ANRS - AC 11: RESISTANCE GROUP
GENOTYPE INTERPRETATION: NUCLEOSIDE AND NUCLEOTIDE REVERSE TRANSCRIPTASE INHIBITORS

	Mutations associated with resistance	Mutations associated with « possible resistance »
ZDV	• T215Y/F • At least 3 mutations among: M41L, D67N, K70R, L210W, T215A/C/D/E/G/H/I/L/N/S/V, K219Q/E [1, 2, 3, 4] • Q151M • Insertion at codon 69	• T215A/C/D/E/G/H/I/L/N/S/V [1, 2, 3, 4]
3TC/FTC	• M184V/I • Insertion at codon 69	• K65R [11, 12, 16] • Q151M
ddI	• At least a score of + 2 among: M41L + T69D + 215Y/F + K219Q/E – K70R – M184 V/I [5, 14, 15, 17, 18] • L74V/I [19] • Q151M • Insertion at codon 69	• K65R [11, 12]
d4T	• V75A/M/S/T • T215Y/F [6] • At least 3 mutations among: M41L, D67N, K70R, L210W, T215A/C/D/E/G/H/I/L/N/S/V, K219Q/E [4, 7, 14, 15] • K65R [30, 31, 32] • Q151M • Insertion at codon 69	• T215A/C/D/E/G/H/I/L/N/S/V [4, 7]
ABC	• At least 4 mutations among: M41L, D67N, M184V/I, L210W, T215Y/F [8, 19, 29] • K65R [9, 11, 12] • L74V/I [24, 25, 26, 27, 28, 29] • Y115F • Q151M • Insertion at codon 69	• 3 mutations among: M41L, D67N, M184V/I, L210W, T215Y/F [8, 19, 29]
TDF	• At least 6 mutations among: M41L, E44D, D67N, T69D/N/S, L74V/I, L210W, T215Y/F [13, 20, 33] • K65R/E [9, 10, 11, 12, 34] • Insertion at codon 69 • K70E [21, 22, 23]	• 3, 4 or 5 mutations among: M41L, E44D, D67N, T69D/N/S, L74V/I, L210W, T215Y/F [13, 33]

ZDV: zidovudine, 3TC: lamivudine, FTC: emtricitabine, ddI: didanosine, d4T: stavudine, ABC: abacavir, TDF: tenofovir

ANRS - AC 11: RESISTANCE GROUP
GENOTYPE INTERPRETATION: NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS

	Mutations associated with resistance	Mutations associated with « possible resistance »
EFV	• L100I • K101E • K103H/N/S/T [1] • V106M [2] • E138K [12, 13] • Y181C/I • Y188C/L • G190A/C/E/Q/S/T/V • P225H • M230L	
NVP	• A98S (for HIV-1 subtype C only) [3] • L100I • K101E • K103H/N/S/T [1] • V106A/M [2] • Y181C/I • Y188C/H/L • G190A/C/E/Q/S/T/V • M230L	• E138K [13]
ETR	• At least 4 among: V90I, A98G, L100I, K101E/H/I/P/R, V106I, V179D/F/I/L/M/T, Y181C/I, G190A/S, M230L [4, 7, 8, 9, 10, 11] • E138K [12, 13] • Y181V [5, 6] • Y181C+H221Y [7]	• 3 mutations among: V90I, A98G, L100I, K101E/H/I/P/R, V106I, V179D/F/I/L/M/T, Y181C/I, G190A/S, M230L [4, 7, 8, 9, 10, 11] • E138A/G/Q/R [5, 6, 7, 8]
RPV	• K101E/P [9, 13] • E138A/G/K/Q/R/S [12, 13, 14] • V179L [9] • Y181C/I/V [13] • Y188L [9] • H221Y [13] • M230I/L/V [9] • L100I + K103N/S [9, 15] • L100I + K103R + V179D [15]	

EFV: efavirenz, NVP: nevirapine, ETR: etravirine, RPV : rilpivirine

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GENOTYPE INTERPRETATION: PROTEASE INHIBITORS

	Mutations associated with resistance	Mutations associated with « possible resistance »
IDV	• **M46I/L** • **V82A/F/M/S/T [11]** • **I84A/V [8]** • **L90M and at least 2 among: K20M/R, L24I, V32I, M36I, I54V/L/M/T, A71V/T, G73S/A, V77I**	• **L90M**
SQV/RTV **1000/100 mg BID**	• **G48V** • **At least 4 mutations among: L10F/I/M/R/V, I15A/V, K20I/M/R/T, L24I, I62V, G73S/T, V82A/F/S/T, I84V, L90M [9]**	• **3 mutations among: L10F/I/M/R/V, I15A/V, K20I/M/R/T, L24I, I62V, G73S/T, V82A/F/S/T, I84V, L90M [9]**
NFV	• **D30N** • **I84A/V [8]** • **N88S/D** • **L90M**	• **V82A/F/S/T and at least 2 among: L10I, M36I, M46I/L, I54V/L/M/T, A71V/T, V77I [1]**
FPV/RTV **700/100 mg BID**	• **I50V** • **V32I and I47A/V [2, 13, 14]** • **At least 4 mutations among: L10F/I/V, L33F, M36I, I54A/L/M/S/T/V, I62V, V82A/C/F/G, I84V, L90M [2, 20]**	
LPV/r	• **At least 6 mutations among: L10F/I/R/V, K20M/R, L24I, L33F, M46I/L, I50V, F53L, I54M/L/T/V, L63P, A71I/L/V/T, V82A/F/S/T, I84V, L90M [3, 4, 5, 21]** • **I47A [15, 16]** • **L76V [18, 19]**	• **4 or 5 mutations among: L10F/I/R/V, K20M/R, L24I, L33F, M46I/L, I50V, F53L, I54M/L/T/V, L63P, A71I/L/V/T, V82A/F/S/T, I84V, L90M [3, 4, 5, 21]**
ATV/RTV **300/100 mg QD**	• **I50L [6]** • **N88S [28,29,30]** • **At least 3 mutations among: L10F/I/V, G16E, L33F/I/V, M46I/L, D60E, I84V, I85V, L90M [7, 12, 22]**	
TPV/RTV **500/200 mg BID**	• **At least a score of + 3*: 36I/L/V – 53L/W/Y + 58E + 69I/K/N/Q/R/Y + 89I/M/R/T/V [10, 23]**	• **A score of + 2*: 36I/L/V – 53L/W/Y + 58E + 69I/K/N/Q/R/Y + 89I/M/R/T/V [10, 23]**
DRV/RTV **600/100 mg BID**	• **At least 4 mutations among: V11I, V32I, L33F, I47V, I50V, I54L/M, T74P, L76V, I84V, L89V [17, 24, 25, 26]**	• **3 mutations among: V11I, V32I, L33F, I47V, I50V, I54L/M, T74P, L76V, I84V, L89V [17, 24, 25, 26]**

IDV: indinavir, SQV: saquinavir, NFV: nelfinavir, RTV: ritonavir, FPV: fosamprenavir, LPV: lopinavir, ATV:atazanavir, TPV: tipranavir, DRV : darunavir

*** Insufficient data for HIV-1 subtype non-B**

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GENOTYPE INTERPRETATION: FUSION INHIBITOR

	Mutations associated with resistance
ENF **T20**	• **G36A/D/E/S/V [1, 2, 3, 4, 5, 6, 7]** • **V38A/E/K/M** • **Q40H/K/P/T** • **N42D/T** • **N43D/H/K/S** • **L44M** • **L45Q/M**

ENF (T20): enfuvirtide

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GENOTYPE INTERPRETATION: INTEGRASE INHIBITORS

	Mutations associated with resistance	Mutations associated with « possible resistance »
RAL	• T66K [10] • E92Q [1, 2] • G118R [10] • F121Y [10] • G140A/S [7] • Y143A/C/G/H/R/S [1, 3, 4, 5, 8, 14] • Q148E/G/H/K/R [1, 2] • V151L [9] • N155H/S/T [1, 2, 9] • E157Q [2]	
EVG	• T66I/A/K [6] • E92Q [6] • F121Y [9] • E138K • G140C/S • Y143A/C/G/H/R/S [14] • P145S [9] • S147G • Q148H/R/K [6] • V151L [9] • N155H/S/T [6,9] • E157Q [11]	
DTG	• G118R [12,13] • V151L [9] • S153Y • T66K + L74M • E92Q + N155H • Q148H/K/R + at least 2 mutations among: L74I or E138A/K/T or G140A/C/S [15] • Q148R + N155H • R263K [16]	• T66K [9] • S153F • Q148H/K/R + 1 mutation among: L74I or E138A/K/T or G140A/C/S [15]

RAL: raltegravir, EVG: elvitegravir, DTG: dolutegravir

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GENOTYPE INTERPRETATION FOR HIV-2

NUCLEOSIDE AND NUCLEOTIDE REVERSE TRANSCRIPTASE INHIBITORS
• **K65R : resistance to ddI, TDF, ABC [1]** • **Q151M : all NRTI except 3TC and FTC [1]** • **M184V : resistance to 3TC/FTC [1]** • **S215A/C/F/L/P/Y : resistance to AZT and d4T [1]**
NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS
• **Naturally resistant to all NNRTI [2, 3]**
PROTEASE INHIBITORS
• **Naturally resistant to APV and fosAPV [2, 3]** **Contradictory data for ATV , TPV [2, 4]**
FUSION INHIBITOR
• **Naturally resistant to T20 [2, 3]**
INTEGRASE INHIBITORS
• **Y143C/H/R : resistance to raltegravir [7]** • **Q148K/R : resistance to raltegravir [5]** • **N155H : resistance to raltegravir [6]**

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