Drug resistance interpretation: PR — HIVDB 9.5.1 (2023-11-05)

PI Major Mutations: M46MI • I54L

PI Accessory Mutations: K20T • L23LI • G73GS • L89T

PR Other Mutations: I13V • E35D • M36I • R41K • R57K • L63P • H69K • A71V

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

PR comments

Major

- **M46I/L** are relatively non-polymorphic PI-selected mutations. In combination with other PI-resistance mutations, they are associated with reduced susceptibility to each of the PIs except DRV.
- **I54M/L** are non-polymorphic mutations selected primarily by FPV and DRV. **I54M/L** reduce susceptibility to LPV, ATV, and DRV.

Accessory

- **K20T** is a non-polymorphic accessory PI-selected mutation associated with reduced susceptibility to ATV and LPV.
- **L23I** is an uncommon non-polymorphic mutation selected primarily by NFV. It appears to have minimal if any effects on the susceptibility to other PIs.
- **G73S/T/C/A** are common non-polymorphic accessory mutations selected primarily by most PIs. They are associated with minimally reduced susceptibility to each of the PIs.
- L89V is a nonpolymorphic accessory mutation weakly selected by each of the PIs. It appears to be minimally associated with reduced PI susceptibility. **L89T** is an uncommon non-polymorphic PI-selected mutation selected primarily by ATV.

Other

- **A71V/T** are polymorphic, PI-selected accessory mutations that increase the replication of viruses with other PI-resistance mutations.
- There is evidence for low-level **DRV** resistance. If **DRV** is administered it should be used twice daily.

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
K20T	5	0	5	5	0	15	5	0
M46MI	10	0	10	10	10	30	10	5
I54L	15	20	60	10	20	20	15	-10
G73GS	10	0	10	15	5	15	15	0
L23LI	0	0	0	0	0	15	0	0
Total	40	20	85	40	35	95	45	-5

Drug resistance interpretation: RT — HIVDB 9.5.1 (2023-11-05)

NRTI Mutations: M41L • S68SG • M184V • T215Y

NNRTI Mutations: K103KN

RT Other Mutations: V35T • K49R • V60I • A98AS • D121Y • K122E • D123DG • K126KQ • D177E • T200K • Q207E • R211K • V245Q • E248D • D250E • A272P • K281R • R284K • T286A • V292VI • P294T • K512R • S519N • Q520H • Q524K • K527E • E529D • A334S • V559I

Nucleoside Reverse Transcriptase Inhibitors	
abacavir (ABC)	Intermediate Resistance
zidovudine (AZT)	High-Level Resistance
stavudine (D4T)	Intermediate 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)	Susceptible
efavirenz (EFV)	High-Level Resistance
etravirine (ETR)	Susceptible
nevirapine (NVP)	High-Level Resistance
rilpivirine (RPV)	Susceptible

RT comments

NRTI

- **M41L** is a TAM that usually occurs with T215Y. In combination, **M41L** plus T215Y confer intermediate / high-level resistance to AZT and d4T and contribute to reduced ddI, ABC and TDF susceptibility.
- **S68G** is a polymorphic mutation that is often selected in combination with K65R. It partially restores the replication defect associated with K65R.
- **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.

NNRTI

- **K103N** is a non-polymorphic mutation that confers high-level reductions in NVP and EFV susceptibility. It is the most commonly transmitted DRM.

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
M41L	5	15	15	10	0	0	5
M41L + M184V + T215Y	10	0	0	0	0	0	0
M41L + T215Y	10	10	10	10	5	5	10
M184V	15	-10	-10	10	60	60	-10
T215Y	10	60	40	15	0	0	10
Total	50	75	55	45	65	65	15

Drug resistance mutation scores of NNRTI: Download CSV

Rule	DOR	EFV	ETR	NVP	RPV
K103KN	0	60	0	60	0

Drug resistance interpretation: IN

HIVDB 9.5.1 (2023-11-05)

INSTI Major Mutations: None

INSTI Accessory Mutations: T97A

IN Other Mutations: V31I • M50I • I60M • I72V • T112V • I113V • T124A • T125A • V126F • G134N • I135V • K136Q • F139Y • D167E • V201I • D256E • S283G

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

IN comments

Accessory

- **T97A** is a polymorphic INSTI-selected mutation that, depending on subtype, occurs in 1% to 5% of viruses from untreated persons. Alone, it has minimal effects on INSTI susceptibility but in combination with other major resistance mutations, it synergistically reduces susceptibility to each of the INSTIs.

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)

Drug resistance mutation scores of INSTI: Download CSV

Rule	BIC	CAB	DTG	EVG	RAL
T97A	0	0	0	10	10