

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

	Mutations associated with resistance	Mutations associated with « possible resistance »
ZDV	<ul style="list-style-type: none"> <li>• T215A/C/D/E/G/H/I/L/N/S/V/Y/F [1, 2, 3, 4]</li> <li>• At least 3 mutations among: M41L, D67N, K70R, L210W, K219Q/E [1, 2, 3, 4]</li> <li>• Q151M</li> <li>• Insertion at codon 69</li> </ul>	
3TC/FTC	<ul style="list-style-type: none"> <li>• K65R [11, 12, 16]</li> <li>• M184V/I</li> <li>• Insertion at codon 69</li> </ul>	<ul style="list-style-type: none"> <li>• Q151M</li> </ul>
ddl	<ul style="list-style-type: none"> <li>• At least a score of + 2 among: M41L + T69D + 215Y/F + K219Q/E – K70R – M184V/I [5, 14, 15, 17, 18]</li> <li>• K65R [11, 12]</li> <li>• L74V/I [19]</li> <li>• Q151M</li> <li>• Insertion at codon 69</li> </ul>	
d4T	<ul style="list-style-type: none"> <li>• V75A/M/S/T</li> <li>• T215A/C/D/E/G/H/I/L/N/S/V/Y/F [6]</li> <li>• At least 3 mutations among: M41L, D67N, K70R, L210W, K219Q/E [4, 7, 14, 15]</li> <li>• K65R [30, 31, 32]</li> <li>• Q151M</li> <li>• Insertion at codon 69</li> </ul>	
ABC	<ul style="list-style-type: none"> <li>• At least 3 mutations among: M41L, D67N, M184V/I, L210W, T215A/C/D/E/G/H/I/L/N/S/V/Y/F [8, 19, 29]</li> <li>• K65R [9, 11, 12]</li> <li>• L74V/I [24, 25, 26, 27, 28, 29]</li> <li>• Y115F</li> <li>• Q151M</li> <li>• Insertion at codon 69</li> </ul>	<ul style="list-style-type: none"> <li>• 2 mutations among: M41L, D67N, L210W, T215A/C/D/E/G/H/I/L/N/S/V/Y/F [8, 19, 29]</li> <li>• M184V/I [36]</li> </ul>
TDF/TAF	<ul style="list-style-type: none"> <li>• At least 4 mutations among: M41L, E44D, D67N, T69D/N/S, L74V/I, L210W, T215A/C/D/E/G/H/I/L/N/S/V/Y/F [13, 20, 33, 37, 38]</li> <li>• K65R/E/N [9, 10, 11, 12, 34, 35, 37, 38]</li> <li>• Insertion at codon 69</li> <li>• K70E [21, 22, 23]</li> </ul>	<ul style="list-style-type: none"> <li>• 3 mutations among: M41L, E44D, D67N, T69D/N/S, L74V/I, L210W, T215A/C/D/E/G/H/I/L/N/S/V/Y/F [13, 33, 37, 38]</li> </ul>

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

For DNA provirus, impact of stop codons and G->A mutations on ARV resistance is unknown

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

	Mutations associated with resistance	Mutations associated with « possible resistance »
EFV	<ul style="list-style-type: none"> <li>• L100I</li> <li>• K101E</li> <li>• K103H/N/S/T [1]</li> <li>• V106M [2]</li> <li>• E138K [12, 13]</li> <li>• Y181C/I</li> <li>• Y188C/L</li> <li>• G190A/C/E/Q/S/T/V</li> <li>• P225H</li> <li>• M230L</li> </ul>	
NVP	<ul style="list-style-type: none"> <li>• A98S (for HIV-1 subtype C only) [3]</li> <li>• L100I</li> <li>• K101E</li> <li>• K103H/N/S/T [1]</li> <li>• V106A/M [2]</li> <li>• Y181C/I</li> <li>• Y188C/H/L</li> <li>• G190A/C/E/Q/S/T/V</li> <li>• M230L</li> </ul>	<ul style="list-style-type: none"> <li>• E138K [13]</li> </ul>
ETR	<ul style="list-style-type: none"> <li>• At least 3 among: V90I, A98G, L100I, K101E/H/I/P/R, V106I, V179D/F/I/L/M/T, G190A/S, M230L [4, 7, 8, 9, 10, 11]</li> <li>• E138K [12, 13]</li> <li>• Y181C/I/V [5, 6]</li> <li>• H221Y [12,16]</li> </ul>	<ul style="list-style-type: none"> <li>• 2 mutations among: V90I, A98G, L100I, K101E/H/I/P/R, V106I, V179D/F/I/L/M/T, G190A/S, M230L [4, 7, 8, 9, 10, 11]</li> <li>• E138A/G/Q/R/S [5, 6, 7, 8]</li> </ul>
RPV	<ul style="list-style-type: none"> <li>• K101E/P [9, 13]</li> <li>• E138A/G/K/Q/R/S [12, 13, 14]</li> <li>• V179L [9]</li> <li>• Y181C/I/V [13]</li> <li>• Y188L [9]</li> <li>• F227C [9]</li> <li>• H221Y [13]</li> <li>• M230I/L/V [9]</li> <li>• L100I + K103N/S [9, 15]</li> <li>• L100I + K103R + V179D [15]</li> </ul>	<ul style="list-style-type: none"> <li>• V179D [9,15, 17]</li> </ul>

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

For DNA provirus, impact of stop codons and G->A mutations on ARV resistance is unknown

**ANRS - AC 11: RESISTANCE GROUP  
GENOTYPE INTERPRETATION: PROTEASE INHIBITORS**

	Mutations associated with resistance	Mutations associated with « possible resistance »
IDV	<ul style="list-style-type: none"> <li>• M46I/L</li> <li>• V82A/F/M/S/T [11]</li> <li>• I84A/V [8]</li> <li>• L90M and at least 2 among: K20M/R, L24I, V32I, M36I, I54V/L/M/T, A71V/T, G73S/A, V77I</li> </ul>	<ul style="list-style-type: none"> <li>• L90M</li> </ul>
SQV/RTV 1000/100 mg BID	<ul style="list-style-type: none"> <li>• G48V</li> <li>• At least 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]</li> </ul>	<ul style="list-style-type: none"> <li>• 2 mutations among: L10F/I/M/R/V, I15A/V, K20I/M/R/T, L24I, I62V, G73S/T, V82A/F/S/T, I84V, L90M [9]</li> </ul>
NFV	<ul style="list-style-type: none"> <li>• D30N</li> <li>• I84A/V [8]</li> <li>• N88S/D</li> <li>• L90M</li> </ul>	<ul style="list-style-type: none"> <li>• V82A/F/S/T and at least 2 among: L10I, M36I, M46I/L, I54V/L/M/T, A71V/T, V77I [1]</li> </ul>
LPV/r	<ul style="list-style-type: none"> <li>• At least 4 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]</li> <li>• I47A [15, 16]</li> <li>• L76V [18, 19]</li> </ul>	<ul style="list-style-type: none"> <li>• 3 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]</li> </ul>
FPV/RTV 700/100 mg BID	<ul style="list-style-type: none"> <li>• I50V</li> <li>• V32I and I47A/V [2, 13, 14]</li> <li>• 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]</li> </ul>	
ATV/RTV 300/100 mg QD	<ul style="list-style-type: none"> <li>• I50L [6]</li> <li>• N88S [28,29,30]</li> <li>• At least 3 mutations among: L10F/I/V, G16E, L33F/I/V, M46I/L, D60E, A71V/T, I84V, I85V, L90M [7, 12, 22, 31]</li> </ul>	<ul style="list-style-type: none"> <li>• 2 mutations among: L10F/I/V, G16E, L33F/I/V, M46I/L, D60E, A71V/T, I84V, I85V, L90M [7, 12, 22, 31]</li> </ul>
TPV/RTV 500/200 mg BID	<ul style="list-style-type: none"> <li>• 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]</li> </ul>	<ul style="list-style-type: none"> <li>• A score of + 2*: 36I/L/V – 53L/W/Y + 58E + 69I/K/N/Q/R/Y + 89I/M/R/T/V [10, 23]</li> </ul>

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<b>DRV/RTV**</b> <b>600/100 mg BID</b>	<ul style="list-style-type: none"><li>• At least 4 mutations among: V11I, V32I, L33F, I47V, I50V, I54L/M, T74P, L76V, I84V, L89V [17, 24, 25, 26, 27]</li></ul>	<ul style="list-style-type: none"><li>• 3 mutations among: V11I, V32I, L33F, I47V, I50V, I54L/M, T74P, L76V, I84V, L89V [17, 24, 25, 26, 27]</li></ul>
<b>800/100 mg QD</b>	<ul style="list-style-type: none"><li>• 2 mutations among: V11I, V32I, L33F, I47V, I50V, I54L/M, T74P, L76V, I84V, L89V [17, 24, 25, 26, 27]</li></ul>	

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

\*\* Please note that rules are different for DRV/RTV 600/100 mg BID and 800/100 mg QD

For DNA provirus, impact of stop codons and G->A mutations on ARV resistance is unknown

**ANRS - AC 11: RESISTANCE GROUP**  
**GENOTYPE INTERPRETATION: FUSION INHIBITOR**

	<b>Mutations associated with resistance</b>
<b>ENF</b> <b>T20</b>	<ul style="list-style-type: none"><li>• G36A/D/E/S/V [1, 2, 3, 4, 5, 6, 7]</li><li>• V38A/E/K/M</li><li>• Q40H/K/P/T</li><li>• N42D/T</li><li>• N43D/H/K/S</li><li>• L44M</li><li>• L45Q/M</li></ul>

**ENF (T20): enfuvirtide**

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GENOTYPE INTERPRETATION: INTEGRASE STRAND TRANSFER INHIBITORS

	Mutations associated with resistance	Mutations associated with « possible resistance »
RAL	<ul style="list-style-type: none"> <li>• T66K [10]</li> <li>• E92Q [1, 2]</li> <li>• G118R [10, 17]</li> <li>• F121Y [10,17]</li> <li>• G140A/S [7]</li> <li>• Y143A/C/G/H/R/S [1, 3, 4, 5, 8, 14]</li> <li>• Q148E/G/H/K/R [1, 2]</li> <li>• V151L [9]</li> <li>• N155H/S/T [1, 2, 9]</li> <li>• E157Q [2]</li> <li>• A49G + S230G/R + R263K [18]</li> </ul>	
EVG	<ul style="list-style-type: none"> <li>• T66I/A/K [6]</li> <li>• E92Q [6]</li> <li>• T97A [21,22]</li> <li>• G118R [17]</li> <li>• F121Y [9,17]</li> <li>• E138K</li> <li>• G140C/S</li> <li>• Y143A/C/G/H/R/S [14]</li> <li>• P145S [9]</li> <li>• S147G [21]</li> <li>• Q148H/R/K [6]</li> <li>• V151L [9]</li> <li>• N155H/S/T [6,9]</li> <li>• E157Q [11]</li> <li>• R263K [18]</li> </ul>	

<p>DTG* 50 mg BID</p>	<ul style="list-style-type: none"> <li>• G118R [12,13]</li> <li>• F121Y [17]</li> <li>• V151L [9,25]</li> <li>• S153Y [9, 25]</li> <li>• R263K [16]</li> <li>• T66K + L74M [9]</li> <li>• E92Q + N155H [9, 23, 24]</li> <li>• Q148H/K/R + at least 2 mutations among: L74I or E138A/K/T or G140A/C/S [15]</li> <li>• Q148H/K/R + N155H [9, 29,30]</li> </ul>	<ul style="list-style-type: none"> <li>• T66K [9]</li> <li>• S153F [9, 28]</li> <li>• E157Q [19, 20]</li> <li>• Q148H/K/R + 1 mutation among: L74I or E138A/K/T or G140A/C/S [15]</li> </ul>
<p>50 mg QD</p>	<ul style="list-style-type: none"> <li>• G118R [12,13]</li> <li>• F121Y [17]</li> <li>• E138A/K/T</li> <li>• G140A/C/S</li> <li>• Q148H/K/R</li> <li>• V151L [9,25]</li> <li>• S153Y [9,25]</li> <li>• N155H [18]</li> <li>• S230R [31]</li> <li>• R263K [16]</li> <li>• T66K + L74M [9]</li> <li>• L74I + E92Q [32]</li> </ul>	<ul style="list-style-type: none"> <li>• T66K [9]</li> <li>• S153F [9, 28]</li> <li>• E157Q [19, 20]</li> </ul>
<p>CAB</p>	<ul style="list-style-type: none"> <li>• Q148K/R [25, 26, 27]</li> <li>• T66K + L74M [25]</li> <li>• E92Q + N155H [25]</li> <li>• G140S + Q148H [25]</li> <li>• Y143H + N155H [25]</li> </ul>	

RAL: raltegravir, EVG: elvitegravir, DTG: dolutegravir, CAB: cabotegravir

\* Please note that rules are different for DTG 50 mg BID and 50 mg QD

For DNA provirus, impact of stop codons and G->A mutations on ARV resistance is unknown

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