Table 1: Types of HIV Resistance Tests
Table 3: Genotypic Resistance Testing Based on Viral Load

Table 1: Types of HIV Resistance Tests [a]		
Test	**Description**	**Use**
Genotype	• Assesses mutations in the HIV RNA genes that encode enzymes targeted by ARVs: reverse transcriptase, protease, integrase • Algorithms interpret the effect of mutations on ARV efficacy	• At diagnosis, when a patient has incomplete virologic response to ART, or when viral rebound occurs • Has utility if plasma HIV-1 RNA level (viral load) is ≥500 to 1,000 copies/mL • May not detect all RAMs
Phenotype	• Assesses the effect of HIV genes on the ARV concentration required to inhibit viral growth compared with wild-type (nonmutant) virus • Estimates a fold change	• Historically used to help assess the effect of the interplay of multiple RAMs on viral growth • Supplanted by more comprehensive genotypic interpretation algorithms
Proviral DNA genotype (archived genotype)	• Assesses genetic mutations in HIV proviral DNA genes that encode enzymes targeted by ARVs: reverse transcriptase, protease, integrase • Algorithms interpret the effect of mutations on ARV efficacy	• When planning ART simplification or other changes, may have a role in identifying RAMs when standard genotype testing may not yield results, i.e., in patients who have prior treatment experience, have stopped taking ARVs for >4 weeks, or have an HIV viral load <500 to 1,000 copies/mL or below the limit of quantification • May not detect all RAMs in proviral DNA, or may report RAMs from non-replication-competent viruses [Li, et al. 2021]
Tropism test	Assesses the effect of HIV RNA (or proviral DNA) gp120 on the coreceptor(s) used for viral attachment: CCR5, CXCR4, or mixed/dual	• Treatment-experienced patients for whom a coreceptor antagonist is being imminently considered • RNA tropism test can be used with viral loads ≥1,000 copies/mL; proviral DNA test can be used for viral loads <1,000 copies/mL

Abbreviations: ART, antiretroviral therapy; ARV, antiretroviral medication; gp120, envelope glycoprotein 120; RAM, resistance-associated mutation.

Note:

a. All resistance assays are affected by limitations of detection; minor variants may not be present at high enough concentrations to be amplified by the assay.

Table 3: Genotypic Resistance Testing Based on Viral Load	
HIV RNA (Viral Load)	**Indicated Genotypic Resistance Test**
0 to 500 copies/mL	HIV proviral DNA genotype (RT, PR, INT) or phenotype (tropism)
500 to 1,000 copies/mL	HIV RNA genotype (RT, PR, INT) or phenotype (tropism) at assay amplification threshold; may use HIV proviral DNA test if nonamplifiable
≥1,000 copies/mL	HIV RNA genotype if currently or recently (within 4 weeks) on ART; DNA proviral genotype may be considered for patients who are currently not taking ART but have in the past

Abbreviations: ART, antiretroviral therapy; INT, integrase; PR, protease; RT, reverse transcriptase.

Reference

Li Y, Etemad B, Dele-Oni R, et al. Drug resistance mutations in HIV provirus are associated with defective proviral genomes with hypermutation. *AIDS* 2021;35(7):1015-20. [PMID: 33635848] https://pubmed.ncbi.nlm.nih.gov/33635848