

#### KEY POINTS

#### Virologic and Immunologic Monitoring

- Quarterly HIV RNA monitoring remains appropriate for patients with a recent history of nonadherence, mental health disorders, substance use, homelessness, poor social support system, or other major medical conditions. Semiannual monitoring may be appropriate for patients with persistently undetectable HIV RNA and none of the above characteristics.
- Achieving and maintaining an undetectable viral load is always the goal of ART.
- Resistance testing is recommended when patients are interrupting or stopping ART. In cases where the patient has already stopped therapy, testing should be performed as soon as practical and no more than 4 weeks after cessation, before the return of wild-type virus. Mutations detected in this setting may provide useful information, but the absence of mutations does not rule out their presence in minor variants.

#### Determining HIV Drug Resistance

#### ALL RECOMMENDATIONS

#### Determining HIV Drug Resistance continued

- When determining the optimal regimen for achieving viral suppression, clinicians should perform genotypic resistance testing that includes the protease (A2), reverse transcriptase (A2), and integrase genes (B2) at baseline, whether ART is being initiated or not.
- In patients experiencing treatment failure or incomplete viral suppression, such testing should be performed while patients are still on therapy, but no later than 4 weeks after stopping ART, given the rapid return of wild-type virus. (A2)
- Perform co-receptor tropism testing prior to initiation of a CCR5 antagonist. (A1)
- If fusion inhibitor resistance is suspected, that test should be obtained as a supplement to the other genotypic resistance tests. (A2)
- Note: Virologic failure is defined as >200 copies/mL. See the NYSDOH AI guideline *Virologic and Immunologic Monitoring in HIV Care*.

#### RESOURCES: DRUG RESISTANCE MUTATIONS

New resistance mutations and the emerging clinical significance of these mutations frequently change. See the following for more information on drug resistance mutations and resistance testing:

- Stanford University HIV Drug Resistance Database: <https://hivdb.stanford.edu/>
- IAS–USA 2019 Update of the Drug Resistance Mutations in HIV–1: <https://www.iasusa.org/resources/hiv-drug-resistance-mutations/>
- HIV Resistance Response Database Initiative: <https://www.hivrdb.org/>
- Los Alamos National Laboratory HIV Databases: <https://www.hiv.lanl.gov/content/index>
- HIV French Resistance Database: <https://hivfrenchresistance.org/>



← Use this code with your phone's QR code reader to go directly to a mobile-friendly version of the guideline.

■ This 1/4-Folded Guide is a companion to the New York State Department of Health AIDS Institute guideline *Virologic and Immunologic Monitoring*. The full guideline is available at [www.hivguidelines.org](http://www.hivguidelines.org).



← Use this code with your phone's QR code reader to go to HIV Resistance Assays.

#### HIV CLINICAL RESOURCE ■ 1/4-FOLDED GUIDE

VISIT [HIVGUIDELINES.ORG](http://HIVGUIDELINES.ORG) TO LEARN MORE OR VIEW COMPLETE GUIDE



#### VIROLOGIC AND IMMUNOLOGIC MONITORING AND RESISTANCE ASSAYS

NYSDOH AIDS INSTITUTE HIV CLINICAL GUIDELINE

JUNE 2022

#### ALL RECOMMENDATIONS

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#### Virologic and Immunologic Monitoring

- To assess a patient's response to ART and immunologic status and to identify when a change in ART regimen is needed, clinicians should perform plasma HIV-1 RNA level (viral load) and CD4 count testing as detailed in *Table 1: Recommended Viral Load and CD4 Count Monitoring in Nonpregnant Patients With HIV*. (A1)
- Clinicians should address modifiable barriers to adherence and engagement in care to help ensure optimal virologic suppression. Modifiable barriers may include, but are not limited to, substance use, mental illness, other chronic medical conditions, ART-associated adverse medication effects, unstable housing, or low health literacy. (A2)
- Quarterly CD4 count monitoring is *no longer recommended* for non-pregnant patients receiving ART who have consistently undetectable HIV RNA levels and CD4 counts >200 cells/mm<sup>3</sup> (see Table 1 for recommended intervals). (A2)

#### Determining HIV Drug Resistance

- Clinicians should consult with an expert to interpret the results of resistance assays because such results are often complex. (A3)
  - The NYSDOH AIDS Institute's Clinical Education Initiative line is available for phone consultation: 866-637-2342.

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**Table 1: Recommended Viral Load and CD4 Count Monitoring in Nonpregnant Patients With HIV [a]**

Event	HIV RNA Viral Load	CD4 Count	Comments
Entry into care	Baseline viral load (A1)	Baseline CD4 count (A1)	<ul style="list-style-type: none"> <li>If a patient is not taking ART, recommend initiation [b] (A1)</li> <li>Monitor as below</li> </ul>
<b>Patients Taking ART</b>			
ART initiation or change to address virologic failure	<ul style="list-style-type: none"> <li>Within 4 weeks after ART start or change (A3)</li> <li>At least every 8 weeks until complete virologic suppression is documented (A3)</li> </ul>	<ul style="list-style-type: none"> <li>12 weeks after ART initiation</li> <li>Every 4 months until CD4 count 200 cells/mm<sup>3</sup> is obtained on 2 measurements at least 4 months apart (A2), then monitor as below once virologic suppression is achieved</li> </ul>	<ul style="list-style-type: none"> <li>Virologic failure occurs when a viral load &lt;200 copies/mL is either not achieved or not maintained</li> <li>Virologic suppression is defined as a viral load &lt;20 to &lt;50 copies/mL obtained with a highly sensitive assay</li> </ul>
ART change for simplification or due to adverse effects	Within 4 weeks after ART change, then as below (A3)	Monitor as below for documented virologic suppression	--
Documented viral suppression	<ul style="list-style-type: none"> <li>At least every 4 months (A3)</li> <li>May extend interval to 6 months in patients stable on ART with CD4 count &gt;200 cells/mm<sup>3</sup> and complete viral suppression for 1 year (B2)</li> </ul>	<ul style="list-style-type: none"> <li>At least every 6 months if CD4 count is ≤350 cells/mm<sup>3</sup> (B2)</li> <li>Optional if CD4 count is &gt;350 cells/mm<sup>3</sup> (B2)</li> </ul>	--
New HIV RNA ≥500 copies/mL after previous viral suppression	Repeat viral load test 2 weeks after first result (A2)	Obtain CD4 count if previous result is >6 months old (B3)	<ul style="list-style-type: none"> <li>Assess for adherence and drug-drug interactions (A3)</li> <li>Obtain resistance testing (A1)</li> </ul>
New HIV RNA level over the limit of detection of sensitive assays, 20 to 50 copies/mL, but <500 copies/mL after previous viral suppression	Repeat viral load test within 4 weeks to differentiate low-level transient viremia ("blip") from virologic failure [c] (A2)	If repeat viral load is detectable, obtain CD4 count if previous result is >6 months old (B3)	<ul style="list-style-type: none"> <li>Assess for adherence and drug-drug interactions (A3)</li> <li>If repeat viral load is detectable, consider resistance testing [d] (B3)</li> <li>Patients with low-level viremia ≤200 copies/mL over a period of 12 months without demonstrated failure may continue routine testing intervals of at least every 4 months [e]</li> </ul>
<b>Patients Taking Antiretroviral Therapy (ART)</b>			
CD4 count ≤500 cells/mm <sup>3</sup> (A2)	At least every 4 months	At least every 4 months	At every visit, recommend ART initiation [b]
CD4 count >500 cells/mm <sup>3</sup> (A2)	At least every 6 months	At least every 6 months	At every visit, recommend ART initiation [b]
<p><b>Abbreviation:</b> ART, antiretroviral therapy</p> <p><b>Notes:</b></p> <p>a. For recommendations on virologic monitoring in pregnancy, see DHHS: <i>Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States</i>.</p> <p>b. See the NYSDOH AI guideline <i>When to Initiate ART, With Protocol for Rapid Initiation</i>.</p> <p>c. An ART regimen should not be changed based on a single viral load elevation. The risk of virologic rebound (breakthrough) increases when values are ≥500 copies/mL [Grennan, et al. 2012].</p> <p>d. Standard genotypic tests may not provide resistance results when viral load is low. For repeated low-level viremia, an assay that detects resistance mutations in archived proviral DNA is available; however, clinical data are insufficient to recommend for or against its use in the patient care setting.</p> <p>e. In patients with low-level viremia, clinicians should consult with an experienced HIV care provider; low-level viremia can be due to multiple causes, and its clinical effect is not clear.</p>			

**Table 3: FDA-Approved Quantitative HIV-1 RNA Assays for Viral Load Monitoring**

Test Name	Method	Lower and Upper LOQ
Abbott RealTime HIV-1 (Abbott Laboratories)	Real-time PCR	<ul style="list-style-type: none"> <li>40 copies/mL [a]</li> <li>10,000,000 copies/mL</li> </ul>
Cobas AmpliPrep/Cobas TaqMan HIV-1 Test, version 2.0 (Roche Diagnostics)	Real-time PCR	<ul style="list-style-type: none"> <li>20 copies/mL</li> <li>10,000,000 copies/mL</li> </ul>
Cobas HIV-1 quantitative NAT for use on Cobas 6800/8800 systems (Roche Diagnostics)	Real-time PCR	<ul style="list-style-type: none"> <li>20 copies/mL</li> <li>10,000,000 copies/mL</li> </ul>
Cobas TaqMan HIV-1 Test, v2.0 for use with the high pure system (Roche Diagnostics)	Real-time PCR	<ul style="list-style-type: none"> <li>34 copies/mL</li> <li>10,000,000 copies/mL</li> </ul>
<p><b>Abbreviation:</b> FDA, U.S. Food and Drug Administration; LOQ, limit of quantification; NAT, nucleic acid test, PCR, polymerase chain reaction.</p> <p><b>Note:</b></p> <p>a. This lower LOQ applies when 1.0 mL of plasma is used. When 0.5 and 0.2 mL of plasma are used, the lower LOQ is 75 copies/mL and 150 copies/mL, respectively.</p>		