	0	10
Varicella-zoster virus (VZV IgG and/or IgM)	10	0	10
Human T-cell Lymphotrophic Virus (HTLV I & II)	10	0	10
Human Immunodeficiency Virus (HIV)	10	0	10
Hepatitis A Virus (HAV)	10	0	10
Hepatitis B Virus (HBV)	10	0	10
Hepatitis D Virus (HDV)	10	0	10
Hepatitis E Virus (HEV)	10	0	10
Alcohol liver disease	10	0	10
Cirrhosis	10	0	10
Primary biliary cirrhosis	10	0	10
Other Non-Viral Liver Disease (elevated transaminase)	10	0	10
Fatty Liver disease	10	0	10
Non-alcoholic Steato hepatitis (NASH)	10	0	10
Flavivirus (Dengue)	10	0	10
Flavivirus (West Nile)	10	0	10
Flavivirus (Zika)	10	0	10
Parvovirus B19	10	0	10
HAV vaccination	10	0	10
HBV vaccination	10	0	10
Influenza post-vaccination	10	0	10
HAMA	10	0	10
Anti-Nuclear Antibody (ANA)	10	0	10
Auto-immune hepatitis	10	0	10
Rheumatoid Factor	10	0	10
Systemic lupus erythematosus (SLE)	10	0	10
Pregnancy multipara	10	0	10
Pregnancy first trimester	10	0	10
Pregnancy second trimester	10	0	10
Pregnancy third trimester	10	0	10
Transplant / Transplant recipient	10	0	10
Dialysis patients	10	0	10
Hemophiliac / Clotting factor	10	0	10
Anti-E.Coli (E.Coli infection)	10	0	10

Table 4 – Method agreement

NPA = 98.9% (1482/1498)
PPA = 98.7% (551/558)

Presumed HCV Ab positive		Abbott ARCHITECT Anti-HCV assay		
		Repeat Reactive	Non-reactive	Total
ACCESS anti-HCV assay	Repeat Reactive	517	0	517
	Non-Reactive	4*	2	6
	Total	521	2	523

Hospitalized Patients		Abbott ARCHITECT Anti-HCV assay		
		Repeat Reactive	Non-reactive	Total
ACCESS anti-HCV assay	Repeat Reactive	34	16***	50
	Non-Reactive	3**	1480	1483
	Total	37	1496	1533

* Samples were found to be PCR-negative and immunoblot negative (2), indeterminate (1) or positive (1) upon supplementary testing.
** Samples were found to be PCR-negative and immunoblot negative (2) or indeterminate (1) upon supplementary testing.
*** 6/16 samples were found to be PCR-positive upon supplementary testing.