

3004615: Cytomegalovirus Drug Resistance by Next Generation Sequencing, Ganciclovir, Foscarnet, Cidofovir, Maribavir and Letemovir

EVALUATED MUTATIONS

Gene	Variant	Cidofovir	Foscarnet	Ganciclovir	Maribavir	Letemovir	Confirmed by Phenotyping	References
UL27	A269T	-	-	-	P	-	Y	85
UL27	A406V	-	-	-	P	-	Y	85
UL27	C415*	-	-	-	P	-	Y	85
UL27	D534Y	-	-	-	P	-	Y	97
UL27	E22*	-	-	-	P	-	Y	85
UL27	L193F	-	-	-	P	-	Y	85
UL27	L335P	-	-	-	P	-	N	85
UL27	L426F	-	-	-	P	-	Y	85
UL27	R233S	-	-	-	P	-	Y	97
UL27	R448P	-	-	-	P	-	Y	97
UL27	V353E	-	-	-	P	-	Y	85
UL27	W153R	-	-	-	P	-	Y	85
UL27	W362*	-	-	-	P	-	Y	85
UL27	W362R	-	-	-	P	-	Y	59
UL54	883-884ins	-	-	-	-	-	N	107
UL54	981-982del	R	R	R	-	-	Y	28, 44, 49, 56, 64, 88, 131, 132
UL54	A505V	P	-	P	-	-	Y	105, 132
UL54	A543P	R	-	R	-	-	Y	131, 138
UL54	A809V	-	R	R	-	-	Y	15, 44, 47, 49, 56, 74, 77, 127, 132
UL54	A834P	R	R	R	-	-	Y	80, 88, 132
UL54	A987G	R	-	R	-	-	Y	2, 17, 24, 38, 44, 47, 53, 132
UL54	A987V	-	R	-	-	-	Y	139
UL54	C524del	R	-	R	-	-	Y	101, 132
UL54	C539G	R	-	R	-	-	Y	106, 132
UL54	C539R	R	-	R	-	-	Y	93, 95
UL54	D301N	R	-	R	-	-	Y	35, 49, 56, 132
UL54	D413A	R	-	R	-	-	Y	78, 88, 132
UL54	D413E	R	-	R	-	-	Y	10, 35, 38, 39, 44, 49, 56, 88, 132
UL54	D413N	R	-	R	-	-	Y	106, 132
UL54	D413Y	R	-	R	-	-	Y	93, 132
UL54	D515E	R	R	R	-	-	Y	113, 116

Gene	Variant	Cidofovir	Foscarnet	Ganciclovir	Maribavir	Letermovir	Confirmed by Phenotyping	References
UL54	D515Y	P	P	R	-	-	Y	116, 130, 131, 132
UL54	D542E	R	-	-	-	-	Y	102, 132
UL54	D588E	-	R	-	-	-	Y	11, 17, 38, 44, 66
UL54	D588N	-	R	R	-	-	Y	38, 56, 66, 69, 92, 132
UL54	D594N	S	S	S	-	-	Y	139
UL54	E303D	R	-	R	-	-	Y	118, 132
UL54	E303G	R	-	R	-	-	Y	118, 132
UL54	E756D	-	R	-	-	-	Y	10, 49, 56, 66, 132
UL54	E756K	-	R	R	-	-	Y	38, 49, 56, 65, 66, 92, 108, 129, 132, 136
UL54	E756Q	-	R	-	-	-	Y	55, 56, 66, 74, 132
UL54	E951D	-	R	R	-	-	Y	127, 132
UL54	E989D	P	R	R	-	-	Y	139
UL54	F412C	R	-	R	-	-	Y	1, 9, 11, 14, 17, 38, 44, 56, 132
UL54	F412L	R	-	R	-	-	Y	92, 132
UL54	F412S	R	-	R	-	-	Y	47, 92, 95, 132
UL54	F412V	R	-	R	-	-	Y	17, 38, 44, 132
UL54	F595I	-	R	-	-	-	Y	93, 95, 132
UL54	G841A	R	R	R	-	-	Y	44, 77, 88, 132
UL54	G841S	-	P	P	-	-	Y	107, 132
UL54	I521T	R	-	R	-	-	Y	30, 44, 82, 132
UL54	I726T	P	-	P	-	-	Y	107, 132
UL54	I726V	R	-	R	-	-	Y	107, 132
UL54	K493N	R	R	R	-	-	Y	139
UL54	K500N	R	-	R	-	-	Y	93, 95, 132
UL54	K513E	R	-	R	-	-	Y	11, 17, 22, 38, 44, 56, 132
UL54	K513N	R	-	R	-	-	Y	11, 35, 38, 44, 56, 132
UL54	K513R	R	-	R	-	-	Y	11, 44, 106, 132
UL54	K513T	R	-	R	-	-	Y	139
UL54	K805Q	R	-	-	-	-	Y	11, 17, 44, 74, 77, 132
UL54	L501F	P	-	R	-	-	N	10, 35, 38, 44, 47

Gene	Variant	Cidofovir	Foscarnet	Ganciclovir	Maribavir	Letermovir	Confirmed by Phenotyping	References
UL54	L501I	R	-	R	-	-	Y	1, 17, 38, 44, 56, 60, 66, 132
UL54	L516M	S	S	S	-	-	Y	100
UL54	L516P	R	-	R	-	-	Y	130
UL54	L516R	R	-	R	-	-	Y	49, 56, 132
UL54	L516W	R	-	R	-	-	Y	119, 132
UL54	L545S	R	-	R	-	-	Y	17, 44, 56, 66, 132
UL54	L545W	R	-	R	-	-	Y	92, 95, 132
UL54	L565V	P	R	P	-	-	Y	139
UL54	L773V	R	R	R	-	-	Y	54, 106, 132
UL54	L776M	-	R	R	-	-	Y	83, 88, 132
UL54	L802M	-	R	P	-	-	Y	3, 9, 11, 14, 17, 38, 56, 66, 69, 74, 88, 132
UL54	L897P	P	P	-	-	-	Y	65, 95
UL54	L957F	-	-	R	-	-	Y	93, 95, 132
UL54	M393K	R	R	R	-	-	N	14, 44
UL54	M393R	R	R	R	-	-	N	14, 44
UL54	M844T	-	R	-	-	-	Y	96, 132
UL54	M844V	-	R	R	-	-	Y	96, 132
UL54	N408D	R	-	R	-	-	Y	10, 11, 17, 35, 38, 44, 56, 66, 132
UL54	N408K	R	-	R	-	-	Y	80, 92, 132
UL54	N408S	R	-	R	-	-	Y	101, 114, 132
UL54	N410K	R	-	R	-	-	Y	38, 49, 132
UL54	N495K	-	R	-	-	-	Y	71, 88, 127, 132
UL54	P488R	R	-	R	-	-	Y	93, 95, 132
UL54	P497S	R	-	P	-	-	Y	139
UL54	P522A	R	-	R	-	-	Y	17, 44, 47, 49, 55, 56, 82, 132
UL54	P522S	R	-	R	-	-	Y	44, 82, 132
UL54	P829S	-	-	R	-	-	Y	93, 95, 132
UL54	Q578H	R	R	R	-	-	Y	54, 92, 95, 132
UL54	Q578L	-	P	P	-	-	Y	107, 132
UL54	Q783R	-	R	R	-	-	Y	127
UL54	R1052C	S	S	S	-	-	Y	11, 44, 121
UL54	S290R	-	R	-	-	-	Y	127, 132

Gene	Variant	Cidofovir	Foscarnet	Ganciclovir	Maribavir	Letermovir	Confirmed by Phenotyping	References
UL54	S585A	-	R	-	-	-	Y	93, 95, 132
UL54	T419M	-	R	-	-	-	N	54
UL54	T503I	R	-	R	-	-	Y	11, 44, 49, 56, 66, 88, 132
UL54	T552N	-	R	-	-	-	Y	93, 95, 127, 132
UL54	T700A	-	R	-	-	-	Y	6, 15, 17, 44, 56, 74, 132
UL54	T813S	R	R	R	-	-	Y	77, 88, 132
UL54	T821I	-	R	R	-	-	Y	11, 17, 44, 56, 74, 77, 88, 132
UL54	T838A	-	R	-	-	-	Y	69, 77, 88, 132
UL54	V526L	R	-	R	-	-	Y	108, 132
UL54	V715A	-	R	-	-	-	Y	119, 132
UL54	V715M	-	R	-	-	-	Y	6, 15, 17, 44, 47, 55, 56, 74, 132
UL54	V781I	-	R	R	-	-	Y	3, 17, 38, 92, 132
UL54	V787A	-	R	R	-	-	Y	116, 132
UL54	V787E	R	R	R	-	-	Y	136, 138
UL54	V787I	-	R	-	-	-	N	56
UL54	V787L	-	R	R	-	-	Y	36, 55, 74, 88, 132
UL54	V812L	R	R	R	-	-	Y	14, 16, 44, 56, 66, 69, 74, 77, 88, 118, 132
UL54	V823A	R	-	R	-	-	Y	139
UL54	V946L	-	R	-	-	-	Y	93, 95, 132
UL54	Y722V	R	-	R	-	-	N	11, 44
UL54	Y751H	R	-	R	-	-	N	11, 44
UL56	A365S	-	-	-	-	R	Y	131, 138
UL56	C25F	-	-	-	-	R	Y	131
UL56	C325F	-	-	-	-	R	Y	128
UL56	C325R	-	-	-	-	R	Y	128
UL56	C325W	-	-	-	-	R	Y	128, 131
UL56	C325Y	-	-	-	-	R	Y	109, 112
UL56	E237D	-	-	-	-	R	Y	125, 128
UL56	E237G	-	-	-	-	R	Y	128
UL56	F261C	-	-	-	-	R	Y	128
UL56	F261L	-	-	-	-	R	Y	124, 125, 128

Gene	Variant	Cidofovir	Foscarnet	Ganciclovir	Maribavir	Letermovir	Confirmed by Phenotyping	References
UL56	F261S	-	-	-	-	R	Y	128
UL56	K258E	-	-	-	-	R	Y	125
UL56	L241P	-	-	-	-	R	Y	94, 109, 112, 124
UL56	L254F	-	-	-	-	R	Y	124, 138
UL56	L257F	-	-	-	-	R	Y	124, 138
UL56	L257I	-	-	-	-	R	Y	124, 128
UL56	L328V	-	-	-	-	R	Y	131, 138
UL56	M329T	-	-	-	-	R	Y	125, 128
UL56	N232Y	-	-	-	-	R	Y	125
UL56	N368D	-	-	-	-	R	Y	124, 138
UL56	Q204R	-	-	-	-	P	Y	125
UL56	R369G	-	-	-	-	R	Y	109
UL56	R369M	-	-	-	-	R	Y	109, 124
UL56	R369S	-	-	-	-	R	Y	94, 109
UL56	R369T	-	-	-	-	R	Y	134, 138
UL56	S229F	-	-	-	-	R	Y	124, 138
UL56	T244K	-	-	-	-	R	Y	124, 128
UL56	T244R	-	-	-	-	R	Y	128
UL56	V231A	-	-	-	-	R	Y	128
UL56	V231L	-	-	-	-	R	Y	109, 112, 124, 131
UL56	V236A	-	-	-	-	R	Y	131, 138
UL56	V236L	-	-	-	-	R	Y	128
UL56	V236M	-	-	-	-	R	Y	109, 122, 124, 129
UL56	Y321C	-	-	-	-	R	Y	128
UL97	590-593del	-	-	R	-	-	Y	44, 66
UL97	590-600del	-	-	R	-	-	N	40, 44
UL97	590-603del	-	-	R	-	-	N	35, 44
UL97	590-607del	-	-	R	-	-	Y	103
UL97	591-594del	-	-	R	-	-	Y	11, 22, 25, 44, 56, 75, 126
UL97	591-607del	-	-	R	-	-	Y	43, 44
UL97	595-603del	-	-	R	-	-	Y	29, 36, 44, 56, 126
UL97	597-598del	-	-	R	-	-	Y	126, 132
UL97	597-599del	-	-	R	-	-	Y	119, 126
UL97	597-603del	-	-	R	-	-	N	47

Gene	Variant	Cidofovir	Foscarnet	Ganciclovir	Maribavir	Letermovir	Confirmed by Phenotyping	References
UL97	600-601del	-	-	R	-	-	Y	36, 44, 126, 132
UL97	601-602del	-	-	R	-	-	Y	47, 126, 132
UL97	601-603del	-	-	R	-	-	Y	78, 126
UL97	A590T	-	-	R	-	-	Y	23, 25, 44
UL97	A591D	-	-	R	-	-	N	23, 25, 44
UL97	A591V	-	-	R	-	-	Y	126, 131, 132
UL97	A594E	-	-	R	-	-	Y	87, 88, 132
UL97	A594G	-	-	R	-	-	Y	8, 114, 132
UL97	A594P	-	-	R	-	-	Y	37, 44, 46, 47
UL97	A594S	-	-	R	-	-	Y	137, 138
UL97	A594T	-	-	R	-	-	Y	25, 34, 41, 43, 47, 56, 65, 132
UL97	A594V	-	-	R	-	-	Y	6, 25, 34, 37, 40, 47, 56, 64, 69, 75, 91, 126, 132
UL97	A606D	-	-	P	-	-	N	23, 25, 44
UL97	A613V	-	-	R	-	-	Y	100, 114, 132
UL97	A619V	-	-	S	-	-	Y	132
UL97	A674T	-	-	S	-	-	Y	132
UL97	C480F	-	-	R	R	-	Y	138, 139
UL97	C480R	-	-	R	R	-	Y	105, 132
UL97	C518Y	-	-	R	-	-	Y	104, 114, 132
UL97	C592F	-	-	R	-	-	N	44
UL97	C592G	-	-	R	-	-	Y	14, 25, 37, 38, 43, 56, 64, 69, 75, 91, 126, 127, 132
UL97	C603R	-	-	R	-	-	Y	88, 89, 91, 132
UL97	C603S	-	-	R	-	-	Y	88, 103, 132
UL97	C603W	-	-	R	-	-	Y	11, 14, 25, 37, 38, 44, 47, 56, 75, 91, 132
UL97	C603Y	-	-	R	-	-	N	23, 25, 37, 44
UL97	C607F	-	-	R	-	-	Y	34, 43, 44, 75, 132
UL97	C607Y	-	-	R	-	-	Y	11, 13, 22, 25, 43, 44, 47, 56, 132
UL97	D456N	-	-	R	R	-	Y	138
UL97	D605E	-	-	S	-	-	Y	132, 138
UL97	E362D	-	-	R	S	-	Y	140

Gene	Variant	Cidofovir	Foscarnet	Ganciclovir	Maribavir	Letermovir	Confirmed by Phenotyping	References
UL97	E596D	-	-	S	-	-	Y	113, 132
UL97	E596G	-	-	R	-	-	Y	11, 14, 25, 43, 44, 56, 65, 132
UL97	E596Y	-	-	R	-	-	Y	113, 132
UL97	E596del	-	-	R	-	-	Y	126, 132
UL97	E655K	-	-	S	-	-	Y	132
UL97	F342S	-	-	R	R	-	Y	99, 111, 117, 132
UL97	F342Y	-	-	R	R	-	Y	133, 138
UL97	G598S	-	-	R	-	-	Y	23, 25, 33, 44, 56
UL97	G598V	-	-	R	-	-	Y	23, 25, 33, 44, 56
UL97	H411L	-	-	-	R	-	Y	97, 138
UL97	H411N	-	-	-	R	-	Y	97, 138
UL97	H411Y	-	-	-	R	-	Y	97, 138, 139
UL97	H520Q	-	-	R	-	-	Y	25, 37, 47, 53, 56, 72, 91, 132
UL97	I610T	-	-	R	-	-	Y	113, 132
UL97	K355M	-	-	R	R	-	Y	99, 132
UL97	K355del	-	-	R	R	-	Y	99
UL97	K359E	-	-	R	-	-	Y	133, 138
UL97	K359N	-	-	R	-	-	Y	140
UL97	K359Q	-	-	R	-	-	Y	133, 138
UL97	K599E	-	-	S	-	-	Y	132
UL97	K599M	-	-	R	-	-	N	23, 25, 44
UL97	K599R	-	-	S	-	-	Y	132
UL97	K599T	-	-	R	-	-	Y	19, 44, 132
UL97	K599del	-	-	R	-	-	Y	126, 132
UL97	L337M	-	-	-	R	-	Y	97, 138
UL97	L348V	-	-	-	R	-	Y	140
UL97	L397R	-	-	-	R	-	Y	97, 138
UL97	L405P	-	-	R	-	-	Y	87, 132
UL97	L595F	-	-	R	-	-	Y	5, 25, 44, 56, 132
UL97	L595S	-	-	R	-	-	Y	6, 25, 37, 38, 40, 47, 56, 64, 66, 75, 91, 132
UL97	L595T	-	-	R	-	-	N	11, 25, 44
UL97	L595W	-	-	R	-	-	Y	25, 37, 43, 44, 47, 56, 75, 132

Gene	Variant	Cidofovir	Foscarnet	Ganciclovir	Maribavir	Letermovir	Confirmed by Phenotyping	References
UL97	L595del	-	-	R	-	-	Y	4, 25, 40, 44, 126, 132
UL97	L600I	-	-	S	-	-	Y	132
UL97	L600del	-	-	R	-	-	Y	25, 43, 44, 56, 65, 126, 132
UL97	L634Q	-	-	S	-	-	Y	132
UL97	M460I	-	-	R	-	-	Y	3, 6, 25, 37, 38, 47, 56, 66, 72, 75, 91, 132
UL97	M460L	-	-	R	-	-	N	23, 44
UL97	M460T	-	-	R	-	-	Y	87, 132
UL97	M460V	-	-	R	-	-	Y	25, 34, 37, 40, 53, 54, 56, 64, 72, 75, 91, 132
UL97	M615V	-	-	S	-	-	Y	132
UL97	N597D	-	-	S	-	-	Y	132
UL97	N597I	-	-	R	-	-	N	23, 25, 44
UL97	P521L	-	-	R	R	-	Y	99, 132
UL97	T409M	-	-	-	R	-	Y	97, 138, 139
UL97	T601M	-	-	S	-	-	Y	132
UL97	T601del	-	-	R	-	-	Y	67, 126, 132
UL97	V345I	-	-	-	S	-	Y	140
UL97	V353A	-	-	-	R	-	Y	97, 138
UL97	V356G	-	-	R	R	-	Y	99, 111, 132
UL97	V466G	-	-	R	R	-	Y	88, 89, 132
UL97	Y617H	-	-	S	-	-	Y	132
UL97	Y617del	-	-	R	R	-	Y	138

\* = stop codon

del = deletion

R = "Resistant". Resistant indicates evidence of drug resistance compared with a wild-type virus.

P = "Possible Resistance". Possible resistance indicates mutations were detected with borderline-level drug resistance or conflicting resistance status reported in the literature.

S = "Sensitive". Ignored by the plugin and reported as additional variant.

! = No known resistance-association or phenotypically confirmed sensitivity to specified drug. Ignored by the plugin.

Y = "Yes". Mutation's resistance profile was confirmed by marker transfer/phenotyping experiments.

N = "No". Mutation's resistance profile has not been confirmed by marker transfer/phenotyping experiments.



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