

附表 5 A/Astrakhan/3212/2020 (H5N8) 的交叉反应性 CD4⁺ T 细胞嵌套表位
Annexed table 5 Cross-reactivity CD4⁺ T-cell nested epitopes of A/Astrakhan/3212/2020 (H5N8)

Protein Segments	Amino acid point	Overlapping cross-reactive CD4 ⁺ T-cell epitopes	Topology	Antigenic score (AS)	Allergenicity	Toxicity
HA	344-359	<i>KRGLFGAIAGFEGGW</i>	outside	0.4399	Non-Allergen	Non-Toxic
	439-457	<i>YNAELLYLMENERTLDFHD</i>	outside	1.0457	Non-Allergen	Non-Toxic
NEP	93-110	<i>SFEQITFMQALQLLEVE</i>	outside	0.5809	Non-Allergen	Non-Toxic
	6-33	<i>EVEITYLSIVSPGPKAEIAQRLEDVFA</i>	outside	0.3510	Non-Allergen	Non-Toxic
M1	38-76	<i>DLEALMEWLKTRPILSPLTKGILGFVFTLVPSERGLQR</i>	outside	0.4495	Non-Allergen	Non-Toxic
	104-120	<i>KREIFHGAKEVALSYS</i>	inside	0.7828	Non-Allergen	Non-Toxic
	168-192	<i>TTNPLIRHENRMVLASTTAKAMEQM</i>	inside	0.5543	Non-Allergen	Non-Toxic
	208-225	<i>QARQMVQAMRTIGTHPSS</i>	inside	0.1508	Non-Allergen	Non-Toxic
	35-68	<i>GIGRFYIQMCTELKLSDYEGRLIQNSITIERMVL</i>	outside	0.2544	Non-Allergen	Non-Toxic
	104-127	<i>WVRELLYDKEEIRRWQRANNGE</i>	outside	0.2391	Non-Allergen	Non-Toxic
	145-177	<i>DATYQRTRALVRTGMDPRMCSLMQGSTLPRRSG</i>	inside	0.7183	Non-Allergen	Non-Toxic
	184-200	<i>KGVGTMVMELIRMIKRG</i>	inside	0.4428	Non-Allergen	Non-Toxic
	215-239	<i>TRIAFERMCNILKGFQTAAQRAMM</i>	inside	0.2543	Non-Allergen	Non-Toxic
	254-291	<i>EDLIFLARSALILRGSVAHKSCLPACVYGLAVASGYDF</i>	outside	0.5506	Non-Allergen	Non-Toxic
PB2	298-312	<i>LVGHDPFRLLQNSQV</i>	outside	0.5606	Non-Allergen	Non-Toxic
	323-340	<i>AHKSQLVWMACHSAAAFED</i>	inside	0.2673	Non-Allergen	Non-Toxic
	377-397	<i>STLELSRYWAITRSRGGNTN</i>	inside	1.1646	Non-Allergen	Non-Toxic
	402-429	<i>SAGQISVQPTFSVQRNLPFERATIMAAF</i>	outside	0.8385	Non-Allergen	Non-Toxic
	24-62	<i>TYDHMAIIKKYTSGRQEKNPALRMKWMMAMKYPTADKR</i>	outside	0.6303	Non-Allergen	Non-Toxic
	114-131	<i>VYKTYFEKVERLKHGTFG</i>	inside	0.4341	Non-Allergen	Non-Toxic
	311-327	<i>CKAAMGLRISSSFSGG</i>	inside	0.8238	Non-Allergen	Non-Toxic
	357-375	<i>HEGYEEFTMVGRRATAILR</i>	inside	0.8890	Non-Allergen	Non-Toxic
	434-450	<i>LLRHFQKDAKVLFQNWG</i>	inside	0.0098	Non-Allergen	Non-Toxic
	629-645	<i>SRMQFSSLTVNVRGSGM</i>	inside	0.8634	Non-Allergen	Non-Toxic
NS1	30-47	<i>APFLDRLRRDQKSLRGRG</i>	inside	0.1415	Non-Allergen	Non-Toxic

Italics epitopes refer to nested identified CD8⁺ T-cell epitopes; Underscored epitopes refer to nested identified B-cell.

续表 5 A/Astrakham/3212/2020(H5N8)的交叉反应性 CD4⁺ T 细胞嵌套表位Continued Table 5 Cross-reactivity CD4⁺ T-cell nested epitopes of A/Astrakham/3212/2020 (H5N8)

Protein Segments	Amino acid point	Overlapping cross-reactive CD4 ⁺ T-cell epitopes	Topology	Antigenic score (AS)	Allergenicity	Toxicity	
PA	124-141	RREVHIYZLEKAWKIKSE	inside	0.5512	Non-Allergen	Non-Toxic	
	175-189	LFTRQEMANRGLWD	inside	0.4300	Non-Allergen	Non-Toxic	
	257-271	IEPFLKTTTPRPLRLP	outside	0.7227	Non-Allergen	Non-Toxic	
	278-295	QRSKFLMDALKLSIEDP	outside	0.5679	Non-Allergen	Non-Toxic	
	431-447	DVAPIEHIASMRRNFT	inside	0.6760	Non-Allergen	Non-Toxic	
	456-472	TEYIMKGVYNTALLNA	inside	0.2879	Non-Allergen	Non-Toxic	
	497-515	KTNLYGFHIKGRSHLRNDT	inside	0.4594	Non-Allergen	Non-Toxic	
	517-532	VVNFVSMFSLTDPRL	outside	1.4058	Non-Allergen	Non-Toxic	
	558-576	SRPMFLYVRTNGTSKIKMK	inside	0.7234	Non-Allergen	Non-Toxic	
	661-678	ESRKLLLVQALRDNLEP	outside	0.6194	Non-Allergen	Non-Toxic	
	PB1	4-21	NPTLLFLKVPQAIAISTT	outside	0.3321	Non-Allergen	Non-Toxic
		34-49	TGTGYTMDTVNRTHQY	inside	0.7208	Non-Allergen	Non-Toxic
		144-160	ANTIEVFRSNGLTANES	inside	0.0798	Non-Allergen	Non-Toxic
		216-231	NYLRALZNTMTKDA	inside	0.0143	Non-Allergen	Non-Toxic
		267-292	NEKKAKLANVVRKMMTN	inside	0.2478	Non-Allergen	Non-Toxic
		316-369	<i>RMFLAMITYTRNQPEWFRNVL</i> SAPIMFSNKMARLGKGYMFESKSMKLRITQIP	outside	0.4040	Non-Allergen	Non-Toxic
		387-425	KKIEKIRPLLIDGTASLSPGMMMGFNMLSTVLGVSIILN	TMhelix	0.5818	Non-Allergen	Non-Toxic
445-461		DDFALIVNAPNHEGIQA	outside	0.2862	Non-Allergen	Non-Toxic	
498-514		<i>RYGFVANFSMELPSFGV</i>	outside	0.6569	Non-Allergen	Non-Toxic	
525-540		IGVTVIKNNMINNDLG	inside	0.6689	Non-Allergen	Non-Toxic	
595-611	GPNLYNIRNLHIPEVCL	outside	1.0489	Non-Allergen	Non-Toxic		
693-707	CSLFEKFFPSSSYRR	outside	0.0556	Non-Allergen	Non-Toxic		
710-715	GISSMVEAMVSRARID	inside	0.2051	Non-Allergen	Non-Toxic		

Italics epitopes refer to nested identified CD8⁺ T-cell epitopes; Underscored epitopes refer to nested identified B-cell.