## Drug resistance interpretation: PR

HIVDB 9.5.1 (2023-11-05)

PI Major Mutations: None
PI Accessory Mutations: None
PR Other Mutations: I13V • E35ins • M36I • R41K • R57K • L63P • E65D • H69K • V77I • 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**

- Insertions between positions 33 and 41 do not appear to be selected by PIs or to reduce PI susceptibility.

## Mutation scoring: PR

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*No drug resistance mutations were found for PI.*

## Drug resistance interpretation: RT

HIVDB 9.5.1 (2023-11-05)

NRTI Mutations: M41L • V75M • F77L • M184V • T215F
NNRTI Mutations: K103N • E138Q • Y188L
RT Other Mutations: E6D • I31L • V35T • T39L • K49R • V60I • V118I • K122E • D123N • I135T • K173L • Q174K • V179I • T200A • I202V • Q207D • L210S • R211K • L228LR • H235HR • K512R • E514D • S519N • Q524K • K527AE • E529D • V531I • L533M • A534S • A554N • K558R

| Nucleoside Reverse Transcriptase Inhibitors | |
|---|---|
| **abacavir (ABC)** | Intermediate Resistance |
| **zidovudine (AZT)** | High-Level Resistance |
| **stavudine (D4T)** | High-Level Resistance |
| **didanosine (DDI)** | High-Level 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)** | Low-Level Resistance |
| **nevirapine (NVP)** | High-Level Resistance |
| **rilpivirine (RPV)** | High-Level Resistance |

**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.
- **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.
- **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.
- **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.
- **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**

- **V118I** is a polymorphic accessory NRTI-resistance mutation that often occurs in combination with multiple TAMs.
- **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 |
|---|---|---|---|---|---|---|---|
| M41L | 5 | 15 | 15 | 10 | 0 | 0 | 5 |
| M41L + M184V + T215F | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| M41L + T215F | 10 | 10 | 10 | 10 | 5 | 5 | 10 |
| F77L | 5 | 10 | 10 | 10 | 5 | 5 | 5 |
| M184V | 15 | -10 | -10 | 10 | 60 | 60 | -10 |
| T215F | 10 | 60 | 40 | 15 | 0 | 0 | 10 |
| V75M | 0 | 10 | 30 | 15 | 0 | 0 | 0 |
| Total | 55 | 95 | 95 | 70 | 70 | 70 | 20 |

*Drug resistance mutation scores of NNRTI:*

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| Rule | DOR | EFV | ETR | NVP | RPV |
|---|---|---|---|---|---|
| Y188L | 60 | 60 | 10 | 60 | 60 |
| K103N | 0 | 60 | 0 | 60 | 0 |
| E138Q | 0 | 10 | 10 | 10 | 15 |
| Total | 60 | 130 | 20 | 130 | 75 |

Drug resistance interpretation: IN

HIVDB 9.5.1 (2023-11-05)

INSTI Major Mutations: S147SG • Q148K

INSTI Accessory Mutations: V151VA

IN Other Mutations: K14R • S24N • V31I • I60M • L63LI • K71Q • D167E • V201I • K211R • N222K • L234I • K273Q • S283G • D288DN

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

**IN comments**

**Major**

- **S147G** is a nonpolymorphic mutation selected in patients receiving RAL, EVG, and DTG. Alone it reduces EVG susceptibility about 5-fold.
- **Q148H/K/R** are nonpolymorphic mutations reported in persons receiving RAL, EVG, CAB, and DTG. They nearly always occur in combination with G140A/S or E138K. In this setting they are associated with near complete resistance to RAL and EVG, high-levels of reduction in CAB susceptibility, and low-to-intermediate reductions in DTG and BIC susceptibility.

**Accessory**

- **V151A** is an extremely rare mutation associated with minimally reduced susceptibility to RAL and EVG.
- 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 |
|---|---|---|---|---|---|
| S147SG | 10 | 10 | 10 | 60 | 10 |
| S147SG + Q148K | 15 | 20 | 15 | 0 | 0 |
| Q148K | 30 | 50 | 30 | 60 | 60 |
| V151VA | 0 | 0 | 0 | 30 | 15 |
| Total | 55 | 80 | 55 | 150 | 85 |