

**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>• T215Y/F</li> <li>• 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]</li> <li>• Q151M</li> <li>• Insertion at codon 69</li> </ul>	<ul style="list-style-type: none"> <li>• T215A/C/D/E/G/H/I/L/N/S/V [1, 2, 3, 4]</li> </ul>
3TC/FTC	<ul style="list-style-type: none"> <li>• M184V/I</li> <li>• Insertion at codon 69</li> </ul>	<ul style="list-style-type: none"> <li>• K65R [11, 12, 16]</li> <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 – M184 V/I [5, 14, 15, 17, 18]</li> <li>• L74V/I [19]</li> <li>• Q151M</li> <li>• Insertion at codon 69</li> </ul>	<ul style="list-style-type: none"> <li>• K65R [11, 12]</li> </ul>
d4T	<ul style="list-style-type: none"> <li>• V75A/M/S/T</li> <li>• T215Y/F [6]</li> <li>• 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]</li> <li>• K65R [30, 31, 32]</li> <li>• Q151M</li> <li>• Insertion at codon 69</li> </ul>	<ul style="list-style-type: none"> <li>• T215A/C/D/E/G/H/I/L/N/S/V [4, 7]</li> </ul>
ABC	<ul style="list-style-type: none"> <li>• At least 4 mutations among : M41L, D67N, M184V/I, L210W, T215Y/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>• 3 mutations among : M41L, D67N, M184V/I, L210W, T215Y/F [8, 19, 29]</li> </ul>
TDF	<ul style="list-style-type: none"> <li>• At least 6 mutations among: M41L, E44D, D67N, T69D/N/S, L74V/I, L210W, T215Y/F [13, 20, 33]</li> <li>• K65R [9, 10, 11, 12]</li> <li>• Insertion at codon 69</li> <li>• K70E [21, 22, 23]</li> </ul>	<ul style="list-style-type: none"> <li>• 3, 4 or 5 mutations among: M41L, E44D, D67N, T69D/N/S, L74V/I, L210W, T215Y/F [13, 33]</li> </ul>

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

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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 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]</li> <li>• E138K [12, 13]</li> <li>• Y181V [5, 6]</li> <li>• Y181C+H221Y [7]</li> </ul>	<ul style="list-style-type: none"> <li>• 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]</li> <li>• E138A/G/Q/R [5, 6, 7, 8]</li> </ul>
RPV	<ul style="list-style-type: none"> <li>• E138K [12, 13]</li> </ul>	<ul style="list-style-type: none"> <li>• E138G/Q/R [13]</li> <li>• Y181C/I/V [13]</li> <li>• H221Y [13]</li> </ul>

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

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

	Mutations associated with resistance	Mutations associated with « possible resistance »
<b>IDV</b>	<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>
<b>SQV/RTV</b> 1000/100 mg BID	<ul style="list-style-type: none"> <li>• G48V</li> <li>• 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]</li> </ul>	<ul style="list-style-type: none"> <li>• 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>
<b>NFV</b>	<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>
<b>FPV/RTV</b> 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>	
<b>LPV/r</b>	<ul style="list-style-type: none"> <li>• 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]</li> <li>• I47A [15, 16]</li> <li>• L76V [18, 19]</li> </ul>	<ul style="list-style-type: none"> <li>• 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]</li> </ul>
<b>ATV/RTV</b> 300/100 mg QD	<ul style="list-style-type: none"> <li>• I50L [6]</li> <li>• At least 3 mutations among: L10F/I/V, G16E, L33F/I/V, M46I/L, D60E, I84V, I85V, L90M [7, 12, 22]</li> </ul>	
<b>TPV/RTV</b> 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>
<b>DRV/RTV</b> 600/100 mg BID	<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]</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]</li> </ul>

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

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

	Mutations associated with resistance
ENF T20	<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

ANRS - AC 11 : RESISTANCE GROUP

GENOTYPE INTERPRETATION: INTEGRASE 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>• F121Y [10]</li> <li>• G140A/S [7]</li> <li>• Y143C/G/H/R/S [1, 3, 4, 5, 9]</li> <li>• Q148E/G/H/K/R [1, 2]</li> <li>• V151L [10]</li> <li>• N155H/S/T [1, 2, 10]</li> <li>• E157Q [2]</li> </ul>	<ul style="list-style-type: none"> <li>• 3 mutations among : V72I, L74M, T97A, V151I, G163R, S230R [8, 10]</li> </ul>
EVG	<ul style="list-style-type: none"> <li>• T66I/A/K [6]</li> <li>• E92Q [6]</li> <li>• F121Y [10]</li> <li>• E138K</li> <li>• G140C/S</li> <li>• P145S [10]</li> <li>• S147G</li> <li>• Q148H/R/K [6]</li> <li>• V151L [10]</li> <li>• N155H/S/T [6, 10]</li> </ul>	

RAL: raltegravir, EVG: elvitegravir

**ANRS - AC 11 : RESISTANCE GROUP  
GENOTYPE INTERPRETATION FOR HIV-2**

<b>NUCLEOSIDE AND NUCLEOTIDE REVERSE TRANSCRIPTASE INHIBITORS</b>
<ul style="list-style-type: none"><li>• <b>K65R</b> : Resistance to ddl, TDF, ABC [1]</li><li>• <b>Q151M</b> : all NRTI except 3TC and FTC [1]</li><li>• <b>M184V</b> : Resistance to 3TC/FTC [1]</li><li>• <b>S215A/C/F/L/P/Y</b> : resistance to AZT and d4T [1]</li></ul>
<b>NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS</b>
<ul style="list-style-type: none"><li>• <b>Naturally resistant to all NNRTI</b> [2, 3]</li></ul>
<b>PROTEASE INHIBITORS</b>
<ul style="list-style-type: none"><li>• <b>Naturally resistant to APV and fosAPV</b> [2, 3]</li></ul> <p>Contradictory data for ATV , TPV [2, 4]</p>
<b>FUSION INHIBITOR</b>
<ul style="list-style-type: none"><li>• <b>Naturally resistant to T20</b> [2, 3]</li></ul>
<b>INTEGRASE INHIBITORS</b>
<ul style="list-style-type: none"><li>• <b>Y143C/H/R</b> : resistance to raltegravir [7]</li><li>• <b>Q148K/R</b> : Resistance to raltegravir [5]</li><li>• <b>N155H</b> : Resistance to raltegravir [6]</li></ul>

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