

Influenza A(H1N1)pdm09 genotypic drug resistance interpretation's algorithm
October 2023 - Version n°1

Souche	Protein	Mutation	N2 numbering*	Comments	Neuraminidase inhibitors (NAIs)#				PA inhibitors		References
					Osetamivir	FC.IC50.osetamivir	Zanamivir	FC.IC50.zanamivir	Baloxavir	FC.IC50.Baloxavir	
A(H1N1)pdm09	NA	S110F	110		RI	10	RI	17-18			(1, 2)
A(H1N1)pdm09	NA	I117R	117	Mutation I117T found in A(H5N1): RI to osetamivir and zanamivir	NI	1	RI	10			(3)
A(H1N1)pdm09	NA	E119A	119	Mutation found in A(H5N1) with same resistance profile	NI/RI	8-17	RI	58-90			(4, 5)
A(H1N1)pdm09	NA	E119D	119	Mutation found in A(H5N1) with same resistance profile	RI	25-94	HRI	583-2731			(5-7)
A(H1N1)pdm09	NA	E119G	119	Mutation found in A(H5N1) with same resistance profile	NI	1-7	HRI	113-1306			(5, 7-9)
A(H1N1)pdm09	NA	E119V	119	Mutation found in A(H1N1) before 2009 linked to higher resistance at least HRI for all NAI	RI	60	HRI	571			(8)
A(H1N1)pdm09	NA	Q136K	136	Mutation found in A(H1N1) before 2009 with same resistance profile	NI	1	HRI	86-749			(4, 10, 11)
A(H1N1)pdm09	NA	Q136R	136	Mutation Q136L found in A(H5N1) : RI to osetamivir and HRI to zanamivir	NI	1	HRI	200			(12)
A(H1N1)pdm09	NA	R152K	152		RI	18-43	NI/RI	4-12			(5, 7)
A(H1N1)pdm09	NA	D199E	198		RI	16-26	NI	7-8			(7, 13)
A(H1N1)pdm09	NA	D199G	198	Mutation found in A(H5N1) with same resistance profile	RI	17	NI	6			(4, 8)
A(H1N1)pdm09	NA	D199Y	198		RI	37	RI	28			(14)
A(H1N1)pdm09	NA	I223K	222		RI	12-39	NI	5-6			(13, 15, 16)
A(H1N1)pdm09	NA	I223L	222		RI	11	NI	2			(17)
A(H1N1)pdm09	NA	I223R	222		RI	13-45	NI/RI	8-12			(13, 16, 18-20)
A(H1N1)pdm09	NA	I223T	222		NI/RI	9-15	NI	3			(4)
A(H1N1)pdm09	NA	S247G	246		RI	15	NI	1			(13)
A(H1N1)pdm09	NA	S247R	246		RI	36-37	RI	51-54			(3)
A(H1N1)pdm09	NA	H275Y	274	Main mutation found in all N1 and linked with HRI to osetamivir and peramivir. This mutation could be linked to other mutation like substitution on 119 to become RI/HRI to all NAI	HRI	221-1637	NI	1-6			(22-31)
A(H1N1)pdm09	NA	R293K	292		RI	33	NI	4			(5, 9)
A(H1N1)pdm09	NA	N295S	294	Mutation found in A(H1N1) before 2009 and A(H5N1) with same resistance profile	RI/HRI	64-208	NI	2-9			(4, 5, 8, 12)
A(H1N1)pdm09	NA	I427T	427		RI	37	RI	41			(14)
A(H1N1)pdm09	NA	I436N	436		RI	31	RI	71			(32)
A(H1N1)pdm09	NA	P458T	459		HRI	280	HRI	808			(7)
A(H1N1)pdm09	PA	E23G							*	4-7	(7-10)
A(H1N1)pdm09	PA	E23K		Mutation found in A(H1N1) before 2009 with same resistance profile					*	7-13	(9-11)
A(H1N1)pdm09	PA	E23R							*	13	(12)
A(H1N1)pdm09	PA	K34R							*	2-5	(9)
A(H1N1)pdm09	PA	A37T							*	5	(13)
A(H1N1)pdm09	PA	I38F		Mutation found in A(H1N1) before 2009 with same resistance profile					*	7-17	(14, 15)
A(H1N1)pdm09	PA	I38L		Mutation found in A(H1N1) before 2009 with same resistance profile					*	7-12	(7, 8, 16, 17)
A(H1N1)pdm09	PA	I38M		Mutation found in A(H1N1) before 2009 with same resistance profile					*	7- 9	(14, 15, 18)
A(H1N1)pdm09	PA	I38S		Mutation found in A(H1N1) before 2009 with same resistance profile					R	31-112	(9, 11, 16, 19)
A(H1N1)pdm09	PA	I38T		Mutation found in A(H1N1) before 2009 with same resistance profile					R	11-124	(9, 11, 14-16, 20,21)
A(H1N1)pdm09	PA	I38V		Mutation found in A(H1N1) before 2009 with same resistance profile					*	2-4	(7, 9)
A(H1N1)pdm09	PA	E198K		Mutation found in A(H1N1) before 2009 with same resistance profile					*	2	(6)
A(H1N1)pdm09	PA	E199D							*	3	(17)
A(H1N1)pdm09	PA	E199G							*	1-4	(9, 18)

*Not enough data to assess clinical resistance