

Diagnostic Tests for HIV

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HIV DIAGNOSTIC TESTS

CDC/APHL 2014 HIV Diagnostic Algorithm

Laboratory Testing for the Diagnosis of HIV Infection

Updated Recommendations

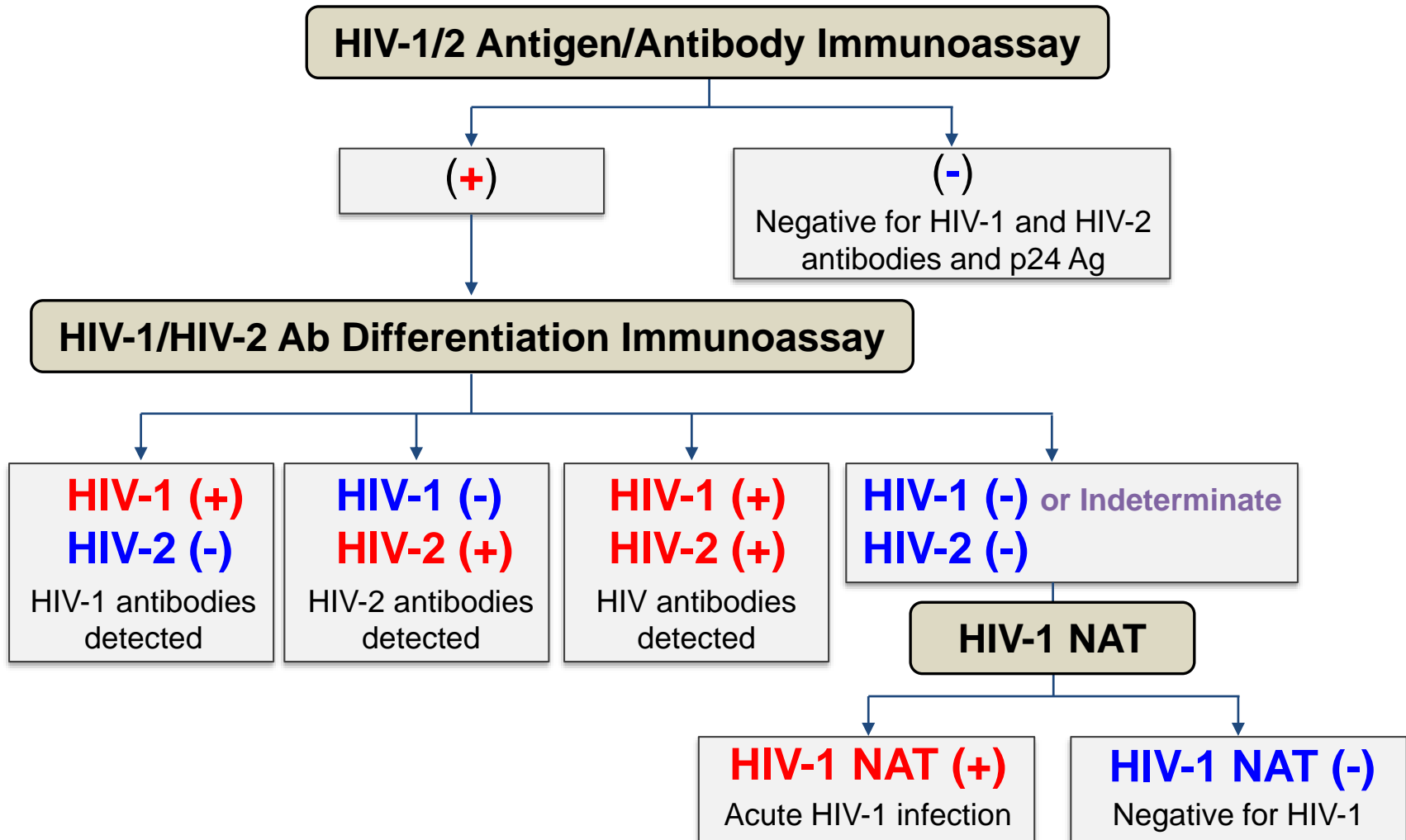


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CDC and Association of Public Health Laboratories 2014 Laboratory Testing for the Diagnosis of HIV Infection



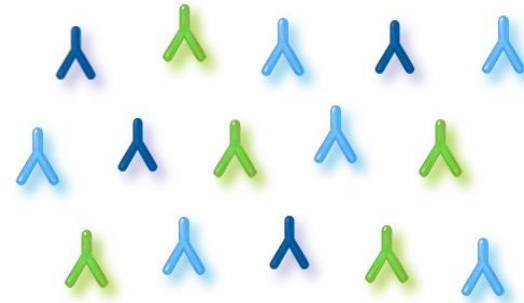
HIV DIAGNOSTIC TESTS
Fourth Generation HIV-1/2 Antigen-Antibody Assay

Fourth Generation HIV Antigen-Antibody Test

HIV p24 Antigen

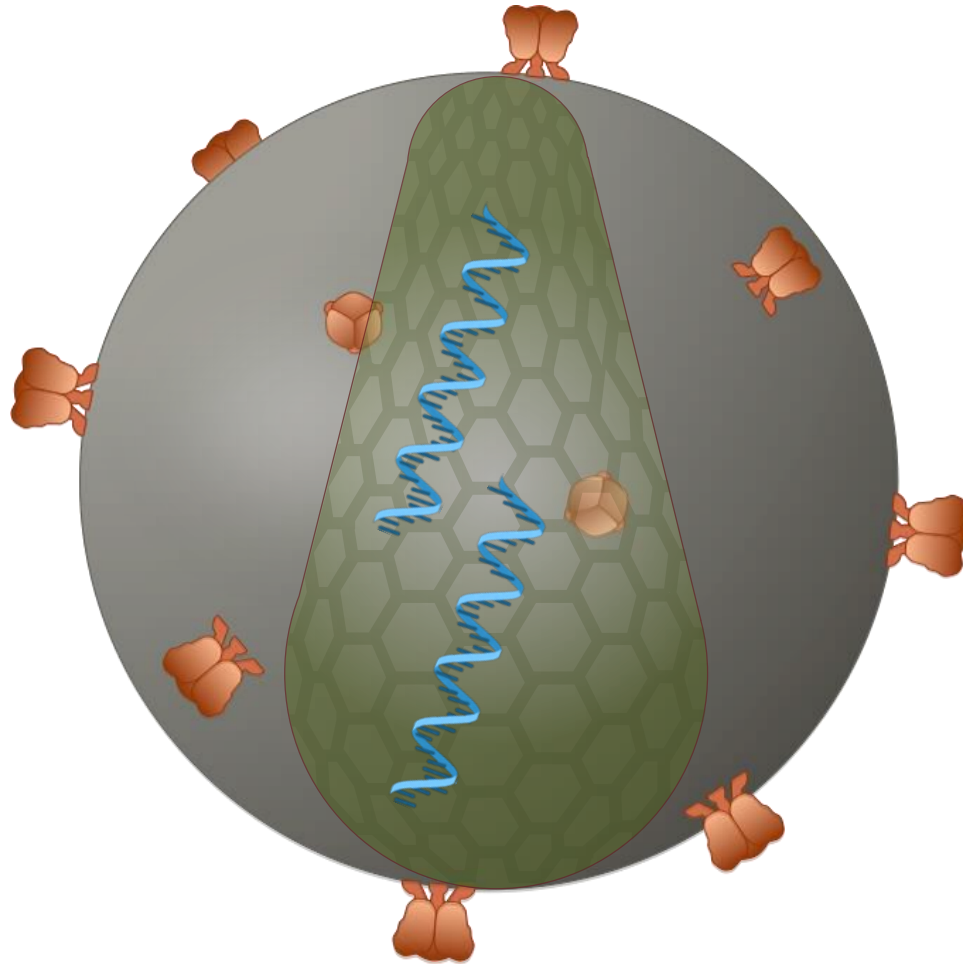


HIV Antibodies

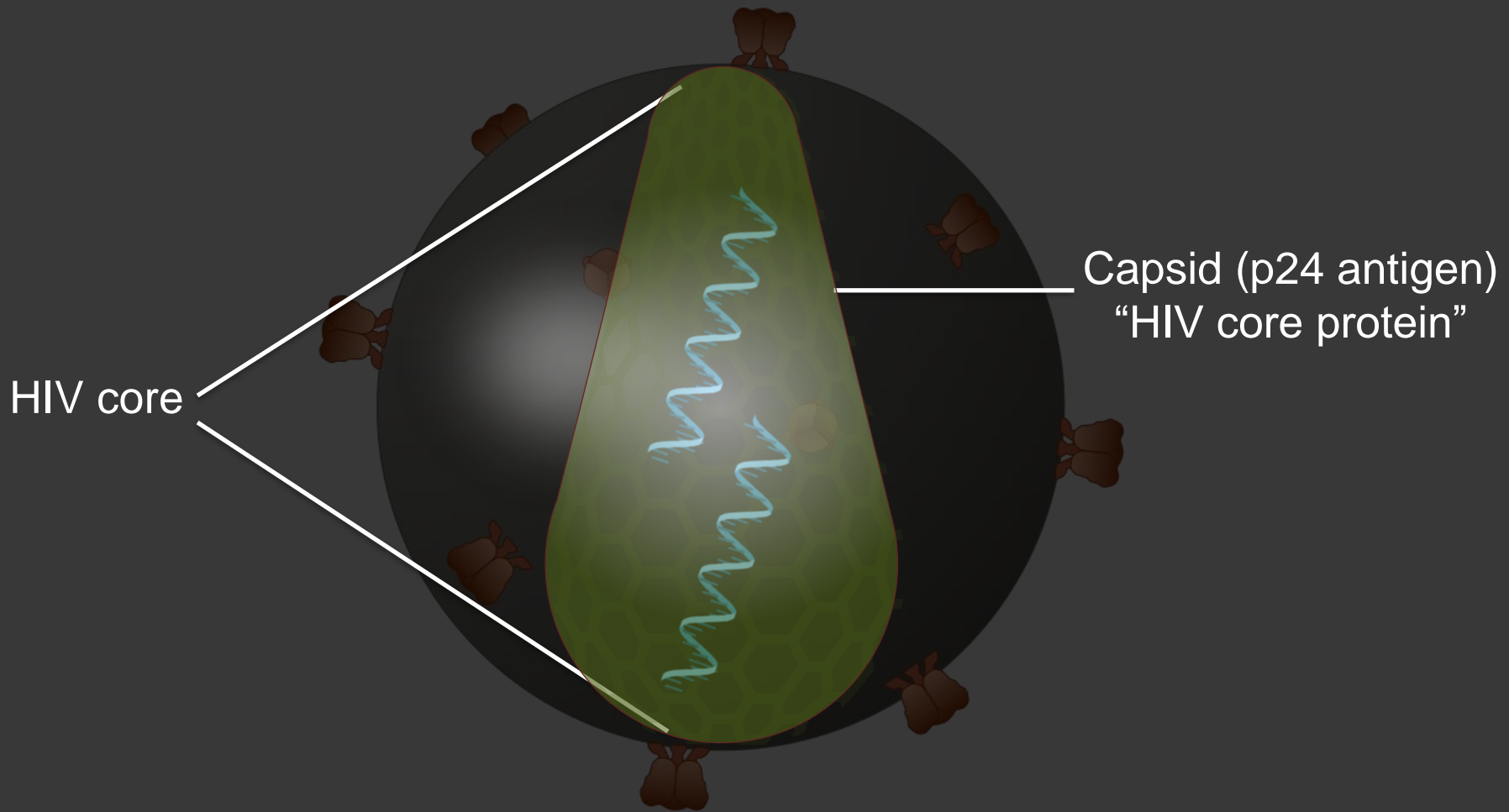


Detects HIV-1 p24 antigen and antibodies to HIV-1 and HIV-2

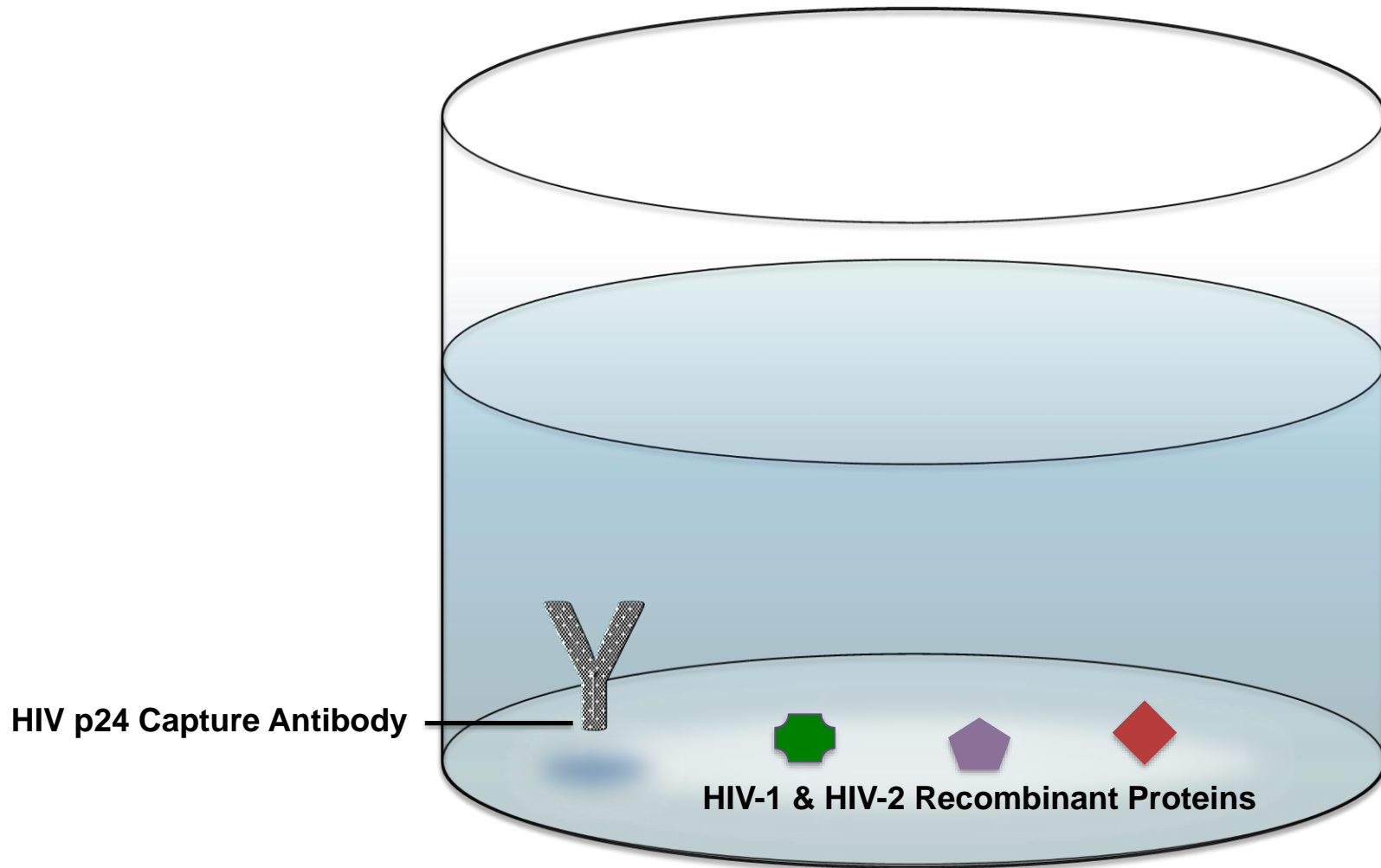
HIV



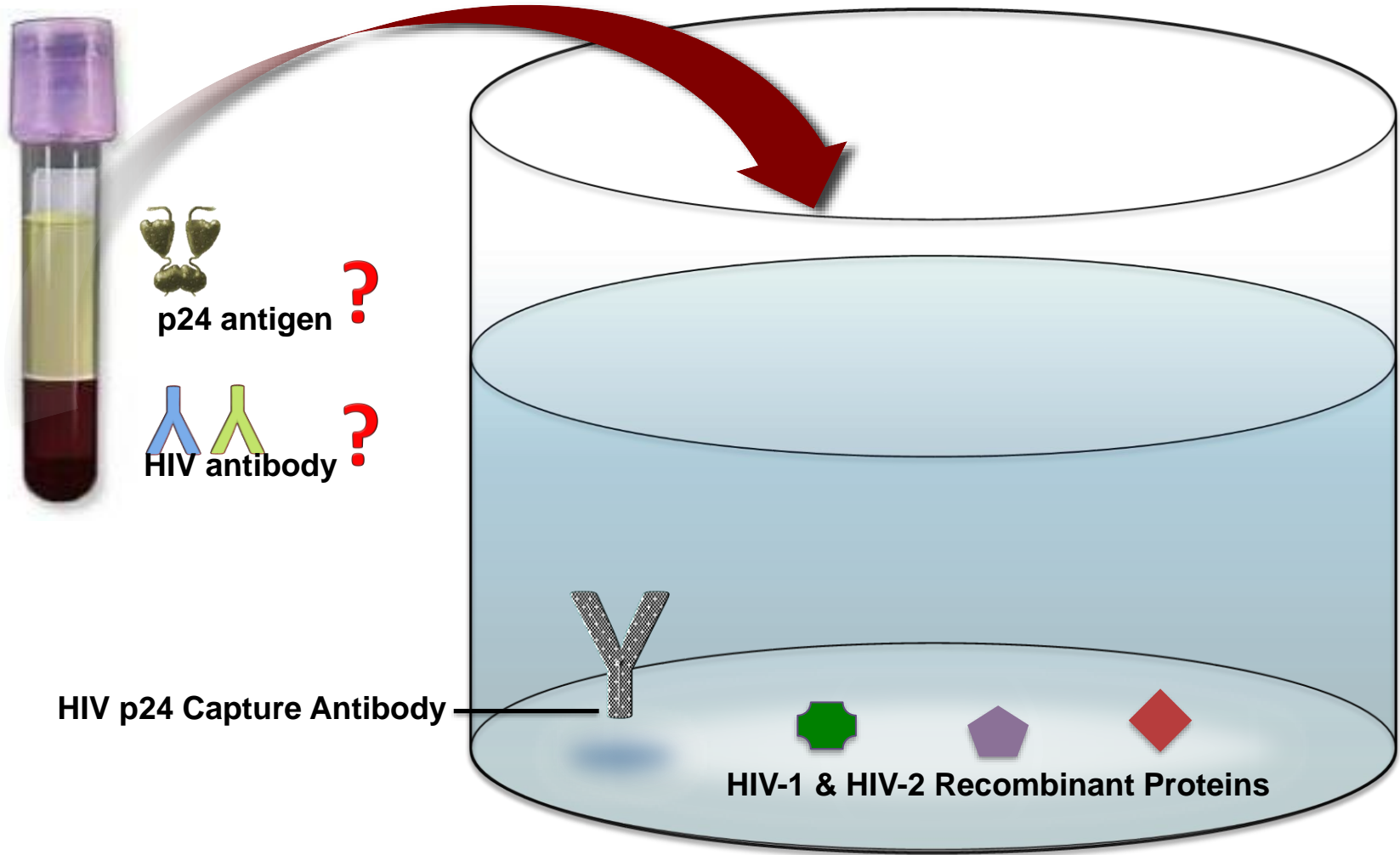
HIV Core and p24 Antigen



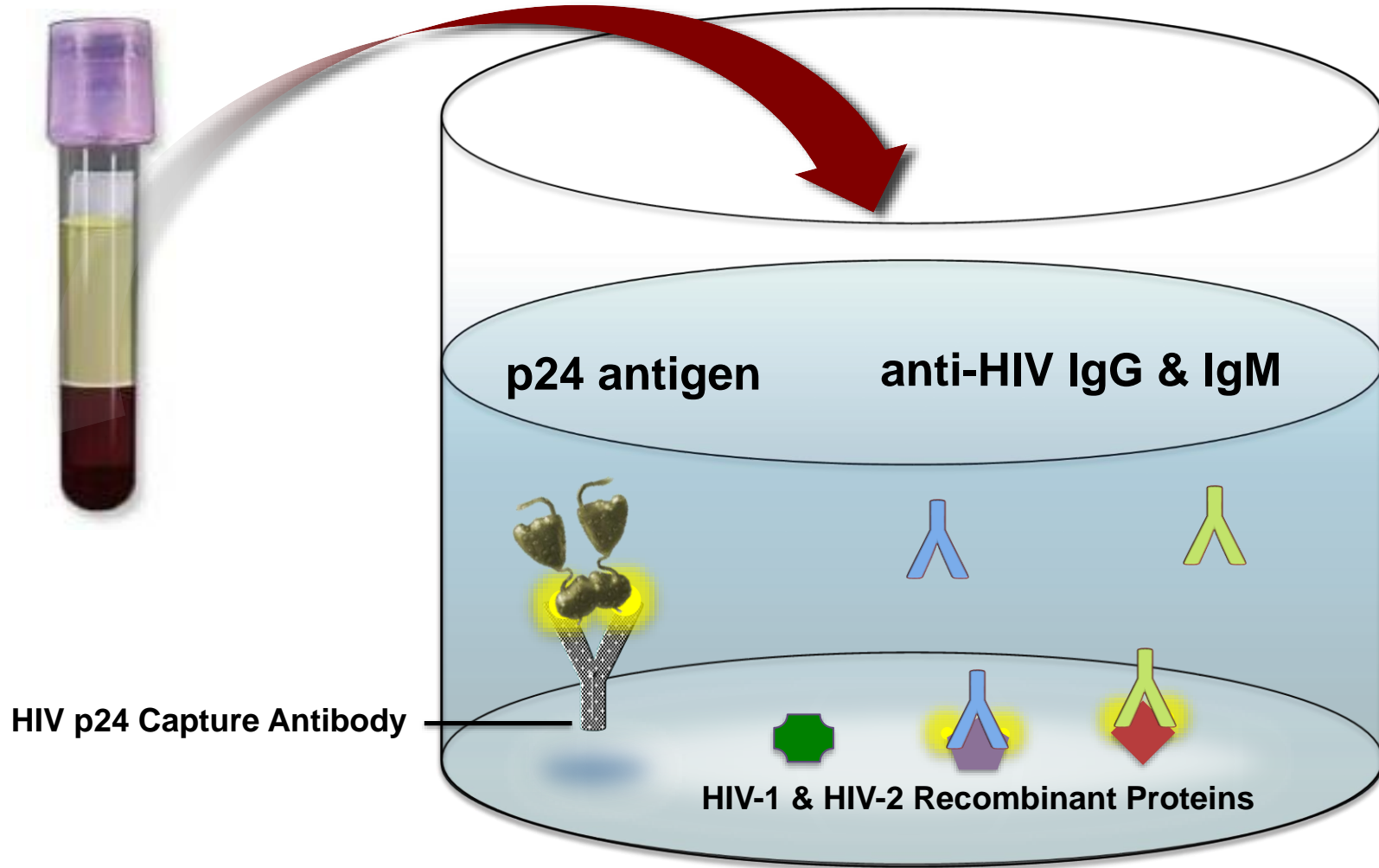
Fourth-Generation HIV Antigen-Antibody Immunoassay



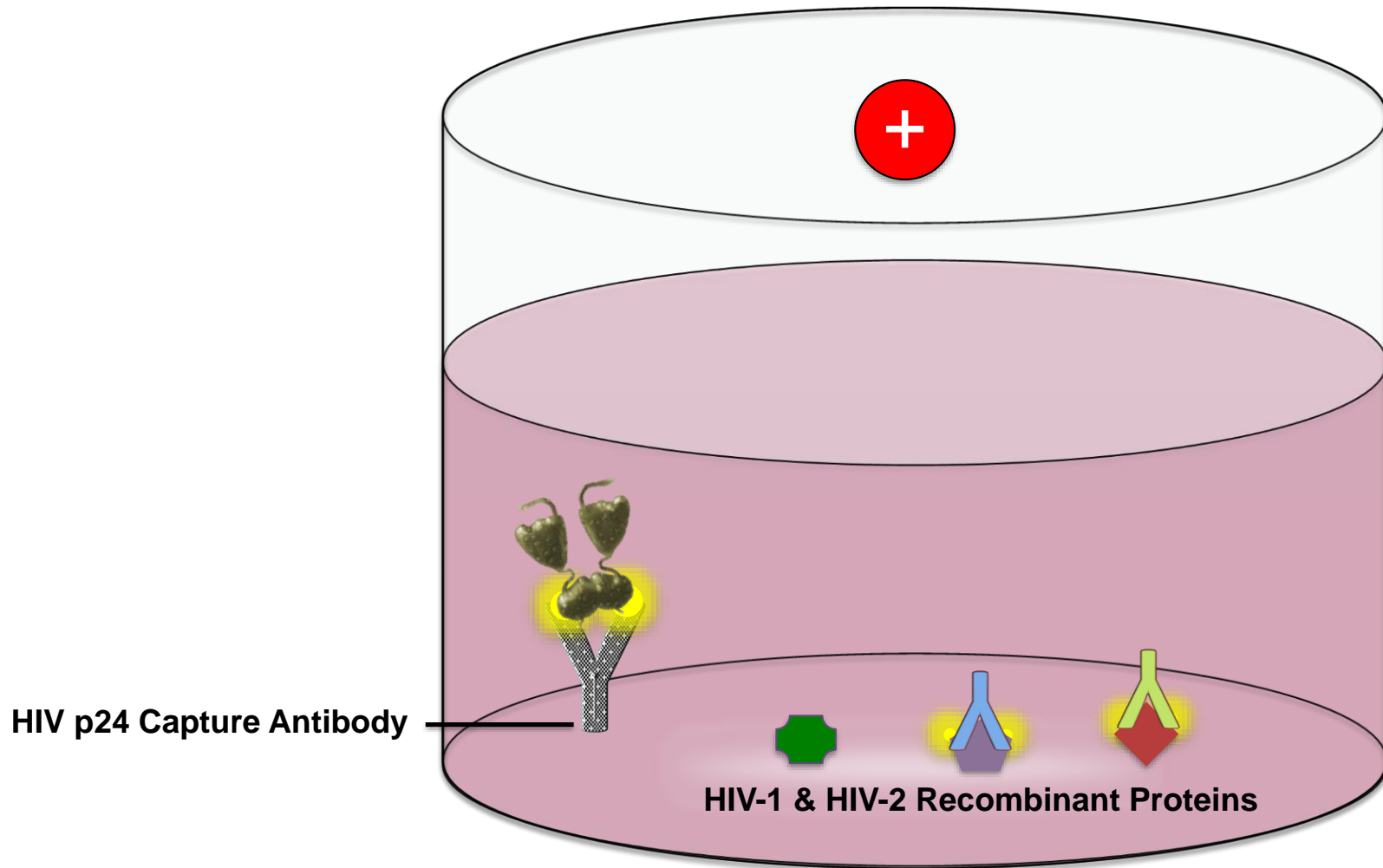
Fourth-Generation HIV Antigen-Antibody Immunoassay



Fourth-Generation HIV Antigen-Antibody Immunoassay



Fourth-Generation HIV Antigen-Antibody Immunoassay



4th Generation HIV Ag/Ab Combination Assays

4 th Generation FDA-Approved Tests	FDA Approval	Company
Architect HIV Ag/Ab Combo	2010	Abbott Laboratories
GS HIV Combo Ag/Ab	2011	BioRad Laboratories
Alere Determine HIV 1/2 Ag/Ab Combo (Point of Care Test)	2013	Alere

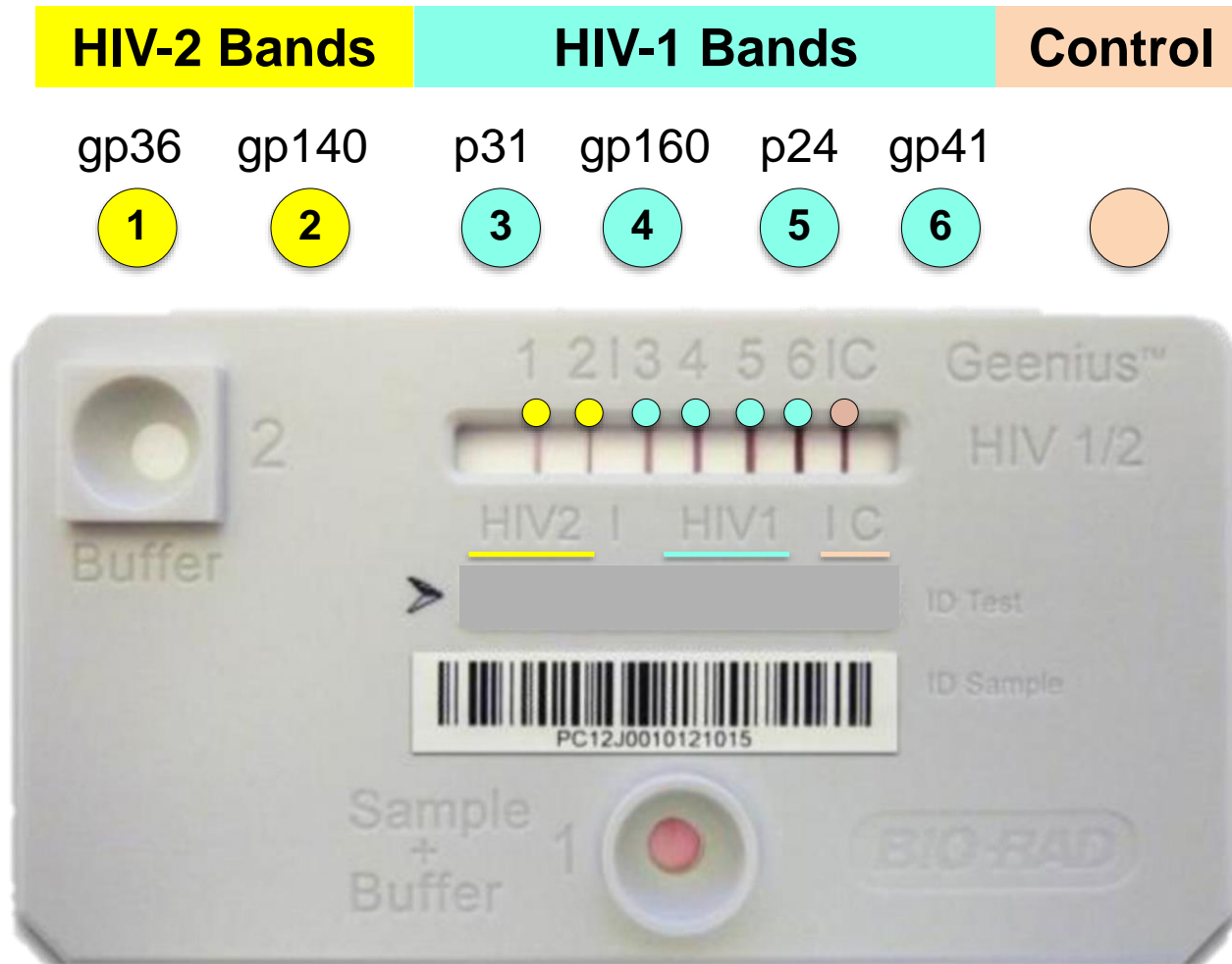
- Combo assays detect HIV-1 p24 antigen and antibodies to HIV-1 and HIV-2
- Assays do not distinguish between HIV-1 antibody or HIV-2 antibody
- Only the Determine HIV 1/2 Ag/Ab Combo distinguishes p24 from HIV antibody
- Reduces “window” by about 10-15 days
- Detects approximately 60-80% of persons with acute HIV

HIV DIAGNOSTIC TESTS
HIV-1/HIV-2 Differentiation Test

Geenius HIV-1/HIV-2 Supplemental Assay

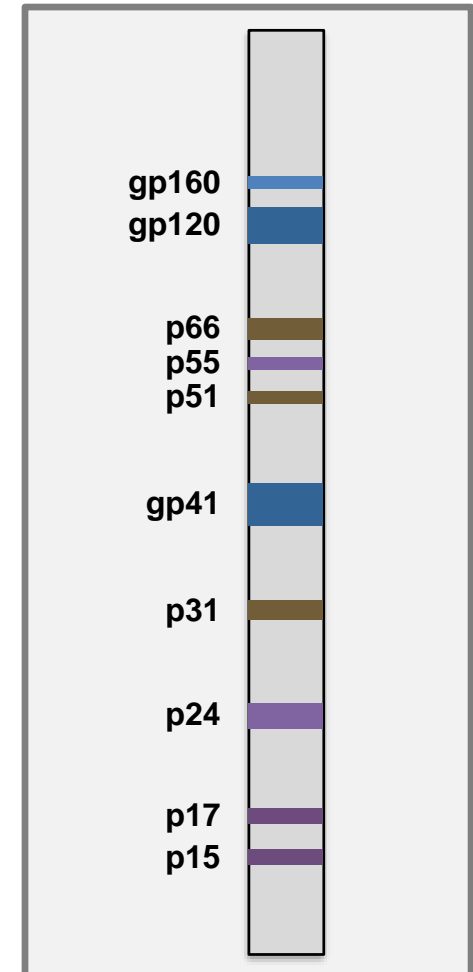


Geenius HIV-1/HIV-2 Supplemental Assay

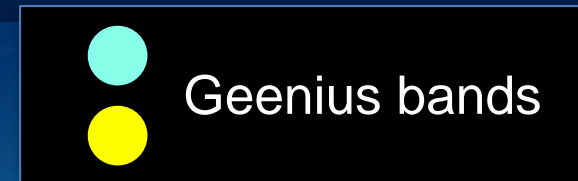








HIV-1 Gene Products & Western blot

HIV-1 Gene and Product	Band on Western blot
<i>env</i>	
Precursor Protein	gp160
External Glycoprotein	gp120
Transmembrane Protein	gp41
<i>pol</i>	
Reverse Transcriptase	p66
Reverse Transcriptase	p51
Endonuclease	p31
<i>gag</i>	
Gag Precursor	p55
Core	p24
Matrix	p17
Nucleocapsid Precursor	p15



HIV-1 & HIV-2 Gene Products



Gene and Product	HIV-1	HIV-2
<i>env</i>		
Precursor Protein	gp160 	gp140 
External Glycoprotein	gp120	gp105/125
Transmembrane Protein	gp41 	gp36/41 
<i>pol</i>		
Reverse Transcriptase	p66	p68
Reverse Transcriptase	p51	p53
Endonuclease	p31 	p31/34
<i>gag</i>		
Gag Precursor	p55	p56
Core	p24 	p26
Matrix	p17	p16
Nucleocapsid Precursor	p15	

Geenius HIV-1/HIV-2 Supplemental Assay Software Interpretation

HIV-1 RESULT	HIV-2 RESULT	ASSAY INTERPRETATION
Negative	Negative	HIV NEGATIVE
<u>Indeterminate</u>	Negative	HIV-1 INDETERMINATE^a
Negative	<u>Indeterminate</u>	HIV-2 INDETERMINATE^b
<u>Indeterminate</u>	<u>Indeterminate</u>	HIV INDETERMINATE^c
Positive	Negative	HIV-1 POSITIVE
Positive	<u>Indeterminate</u>	HIV-1 POSITIVE
Negative	Positive	HIV-2 POSITIVE.
<u>Indeterminate</u>	Positive	HIV-2 POSITIVE
Positive	Positive	HIV-2 POSITIVE with HIV-1 cross-reactivity: Antibody to HIV-2 confirmed in the sample. HIV-1 positivity (with only one HIV-1 envelope band, gp160 or gp41), is due to cross-reactivity and precludes confirmation of HIV-1*. *Note: Differentiation features managed by proprietary algorithm.
Positive	Positive	HIV POSITIVE Untypable (undifferentiated): Antibodies to HIV-1 and HIV-2 confirmed in the sample. This may occur in an HIV-2 positive sample with significant cross-reactivity to HIV-1, or may be due to co-infection with both HIV-1 and HIV-2 (rare)*. *Note: Differentiation features managed by proprietary algorithm.

^a HIV-1 band(s) detected but did not meet the criteria for HIV-1 Positive

^b HIV-2 band(s) detected but did not meet the criteria for HIV-2 Positive

^c HIV band(s) detected but did not meet the criteria for HIV-1 Positive or HIV-2 Positive

Geenius HIV-1/HIV-2 Supplemental Assay Results NOT Seen with Prior Differentiation Assay

- HIV-2 positive with HIV-1 cross reactivity
- HIV-2 indeterminate
- HIV indeterminate

HIV DIAGNOSTIC TESTS

Timing of Test Reactivity Following HIV Acquisition

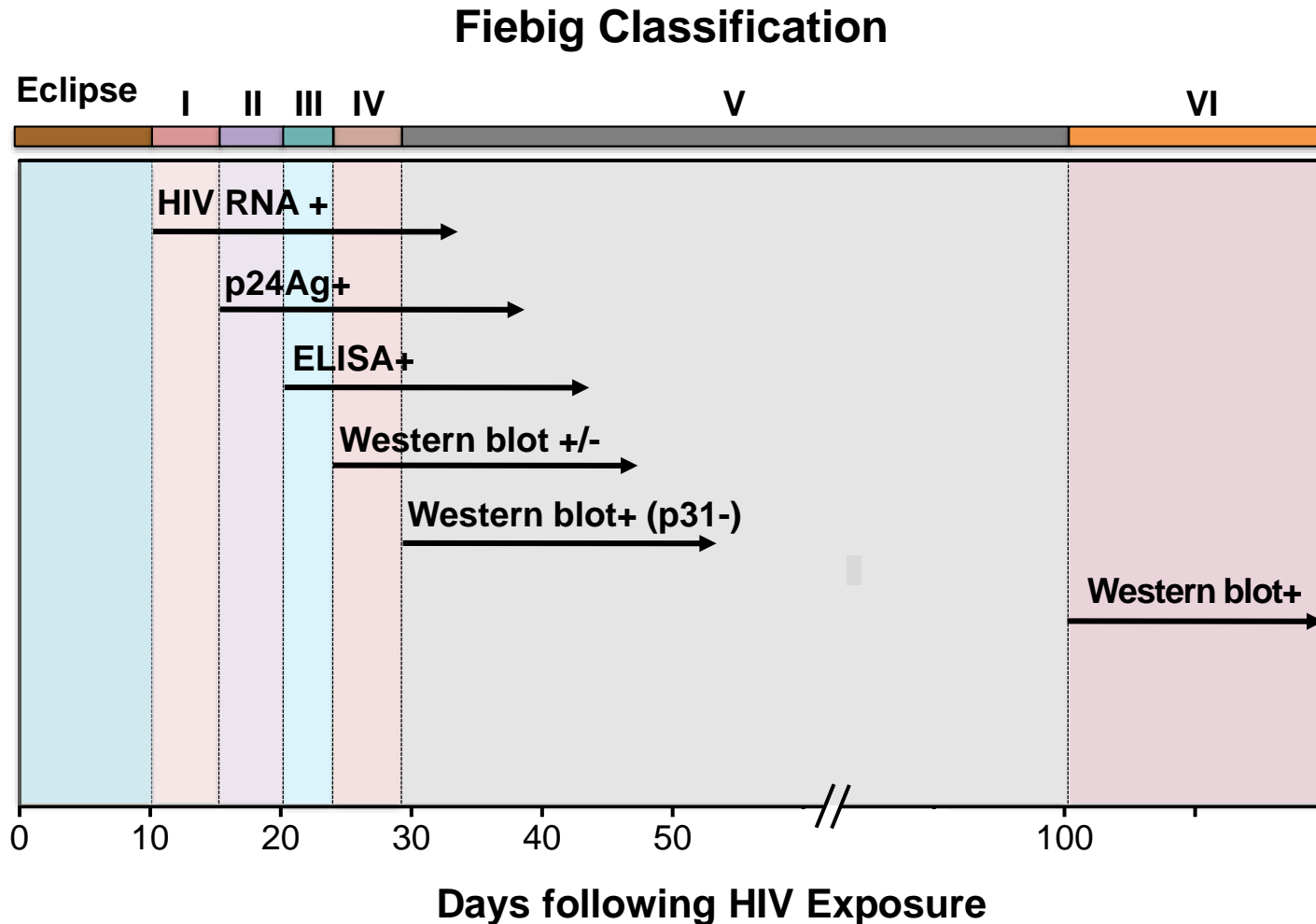
Fiebig Laboratory Staging of Acute HIV Infection

Stage	Duration	HIV RNA	p24 Ag	*EIA	Western blot
Eclipse	11 days	(-)	(-)	(-)	(-)
1	5.0 days	(+)	(-)	(-)	(-)
2	5.3 days	(+)	(+)	(-)	(-)
3	3.2 days	(+)	(+)	IgM Positive	Absence of HIV-specific bands
4	5.6 days	(+)	(+)	IgM Positive	#Indeterminate pattern
5	88.6 days	(+)	(+/-)	Positive	Reactive, but absence of p31 (<i>pol</i>)
6	Open-ended	(+)	(+/-)	Positive	Reactive, including p31 (<i>pol</i>)

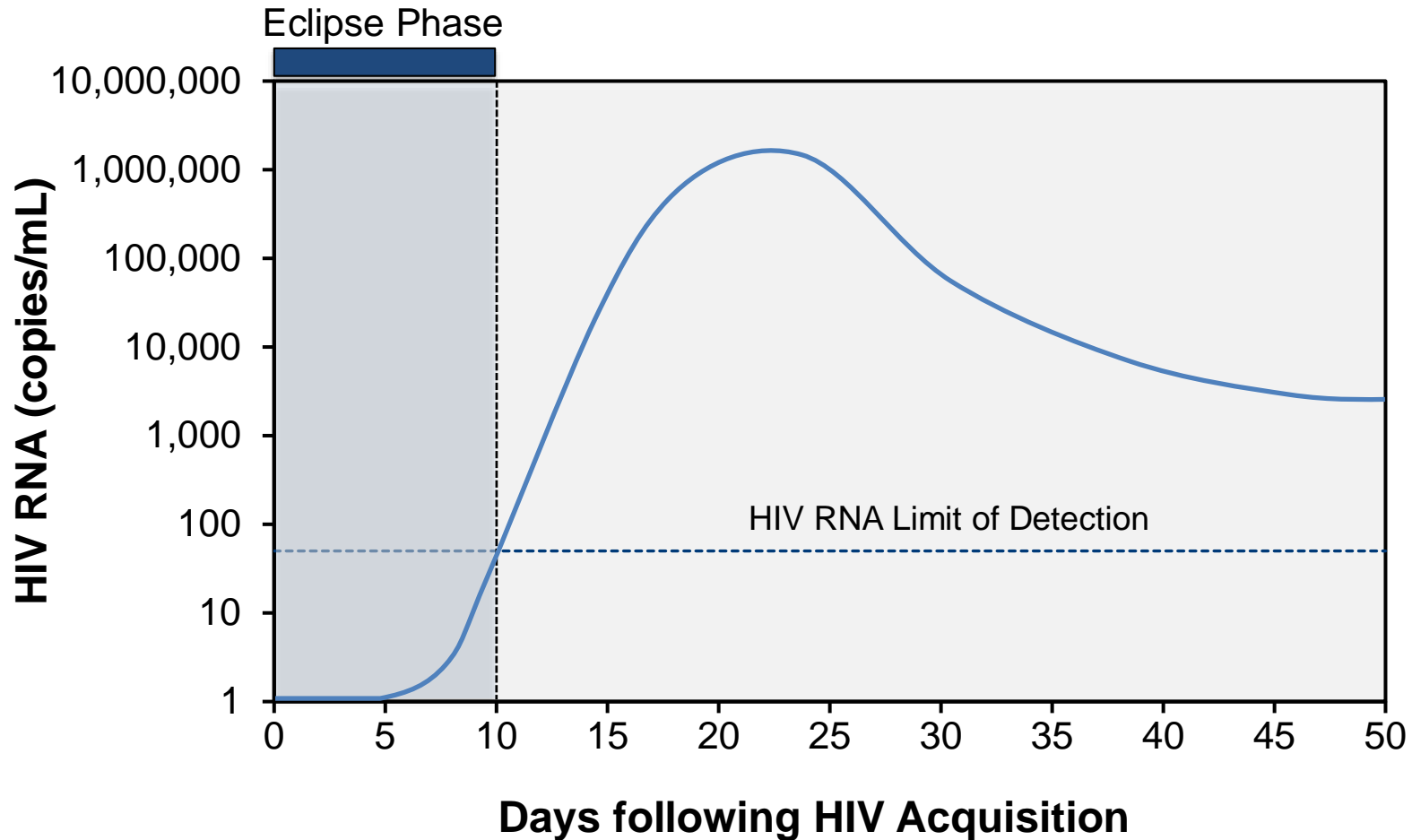
* EIA = enzyme immunoassay

Indeterminate Western blot: presence of HIV-1 specific bands that fail to meet criteria established by US FDA for positive HIV (reactivity to two of the following three bands: p24, gp41, gp120/160)

Fiebig Laboratory Staging of Acute HIV Infection Stages and HIV RNA Levels

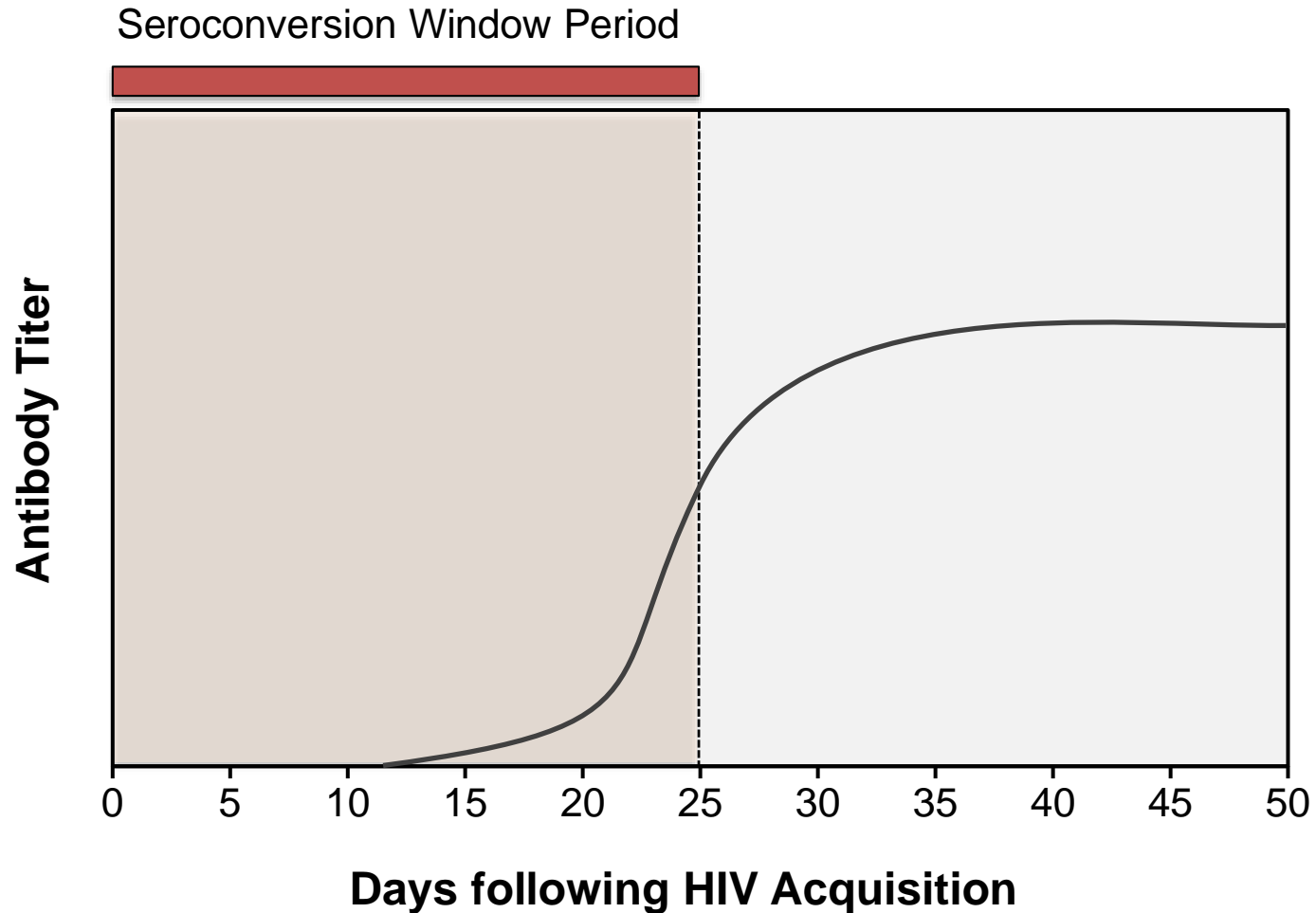


Acute HIV: Eclipse Phase



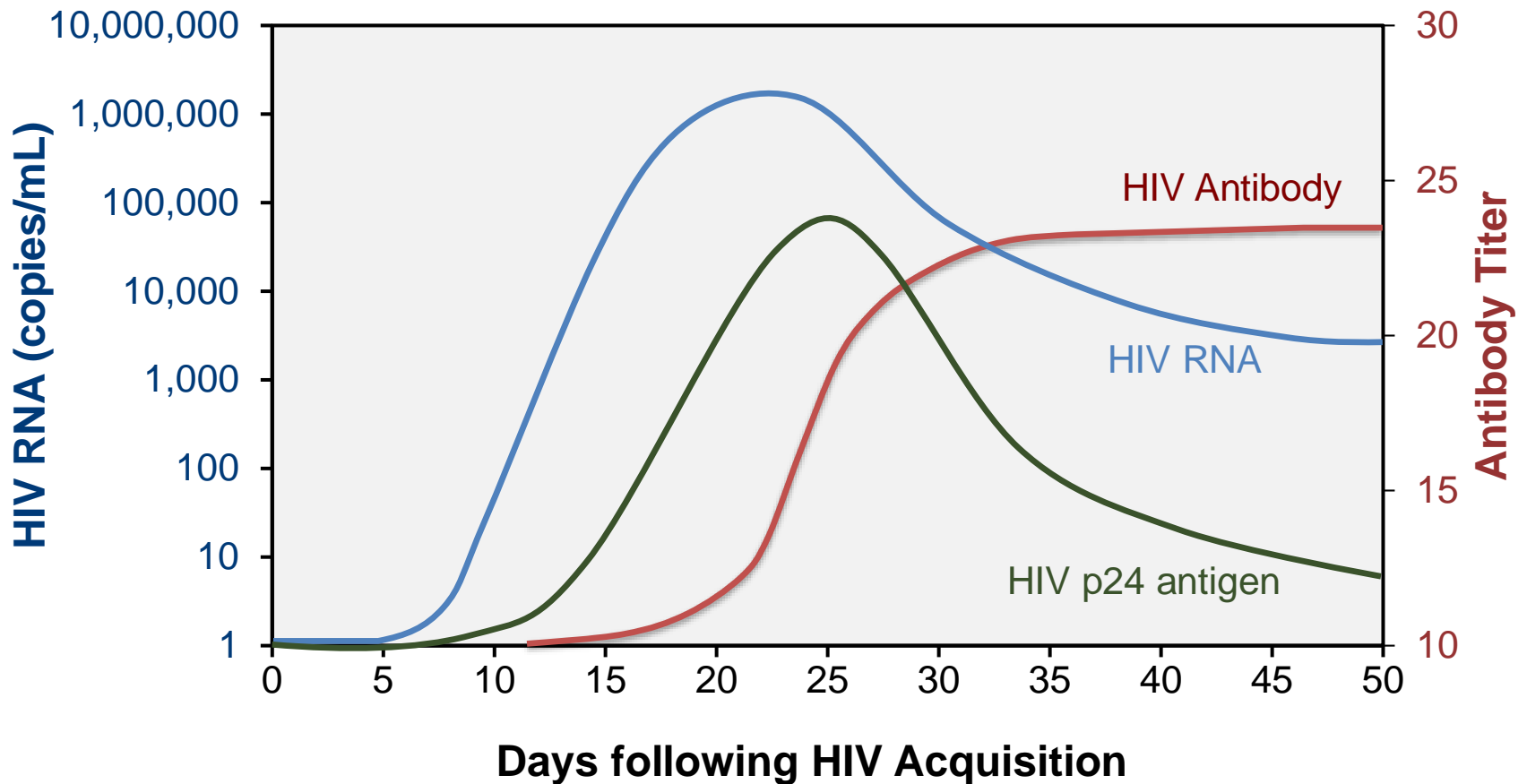
Eclipse Phase = time between infection and detectable HIV RNA

Acute HIV: Seroconversion Window Period



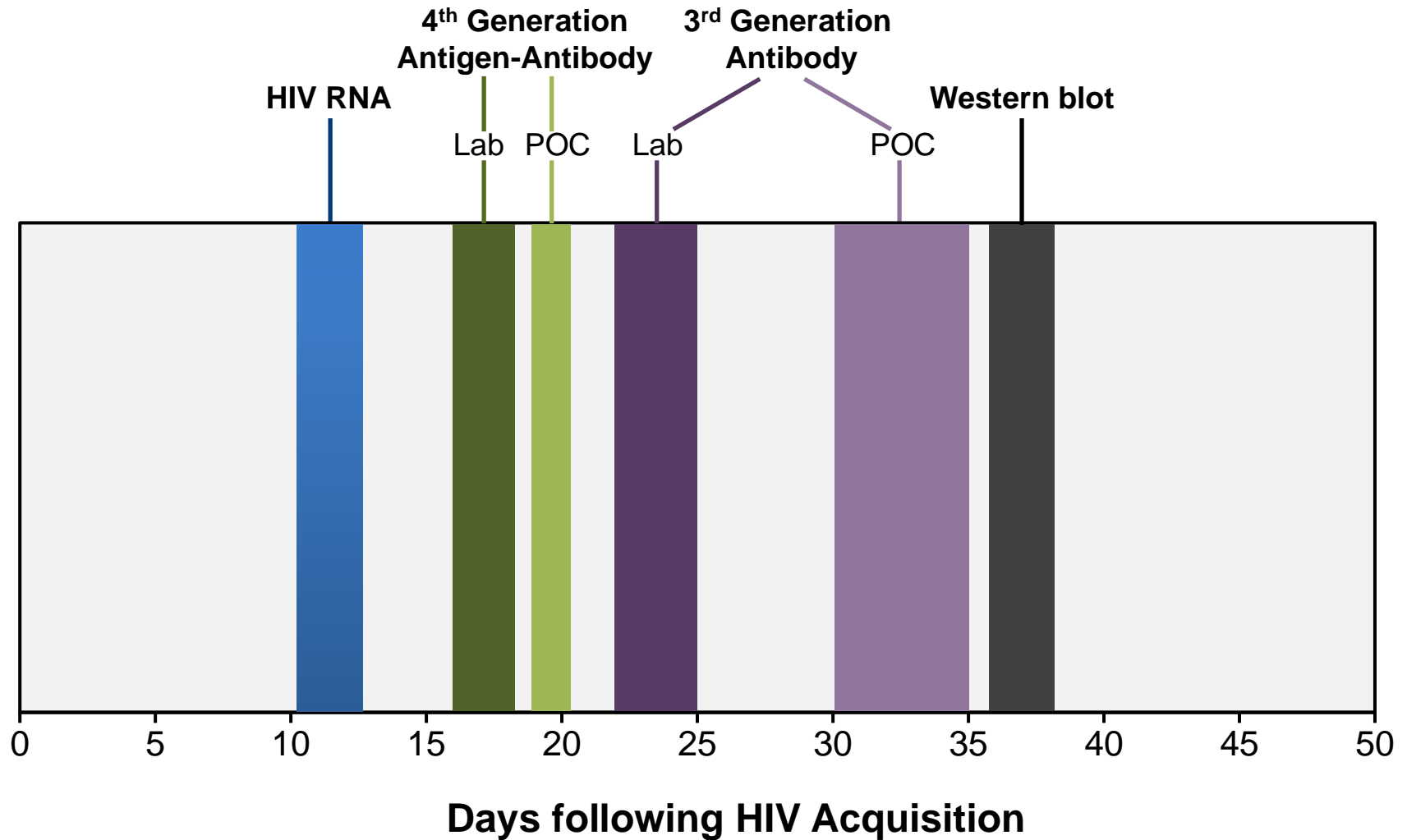
Seroconversion Window Period = time between infection and detectable HIV antibodies

Laboratory Diagnosis of Early HIV Infection



Timing of HIV RNA, HIV p24 antigen, and HIV Antibody

Early HIV Infection and Test Reactivity



Questions

