Drug resistance interpretation: PR

HIVDB 9.5.1 (2023-11-05)

PI Major Mutations:	None
PI Accessory Mutations:	None
PR Other Mutations:	L10H • V11S • T12Q • I13Y • K14* • I15* • G17E • Q18T • L19K • E21R • A22L • L23S • L24* • M36I • N37K • R41K • H69K • L89M • I93L

Protease Inhibitors	
atazanavir/r (ATV/r)	Susceptible
darunavir/r (DRV/r)	Susceptible
fosamprenavir/r (FPV/r)	Susceptible
indinavir/r (IDV/r)	Susceptible
lopinavir/r (LPV/r)	Susceptible
nelfinavir (NFV)	Susceptible
saquinavir/r (SQV/r)	Susceptible
tipranavir/r (TPV/r)	Susceptible

PR comments

Other

- L10F is a common non-polymorphic, PI-selected accessory mutation associated with reduced in vitro susceptibility to LPV and DRV. L10I/V are polymorphic, PI-selected accessory mutations that increase the replication of viruses with other PI-resistance mutations. L10R/Y are rare, non-polymorphic PI-selected mutations. Their effects on PI susceptibility have not been well studied. **L10H** is a highly unusual mutation at this position.

Mutation scoring: PR

HIVDB 9.5.1 (2023-11-05)

No drug resistance mutations were found for PI.

Drug resistance interpretation: RT

HIVDB 9.5.1 (2023-11-05)

NRTI Mutations:	D67G • K70E • Y115F • K219R
NNRTI Mutations:	V106M • Y181S • G190A • F227L • K238T
RT Other Mutations:	V35T • E36T • T39E • V90I • K122E • D123S • P150S • Q151T • W153G • A158S • K166Q • K173T • Q174K • N175T • P176Q • D177N • I178R • V179Y • I180L • Q182Y • Δ183 • M184X • L187S • L193S • I195X • G196K • T200A • E204M • L205R • R206G • Q207H • Δ208 • L209X • L210V • R211K • F214I • P217S • D218E • E224D • P226A • E233D • L234S • H235C • Δ236 • D237X • W239M • P243T • V245R • L246R • P247R • E248N • K249E • D250S • S251* • W252L • T253S • V254*

Nucleoside Reverse Transcriptase Inhibitors	
abacavir (ABC)	Intermediate Resistance
zidovudine (AZT)	Low-Level Resistance
stavudine (D4T)	Intermediate Resistance
didanosine (DDI)	Low-Level Resistance
emtricitabine (FTC)	Potential Low-Level Resistance
lamivudine (3TC)	Potential Low-Level Resistance
tenofovir (TDF)	Intermediate Resistance

Non-nucleoside Reverse Transcriptase Inhibitors	
doravirine (DOR)	High-Level Resistance
efavirenz (EFV)	High-Level Resistance
etravirine (ETR)	Low-Level Resistance
nevirapine (NVP)	High-Level Resistance
rilpivirine (RPV)	Intermediate Resistance

RT comments

NRTI

- D67N is a non-polymorphic TAM associated with low-level resistance to AZT. **D67G/E/S/T/H** are non-polymorphic NRTI-selected mutations that generally occur in viruses with multiple TAMs.
- **K70/E/Q/N/T/S/G** cause low-leve resistance to ABC and TDF.
- **Y115F** causes intermediate resistance to ABC and low-level resistance to TDF.
- **K219E/Q/N/R** are accessory TAMS that usually occur in combination with multiple other TAMs.

NNRTI

- **V106M** is a non-polymorphic mutation that confers high-level resistance to NVP and EFV. It is selected in vitro and in vivo by DOR and preliminary data suggests it reduces DOR susceptibility about 3-fold.
- **Y181F/S/G** are rare non-polymorphic NNRTI-associated mutations that are usually present as part of an electrophoretic mixture. They are likely to represent transitional mutations between Y and I or V.
- **G190A** is a non-polymorphic mutation that causes high-level resistance to NVP and intermediate resistance to EFV. It does not significantly reduce susceptibility to RPV, ETR, or DOR.
- **F227L** is a non-polymorphic mutation that usually occurs in combination with V106A. It is selected in vivo and in vitro with both NVP and DOR. In this context it is associated with high-level reductions in NVP and DOR susceptibility and intermediate reductions in EFV susceptibility. F227I/V are extremely rare mutations that have been selected in vitro by DOR.
- **K238T/N** are uncommon non-polymorphic mutations selected in persons receiving NVP and EFV usually in combination with K103N. Alone, **K238T/N** appear to have minimal effects on NNRTI susceptibility.

Other

- **V90I** is a polymorphic accessory mutation weakly selected by each of the NNRTIs. It is associated with minimal, if any, detectable reduction in NNRTI susceptibility.
- Q151M causes intermediate/high-level resistance to AZT and ABC, and low-level resistance to TDF, 3TC and FTC. In combination with two or more accessory mutations at positions 62, 75, 77, and 116, it confers high-level resistance to AZT and ABC and intermediate resistance to TDF, 3TC and FTC. Q151L is an extremely rare transitional mutation that may precede the emergence of the Q151M. **Q151T** is a highly unusual mutation at this position.
- V179D/E are somewhat polymorphic accessory NNRTI-selected mutation. In combination with other NNRTI DRMs, they appear to contribute low-levels of reduced susceptibility to each of the NNRTIs. In particular, the combinations of K103R/V179D and V106I/V179D act synergistically to reduce NVP and EFV susceptibility. V179F is a non-polymorphic mutation selected in combination with Y181C in persons receiving ETR. Alone it has little effect on NNRTI susceptibility, however in combination with Y181C it is associated with high-level reductions in ETR and RPV susceptibility. V179T is a rare non-polymorphic mutation occasionally selected in persons receiving NNRTIs. It is associated with minimal, if any, reduction in ETR and RPV susceptibility. V179L is a rare non-polymorphic mutation listed as a RPV-associated resistance mutation by the FDA package insert. Its effects on NNRTI susceptibility have not been well studied. **V179Y** is an unusual mutation at this position.
- L234I is a nonpolymorphic mutation selected in persons receiving NVP and EFV. It is also selected in vitro by ETR and DOR. In combination with V106A, it is associated with high-level DOR resistance. Its effect on susceptibility when it occurs alone has not been well characterized. **L234S** is a highly unusual mutation at this position.
- P236L is a rare mutation selected commonly by DLV, which appears to have little if any effect on current NNRTIs. **P236del** is a highly unusual mutation at this position.

- This virus is predicted to have intermediate-level reduced susceptibility to **RPV**. The use of the combination of CAB/**RPV** should be considered to be contraindicated.

Mutation scoring: RT — HIVDB 9.5.1 (2023-11-05)

Drug resistance mutation scores of NRTI: Download CSV

Rule	ABC	AZT	D4T	DDI	FTC	3TC	TDF
D67G	5	15	10	5	0	0	5
K70E	15	0	15	15	10	10	15
Y115F	30	0	0	0	0	0	15
K219R	5	10	10	5	0	0	5
Total	55	25	35	25	10	10	40

Drug resistance mutation scores of NNRTI: Download CSV

Rule	DOR	EFV	ETR	NVP	RPV
V106M	30	60	0	60	0
F227L	60	15	0	30	0
Y181S	0	15	15	60	30
G190A	0	45	10	60	15
K238T	0	30	0	30	0
Total	90	165	25	240	45