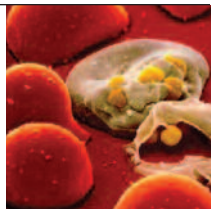
SeraCare Technical Bulletin 0902: HIV Antibody Test Sensitivity



Q: Why do seroconversion panels provide the best measure for evaluating HIV sensitivity?

A: Many laboratories are interested in using the "most sensitive" HIV antibody screening assay to avoid false negative test results. It is well known that HIV antibody is at its lowest level early in seroconversion, and thus most difficult to detect within two to four weeks after HIV infection when the immune response is just beginning. Once an infected person begins to produce antibodies, the titer rises quickly and remains high, even in later stages of the disease.

Early seroconversion samples differ in several ways from those obtained many months after infection:

- Early samples may contain HIV p24 antigen and IgM or IgA antibodies in addition to IgG; later samples most often contain only IgG antibodies
- Some HIV antibodies appear earlier than others: for instance, Western blot patterns indicate that p24 appears first, followed by gp120/160, and then other antibodies, with p31 usually coming up last
- The binding properties of early vs. late antibodies also differ; low affinity antibodies are produced early and high affinity antibodies are produced later in infection

Antibodies present in high titer samples (from later in infection) represent a much different mixture of high and low affinity antibodies to different viral protein epitopes than those from early infection. Thus, testing diluted samples from later in infection will yield a different estimate of test kit sensitivity than from testing naturally-occurring low titer samples from early seroconversion.[1]

ACCURUN® 1 Positive Control, and other ACCURUN HIV controls, are prepared in part by diluting a pool of high titer, anti-HIV samples with fully developed Western blot patterns, most likely collected many months or years after seroconversion. ACCURUN 1 is designed to monitor your test methods for changes in performance.

For evaluation of assay sensitivity to HIV antibodies, SeraCare recommends use of samples from a seroconversion series, or, naturally-occurring low titer, anti-HIV samples.

These samples are available from SeraCare as HIV Seroconversion Panels and Low Titer HIV Performance Panels.
See Table 2, page 3.

Naturally-occurring, low titer, anti-HIV samples may also be found by analyzing HIV test results according to the Fiebig classification, as shown in Table 1 on the following page.[2] Samples that can be classified as Fiebig III, IV or V are generally accepted as low titer anti-HIV.

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Table 1

Laboratory Stages of Primary HIV Infection Based on the Emergence of Viral Markers in 51 Seroconverting Plasma Donors

	Marker					Duration in days (95% CI)[a]	
Stage	RNA	P24 Antigen	Antibody (EIA) NS	Antibody (EIA) S	Western blot	Individual	Cumulative
I	+	–	–	–	–	5.0 (3.1, 8.1)	5.0 (3.1, 8.1)
II	+	+	–	–	–	5.3 (3.7, 7.7)	10.3 (7.1,13.5)
III	+	+	–	+	–	3.2 (2.1, 4.8)	13.5 (10.0, 17.0)
IV	+	+/–	–	+	I	5.6 (3.8, 8.1)	19.1 (15.3, 22.9)
V	+	+/–	+/–	+	+[b]	69.5 (39.7, 121.7)	88.6 (47.4, 129.8)
VI	+	+/–	+	+	+	Open-ended	Open-ended

[a] Calculations are based on a parametric Markov model
[b] Without p31 band
CI = Confidence interval
I = Indeterminate
NS = Not sensitive, refers to second-generation, not IgM-sensitive enzyme immunoassay (EIA)
S = Sensitive, refers to IgM-sensitive, third-generation EIA

References

1. Thorn RM et al. Assessment of HIV-1 screening test sensitivities using serially diluted positive sera can give misleading results. Transfusion 1989, 29(1): 78-80
2. Fiebig EW et al. Dynamics of HIV viremia and antibody seroconversion in plasma donors: implications for diagnosis and staging of primary HIV infection. AIDS 2003, 17:1871–1879

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Table 2: SeraCare HIV Seroconversion Panel and HIV Performance Panel Products

Product	Members/ Volume*	Cat No
HIV Seroconversion Panels		
HIV-1 Panel D	5 x 0.25 mL 5 x 1.0 mL	PRB904-00-0.25 PRB904-00-1.0
HIV-1 Panel H	6 x 1.0 mL	PRB908-00-1.0
HIV-1 Panel J	7 x 0.25 mL	PRB910-00-0.25
HIV-1 Panel L	6 x 0.25 mL	PRB912-00-0.25
HIV-1 Panel N	5 x 1.0 mL	PRB914-00-1.0
HIV-1 Panel P	6 x 1.0 mL	PRB916-00-1.0
HIV-1 Panel Q	5 x 0.25 mL	PRB917-00-0.25 (M)
HIV-1 Panel S	3 x 0.25 mL 3 x 1.0 mL	PRB919-00-0.25 PRB919-00-1.0
HIV-1 Panel V	4 x 1.0 mL	PRB922-00-1.0
HIV-1 Panel X	8 x 0.25 mL 8 x 1.0 mL	PRB924-00-0.25 PRB924-00-1.0
HIV-1 Panel Y	6 x 0.25 mL 6 x 1.0 mL	PRB925-00-0.25 PRB925-00-1.0
HIV-1 Panel Z	6 x 0.25 mL 6 x 1.0 mL	PRB926-00-0.25 PRB926-00-1.0
HIV-1 Panel AD	7 x 0.25 mL	PRB929-00-0.25
HIV-1 Panel AE	4 x 1.0 mL	PRB930-00-1.0
HIV-1 Panel AF	9 x 0.25 mL 9 x 1.0 mL	PRB931-00-0.25 PRB931-00-1.0
HIV-1 Panel AH	3 x 1.0 mL	PRB933-00-1.0
HIV-1 Panel AI	3 x 1.0 mL	PRB934-00-1.0
HIV-1 Panel AJ	7 x 0.25 mL	PRB935-00-0.25
HIV-1 Panel AL	6 x 1.0 mL	PRB937-00-1.0
HIV-1 Panel AN	9 x 1.0 mL	PRB939-00-1.0 (E)
HIV-1 Panel AP	8 x 1.0 mL	PRB940-00-1.0
HIV-1 Panel AR	4 x 0.25 mL 4 x 1.0 mL	PRB942-00-0.25 PRB942-00-1.0
HIV-1 Panel AS	7 x 1.0 mL	PRB943-00-1.0
HIV-1 Panel AT	6 x 1.0 mL	PRB944-00-1.0
HIV-1 Panel AU	6 x 1.0 mL	PRB945-00-1.0
HIV-1 Panel AV	4 x 0.25 mL 4 x 1.0 mL	PRB946-00-0.25 PRB946-00-1.0
HIV-1 Panel AW	4 x 1.0 mL	PRB947-00-1.0
HIV-1 Panel AX	4 x 0.25 mL 4 x 1.0 mL	PRB948-00-0.25 PRB948-00-1.0
HIV-1 Panel AY	4 x 1.0 mL	PRB949(M)-1.0
HIV-1 Panel AZ	4 x 0.25 mL 4 x 1.0 mL	PRB950-00-0.25 PRB950-00-1.0
HIV-1 Panel BA	6 x 0.25 mL 6 x 1.0 mL	PRB951-00-0.25 PRB951-00-1.0
HIV-1 Panel BB	6 x 1.0 mL	PRB952-00-1.0
HIV-1 Panel BC	4 x 1.0 mL	PRB953-00-1.0
HIV-1 Panel BD	7 x 1.0 mL	PRB954-1.0
HIV-1 Panel BE	5 x 1.0 mL	PRB955-1.0
HIV-1 Panel BF	5 x 1.0 mL	PRB956-1.0
HIV-1 Panel BG	7 x 1.0 mL	PRB957-1.0
HIV-1 Panel BH	6 x 1.0 mL	PRB958-1.0
HIV-1 Panel BI	7 x 1.0 mL	PRB959-1.0
HIV-1 Panel	9 x 1.0 mL	PRB960-1.0
HIV-1 Panel	9 x 1.0 mL	PRB961-1.0
HIV-1 Panel	6 x 1.0 mL	PRB962-1.0
HIV-1 Panel	7 x 1.0 mL	PRB963-1.0
HIV-1 Panel	6 x 1.0 mL	PRB964-1.0
HIV-1 Panel	6 x 1.0 mL	PRB965-1.0
HIV-1 Panel	10 x 1.0 mL	PRB966-1.0
HIV Performance Panels		
Anti-HIV-1 Low Titer	10 x 1.0 mL	PRB108(M)-1.0
Anti-HIV-1 Mixed Titer	25 x 0.25 mL	PRB204-0.25
Anti-HIV-1 Mixed Titer	21 x 1.0 mL	PRB204(M)-1.0
HIV-1 Incidence/Prevalence	15 x 1.0 mL	PRB601-1.0
HIV-1 Group O	5 x 1.1 mL	PRD301-1.1
HIV Subtype Infectivity Panel	20 x 1.0 mL	PRD320-1.0
HIV RNA Genotype	10 x 1.1 mL	PRD202-1.1
Worldwide HIV	18 x 1.0 mL	WWRB350-1.0

[M] = Modified [E] = Extended

* Unless otherwise noted, configuration includes one set of members

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