

MUTATIONS IN THE REVERSE TRANSCRIPTASE GENE ASSOCIATED WITH RESISTANCE TO REVERSE TRANSCRIPTASE INHIBITORS

Nucleoside and Nucleotide Analogue Reverse Transcriptase Inhibitors (nRTIs)^a

69 Insertion Complex^b (affects all nRTIs currently approved by the US FDA)



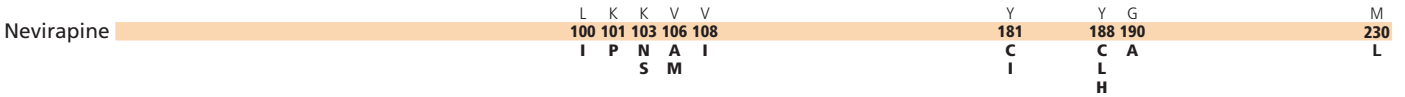
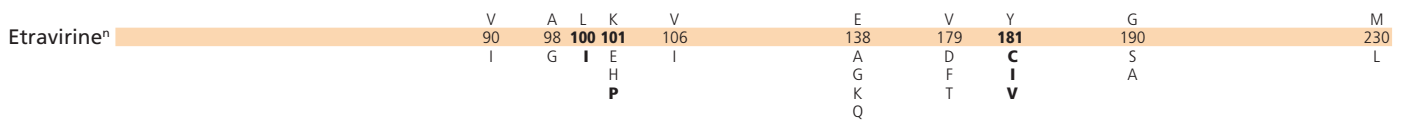
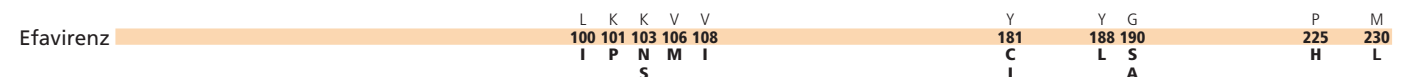
151 Complex^c (affects all nRTIs currently approved by the US FDA except tenofovir)



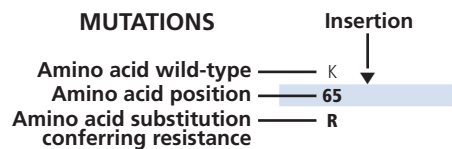
Thymidine Analogue-Associated Mutations^{d,e} (TAMs; affect all nRTIs currently approved by the US FDA other than emtricitabine and lamivudine)



Nonnucleoside Analogue Reverse Transcriptase Inhibitors (NNRTIs)^{a,m}



Amino acid abbreviations: A, alanine; C, cysteine; D, aspartate; E, glutamate; F, phenylalanine; G, glycine; H, histidine; I, isoleucine; K, lysine; L, leucine; M, methionine; N, asparagine; P, proline; Q, glutamine; R, arginine; S, serine; T, threonine; V, valine; W, tryptophan; Y, tyrosine.



MUTATIONS IN THE PROTEASE GENE ASSOCIATED WITH RESISTANCE TO PROTEASE INHIBITORS^{p,q,r}

Atazanavir +/- ritonavir ^s	L 10	G 16	K 20	L 24	V 32	L 33	E 34	M 36	M 46	G 48	I 50	F 53	I 54	D 60	I 62	I 64	A 71	G 73	V 82	I 84	I 85	N 88	L 90	I 93
	I	E	R	I	I	I	Q	I	I	V	L	L	L	E	V	L	V	C	A	V	V	S	M	L
	F	M			F			L	L		Y	V				M	I	S	T				M	
	V				V			V								V		L	I					
	C																A		I					
Darunavir/ ritonavir ^t	V 11				V 32	L 33			I 47	I 50	I 54							T 74	L 76	I 84		L 89		
	I				I	F		V	V	M	L							P	V	V		V		
Fosamprenavir/ ritonavir	L 10				V 32				M 46	I 47	I 50	I 54						G 73	L 76	V 82	I 84		L 90	
	F				I			L	V	V	L							S	V	A	V		M	
	I																			F				
	R																			S				
	V																			T				
Indinavir/ ritonavir ^u	L 10	K 20	L 24	V 32	L 33			M 36	M 46			I 54						A 71	G 73	L 76	V 77	V 82	I 84	L 90
	I	M	I	I				I	I			V						V	S	V	I	A	V	M
	R	R						L	L									T	A			F		
	V																					T		
Lopinavir/ ritonavir ^v	L 10	K 20	L 24	V 32	L 33			M 36	M 46	I 47	I 50	F 53	I 54					L 63	A 71	G 73	L 76	V 82	I 84	L 90
	F	M	I	I	F			I	V	V	L	V						P	V	S	V	A	V	M
	I	R						L	A													F		
	R																					T		
	V																					S		
Nelfinavir ^{u,w}	L 10			D 30				M 36	M 46									A 71	V 77	V 82	I 84	N 88	L 90	
	F			N				I	I									V	I	A	V	D	M	
	I								L									T		F		S		
Saquinavir/ ritonavir ^u	L 10		L 24						G 48		I 54			I 62				A 71	G 73	V 77	V 82	I 84	L 90	
	I		I						V		V			V				V	S	I	A	V	M	
	R																	T			F			
	V																				T			
																					S			
Tipranavir/ ritonavir	L 10			L 33		M 36	K 43	M 46	I 47		I 54	Q 58		H 69		T 74				V 82	N 83	I 84	L 89	
	V			F		I	T	L	V		A	E		K		P				L	D	V	I	
						L					M			R						T			M	
						V					V												V	

MUTATIONS IN THE ENVELOPE GENE ASSOCIATED WITH RESISTANCE TO ENTRY INHIBITORS

Enfuvirtide ^x	G 36	I 37	V 38	Q 39	Q 40	N 42	N 43
	D	V	A	R	H	T	D
	S		M				
			E				
Maraviroc ^y	See User Note						

MUTATIONS IN THE INTEGRASE GENE ASSOCIATED WITH RESISTANCE TO INTEGRASE STRAND TRANSFER INHIBITORS^z

Dolutegravir ^{aa}						F 121	E 138	G 140	Q 148	N 155	R 263		
						Y	A	A	H	H	K		
							K	S	K		R		
									R				
Elvitegravir ^{bb}		T 66			E 92	T 97	F 121		S 147	Q 148	N 155	R 263	
		I			Q	A	Y		G	H	H	K	
		A			G				K			R	
		K							R				
Raltegravir ^{cc}			L 74		E 92	T 97	F 121	E 138	G 140	Y 143	Q 148	N 155	R 263
			M		Q	A	Y	A	A	R	H	H	K
								K	S	H	K		R
										C	R		