Drug resistance interpretation: PR

HIVDB 9.5.1 (2023-11-05)

PI Major Mutations: None
PI Accessory Mutations: None
PR Other Mutations: L10I • I13V • G16E • M36I • P39Q • R41K • I62IV • L63A

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

- **L10I/V** are polymorphic, PI-selected accessory mutations that increase the replication of viruses with other PI-resistance mutations.

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: D67N • M184V • T215Y • K219E
NNRTI Mutations: Y188L
RT Other Mutations: I2V • V35T • T39A • V60I • I94L • D121H • K122E • I135T • I142IV • D177E • V179VI • T200A • Q207E • R211K • V245Q • D250E • A554N

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

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

RT comments

NRTI

- **D67N** is a non-polymorphic TAM associated with low-level resistance to AZT.
- **M184V/I** cause high-level in vitro resistance to 3TC and FTC and low/intermediate resistance to ABC (3-fold reduced susceptibility). **M184V/I** are not contraindications to continued treatment with 3TC or FTC because they increase susceptibility to AZT and TDF and are associated with clinically significant reductions in HIV-1 replication.
- **T215Y/F** are TAMs that causes intermediate/high-level resistance to AZT and potentially low-level resistance to ABC and TDF.
- **K219E/Q/N/R** are accessory TAMS that usually occur in combination with multiple other TAMs.

NNRTI

- **Y188L** is a non-polymorphic mutation that confers high-level resistance to NVP, EFV, RPV, and DOR, and potentially low-level resistance to ETR.

Other

- **V179I** is a polymorphic mutation that is frequently selected in persons receiving ETR and RPV. However, it has little, if any, direct effect on NNRTI susceptibility.

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
D67N	5	15	15	5	0	0	5
D67N + T215Y + K219E	5	5	5	5	0	0	5
M184V	15	-10	-10	10	60	60	-10
T215Y	10	60	40	15	0	0	10
K219E	5	10	10	5	0	0	5
Total	40	80	60	40	60	60	15

Drug resistance mutation scores of NNRTI: Download CSV

Rule	DOR	EFV	ETR	NVP	RPV
Y188L	60	60	10	60	60

Drug resistance interpretation: IN

HIVDB 9.5.1 (2023-11-05)

INSTI Major Mutations: R263K

INSTI Accessory Mutations: None

IN Other Mutations: S17N • M50I • L101I • K111KR • T112IV • S119T • T124N • T125A • I135V • Q137L • V165I • V201I • T206S • D207E • L234I

Integrase Strand Transfer Inhibitors	
bictegravir (BIC)	Intermediate Resistance
cabotegravir (CAB)	Intermediate Resistance
dolutegravir (DTG)	Intermediate Resistance
elvitegravir (EVG)	Intermediate Resistance
raltegravir (RAL)	Low-Level Resistance

IN comments

Major

- **R263K** is a nonpolymorphic mutation selected in vitro by EVG, DTG, BIC, and CAB. It occurs in a high proportion of persons who develop VF and emergent HIVDR while receiving DTG. Alone, it reduces DTG, BIC, and CAB susceptibility about 2-fold.

Other

- **M50I** is a highly polymorphic mutation, which has a prevalence of 3% to 34% in INSTI-naïve persons depending on subtype. It has been selected in vitro by DTG and BIC in combination with R263K. It may contribute to reduced DTG and CAB susceptibility in combination with R263K.
- This virus is predicted to have intermediate-level reduced susceptibility to **CAB**. The use of the combination of **CAB**/RPV should be considered to be contraindicated.
- There is evidence for intermediate **DTG** resistance. If **DTG** is used, it should be administered twice daily.

Mutation scoring: IN

HIVDB 9.5.1 (2023-11-05)

Drug resistance mutation scores of INSTI: Download CSV

Rule	BIC	CAB	DTG	EVG	RAL
R263K	30	30	30	30	25

Drug resistance interpretation: PR

HIVDB 9.5.1 (2023-11-05)

PI Major Mutations: None

PI Accessory Mutations: L33LF • F53FL

PR Other Mutations: L10I • I13V • G16E • V32VA • E35D • M36I • R41K • I66IF • H69K • K70R • A71AV • L89M

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

PR comments

Accessory

- **L33F** is a relatively non-polymorphic accessory mutation selected by each of the PIs. In combination with other PI-resistance mutations, it is associated with reduced susceptibility to LPV, ATV, and DRV.
- **F53L** is a nonpolymorphic accessory mutation selected primarily by SQV, IDV, ATV and LPV. In combination with other mutations, it is associated with reduced susceptibility to ATV and possibly LPV. F53Y is an uncommon nonpolymorphic accessory PI-selected mutation that has not been well studied.

Other

- **L10I/V** are polymorphic, PI-selected accessory mutations that increase the replication of viruses with other PI-resistance mutations.
- V32I is a non-polymorphic mutation selected by LPV, ATV, and DRV which is associated with reduced susceptibility to each of these PIs. **V32A** is a highly unusual mutation at this position.
- **A71V/T** are polymorphic, PI-selected accessory mutations that increase the replication of viruses with other PI-resistance mutations.

Mutation scoring: PR

HIVDB 9.5.1 (2023-11-05)

Drug resistance mutation scores of PI: Download CSV

Rule	ATV/r	DRV/r	FPV/r	IDV/r	LPV/r	NFV	SQV/r	TPV/r
L33LF	5	5	10	5	5	10	5	10
F53FL	10	0	0	0	0	10	15	0
Total	15	5	10	5	5	20	20	10

Drug resistance interpretation: RT

HIVDB 9.5.1 (2023-11-05)

NRTI Mutations: V75M • F77L • M184V

NNRTI Mutations: K103N • E138Q

RT Other Mutations: E6D • T77TA • V35T • T39A • K102N • K122KE • D123N • I135T • P157PA • S162A • K173S • Q174K • D177E • V179I • T200A • Q207A • R211S • V245EK • E248D • A272P • T286A • E291D • V292I • I293V • K527KS • K530R • A534S • A554NS

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

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

RT comments

NRTI

- **V75T/M/A/S** are nonpolymorphic accessory NRTI-selected mutations. They appear to have minimal phenotypic effects on AZT, ABC, and TDF.
- **F77L** usually occurs in combination with the multi-NRTI resistance mutation Q151M. When it occurs alone, its clinical significance is uncertain.
- **M184V/I** cause high-level in vitro resistance to 3TC and FTC and low/intermediate resistance to ABC (3-fold reduced susceptibility). **M184V/I** are not contraindications to continued treatment with 3TC or FTC because they increase susceptibility to AZT and TDF and are associated with clinically significant reductions in HIV-1 replication.

NNRTI

- **K103N** is a non-polymorphic mutation that confers high-level reductions in NVP and EFV susceptibility. It is the most commonly transmitted DRM.
- **E138Q/G** are non-polymorphic accessory mutations selected by ETR occasionally NVP and EFV. They cause low-level reductions in susceptibility to NVP, RPV, and ETR.

Other

- **V179I** is a polymorphic mutation that is frequently selected in persons receiving ETR and RPV. However, it has little, if any, direct effect on NNRTI susceptibility.
- This virus is predicted to have low-level reduced susceptibility to **RPV**. The use of the combination of CAB/**RPV** should be considered to be relatively 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
F77L	5	10	10	10	5	5	5
M184V	15	-10	-10	10	60	60	-10
V75M	0	10	30	15	0	0	0
Total	20	10	30	35	65	65	-5

Drug resistance mutation scores of NNRTI: Download CSV

Rule	DOR	EFV	ETR	NVP	RPV
K103N	0	60	0	60	0
E138Q	0	10	10	10	15
Total	0	70	10	70	15

Drug resistance interpretation: IN

HIVDB 9.5.1 (2023-11-05)

INSTI Major Mutations: None

INSTI Accessory Mutations: None

IN Other Mutations: E13ED • K14KR • S17SN • D25E • V31I • M50I • I84L • F100Y • L101I • T112V • T124A • T125A • K136Q • V201I • I203M • I220V • N222K • Y227F • L234I • S255N • D256E

Integrase Strand Transfer Inhibitors

bictegravir (BIC)	Susceptible
cabotegravir (CAB)	Susceptible
dolutegravir (DTG)	Susceptible
elvitegravir (EVG)	Susceptible
raltegravir (RAL)	Susceptible

IN comments

Other

- **M50I** is a highly polymorphic mutation, which has a prevalence of 3% to 34% in INSTI-naïve persons depending on subtype. It has been selected in vitro by DTG and BIC in combination with R263K. It may contribute to reduced DTG and CAB susceptibility in combination with R263K.

Mutation scoring: IN

HIVDB 9.5.1 (2023-11-05)

No drug resistance mutations were found for INSTI.