Evaluation of the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) Assay

Introduction

The Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay is an *in vitro* immunoassay for the qualitative determination of antibodies to the human immunodeficiency virus type 1, including Group O, and/or type 2 in serum or plasma (potassium EDTA, lithium or sodium heparinised, ACD) using the ADVIA Centaur System. The ADVIA Centaur HIV assay was evaluated by the NRL in collaboration with Gribbles Pathology (Vic) Pty Ltd.

Methods

Specificity

5126 specimens from a single blood donor population and 1126 specimens from a single diagnostic population were tested on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay. All samples initially reactive were retested in duplicate. Samples repeatedly reactive were tested in the NRL HIV confirmatory algorithm to determine the true status. Specimens that were confirmed as positive were excluded from the specificity and negative delta calculations.

Sensitivity

A total of 284 confirmed anti-HIV positive specimens were tested on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay: 244 specimens were anti HIV-1 positive and 40 were anti HIV-2 positive. Sensitivity and positive delta values were calculated for the overall results for the anti HIV positive samples; positive delta values were also calculated separately for the anti HIV-1 and anti HIV-2 positive samples.

A total of 74 specimens, collected as a series of sequential samples from seven individuals undergoing HIV seroconversion were also tested. The results of testing these seven seroconversion panels on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay were compared with the results of testing the same panels on the benchmark assay (BMA). The mean difference in detecting a reactive sample was determined

False Reactivity

Forty-five specimens that had given falsely reactive results on previously evaluated anti-HIV assays were tested on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay. Data from testing these samples were used to determine the degree of common false reactivity between the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay and these other currently registered anti-HIV assays.

Reproducibility

A QC sample of appropriate reactivity for the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay was selected and tested at prescribed intervals. A total of 134 replicates of the QC sample were tested. Reproducibility was assessed by determining mean, standard deviation (S.D.) and coefficient of variation (C. V.) of the 134 replicates; outlying results were identified using Grubb's test.

Results

Specificity

Blood Donor Samples

Five of 5126 specimens from a single blood donor population were repeatedly reactive on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay. None of the repeat reactors was confirmed positive. This gave a specificity of 99.90% and a negative delta value of 4.0.

Table 1: Results of testing anti-HIV negative blood donor samples on the Bayer ADVIA Centaur HIV 1/O/2 Enhancde (EHIV) assay (with corresponding specificity and delta values).

Samples Tested (n)	Initial Reactors (n)	Repeat Reactors (n)	
		True Positives	False Positives
5126	8	0	5

Specificity	**99.90% (95%CI 99.76% - 99.96%)**
δ value	**– 4.01**

Anti-HIV Negative Diagnostic Samples

Four of 1126 specimens from a single diagnostic population were repeatedly reactive on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay. Three of the repeatedly reactive samples were confirmed positive for HIV antibodies, and were excluded from the calculations. This gave a specificity of 99.91% and a negative delta value of 12.9.

Table 2: Results of testing presumed anti-HIV negative diagnostic samples on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay (with corresponding specificity and delta values).

Samples Tested (n)	Initial Reactors (n)	Repeat Reactors (n)	
		True Positives	False Positives
1126	4	3	1

Specificity	**99.91% (95% CI 99.42 – 99.99%)**
δ value	**– 12.92**

Sensitivity

Confirmed anti HIV Positive Samples

All 244 confirmed anti HIV-1 positive and all 40 confirmed anti HIV-2 positive samples were reactive on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay. This gave an estimated sensitivity of 100% and positive delta values of >20 for anti HIV-1 and anti HIV-2 and an overall positive delta value of >20.

Table 3: Results of testing anti-HIV positive samples on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay (with corresponding sensitivity and delta values).

Type of Sample	Number of Positive Samples Tested	Number Correct	δ Value
Anti HIV-1 Positive	244	244	>20
Anti HIV-2 Positive	40	40	>20
TOTAL	**284**	**284**	**>20**

Sensitivity	**100% (95%CI 98.3% - 100%)**
δ value	**>20**

Seroconversion Samples

In five of the seven seroconversion panels the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay detected reactivity before the BMA. In the other two seroconversion panels the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay detected reactivity in the same sample as the BMA. The mean difference in seroconversion sensitivity was -1.57 samples (range 0 to -5 samples).

False Reactivity
Forty-three of 45 samples falsely reactive in previously evaluated assays were non-reactive on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay. Two of 26 samples falsely reactive on the Abbott PRISM HIV-1/2 ChLIA were also falsely reactive on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay.

Table 4: Results of testing falsely reactive samples on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay.

Assay Producing False Reactivity	Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) Assay		Samples Showing Common False Reactivity (n)
	Samples Tested (n)	Samples Non-reactive (n)	
Bio-Rad Genscreen HIV-1/2 EIA	5	5	0
Bio-Rad Genscreen Plus Ag/Ab EIA	1	1	0
Abbott PRISM HIV-1/2 ChLIA	26	24	2
Abbott Murex HIV Ag/Ab Combination EIA	7	7	0
Abbott ARCHITECT HIV Ag/Ab Combo Assay	4	4	0
Bio-Rad Access HIV 1/2 New ChLIA	2	2	0
TOTAL	**45**	**43**	**2**

Reproducibility
A total of 134 observations from 14 test runs for the QC sample Pelispy Type 38 demonstrated acceptable reproducibility (CV < 20%). No outliers were detected using Grubb's test.

Table 5: Results of testing the QC sample Pelispy Type 38 on the Bayer ADVIA Centaur HIV 1/O/2 Enhanced (EHIV) assay.

Test Runs (n)	Observations (n)	Mean Index	S.D.	C.V. (%)
14	**134**	**2.002**	**0.146**	**7.28**

This assay has since been registered on the Australian Register of Therapeutic Goods.

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