

Systematic Identification of Optimal HIV-1 CTL Epitopes

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Over the last ten years, the efforts of many laboratories have led to the identification of numerous HLA class I restricted CTL epitopes in most of the HIV-1 proteins. With the help of many other scientists, who generously contributed their unpublished data, we have created this list which includes only epitopes for which the restricting HLA class I molecule has been defined and for which peptide titration with truncated peptides have been performed. Since the last update of this CTL epitope list in 1997, four new epitopes have been included while two epitopes have been removed due to conflicting data regarding HLA restriction and definition of the minimal epitope, respectively. We consistently try to verify data regarding newly described CTL epitopes before their inclusion in this database. In order to keep this list

as flawless and updated as possible it would be very helpful for us to receive information about newly identified epitopes as they become available. Also conflicting data, when brought to our attention, will be addressed to keep the database as accurate as possible. For comments and/or contributions to the CTL epitope list (C.B. or B.W.) or the database (B.K.) please call, write, or mail us at:

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Table 1 Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference	
HLA-A2	p17	77-85	LAI	SLYNTVATL	[Johnson (1991), Parker (1992), Parker (1994)]	
	RT	33-41	LAI	ALVEICTEM	[Haas (1998)]	
	RT	346-354	LAI	VITYQYMDL	[Harrer (1996a)]	
	RT	476-484	LAI	ILKEPVHGV	[Walker (1989), Tsomides (1991)]	
	gp120	311-320	IIIB	RGPGRAFVTI	[Alexander-Miller (1996)]	
	gp41	818-827	LAI	SLINATDIAY	[Dupuis (1995)]	
	nef	136-145	LAI	PLTFGWCYKL	[Haas (1996)], B. Maier and B. Autran, Per. comm.	
	nef	180-189	LAI	VLEWRFDSRL	[Haas (1996)], B. Maier and B. Autran, Per. comm.	
	HLA-A3.1	p17	18-26	LAI	KIRLRPGGK	[Harrer (1996b)]
		p17	20-28	LAI	RLRPPGKKK	B. Culmann, D. Lewinsohn, D. Ruhl, S. Riddell, B. Wilkes, Per. comm. [Goulder (1997)]
p17		20-29	LAI	RLRPPGKKKY	B. Wilkes, D. Ruhl, Per. comm.	
RT		33-43	LAI	ALVEICTEMEK	[Haas (1998)]	
RT		325-333	LAI	AIFQSSMTK	[Threlkeld (1997)]	
gp120		37-46	LAI	TVYYGVPVWK	[Johnson (1994)]	
gp41		775-785	LAI	RLRDLILLIVTR	[Takahashi (1991)]	
nef		73-82	LAI	QVPLRPMTRYK	[Koenig (1990), Culmann (1991)]	
				23	C	[DiBrino (1993)]
				IF	K	
			L	Y		

Optimal HIV-1 CTL Epitopes

Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference
HLA-A11	p17	84-92	LAI	2	[Zhang (1993)]
	p24	349-359	III-B	I	
	RT	325-333	LAI	K	
				L	
HLA-A19	p17	84-92	LAI	TIYCVHQRI	T. Harter, Per. comm.
	p24	349-359	III-B	ACQGVGGPGGHHK	[Sipsas (1997)]
	RT	325-333	LAI	AIFQSSWTK	[Johnson & Walker(1994), Zhang (1993), Threlkeld (1997)]
				TYQEPFKNIK	B. Culmann, Per. comm.
	nef	75-82	LAI	PLRPMTYK	[Culmann (1991)]
				AVDLSHFLK	[Culmann (1991)]
A*7401	RT	71-79	Clade A/B/D	ITLWQREPLV	S. Rowland-Jones, Per. comm.
HLA-A24	p17	28-36	LAI	KYKIKHIVW	D. Lewinsohn, Per. comm.
	p24	296-306	HIV-1 clade A	RDYVDRFFKTL	S. Rowland-Jones, Per. comm.
	gp120	53-62	LAI	LFCASDAKAY	[Lieberman (1992), Shankar (1996)]
				YIKDQQLL	[Dai (1992)]
	Nef	138-147	LAI	RYPLTFGW	[Goulder (1997)]
HLA-A25	p24	145-155	LAI	QAISPRITINAW	I. Kurane, K. West, Per. comm.
	p24	203-212	LAI	ETINEEAAEW	[Klenerman (1996), van Baalen (1996)]
HLA-A26	p24	167-175	LAI	EVIPMFSAL	[Goulder (1996a)]
	RT	593-603	LAI	ETFFYYVDGAANR	B. Wilkes, D. Ruhl, Per. comm.

Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference
HLA-A28					
A*6802	RT	71-79	Clade A/B/D	ITIMQRPLV	S. Rowland-Jones, Per. comm.
A*6802	RT	85-93	Clade D	DTVLEEMNL	S. Rowland-Jones, Per. comm.
HLA-A29					
	gp120	376-384	LAI	FNGGGEFFY	[Wilson (1997)]
HLA-A31					
	gp41	775-785	LAI	RLRDLLIVTR	[Safrit (1994a), Safrit (1994b)]
HLA-A32					
	RT	559-568	LAI	PIQKETWETW	[Harrer (1996b)]
	gp120	419-427	HXB2	RIKQIINMW	[Harrer (1996b)]
HLA-B7					
				123	C [Englehard (1993)]
				APR	L
	p24	148-156	LAI	SPRTINAWV	D. Lewinsohn, Per. comm.
	p24	179-187	LAI	ATPQDLNTM	B. Wilkes, D. Ruhl, Per. comm.
	RT	323-332	LAI	SPAIFOSSMT	C. Hey and D. Ruhl, Per. comm.
	gp120	303-312	LAI	RPNNNTRKSI	[Safrit (1994b)]
	gp41	843-851	LAI	IIPRRIRQGL	B. Wilkes and D. Ruhl, Per. comm.
	nef	68-77	LAI	FPVTPQVPLR	[Haas (1996)], B. Maier and B. Autran, Per. comm.
	nef	77-85	LAI	RPMTYKAAAL	[Bauer (1997)]
	nef	128-137	LAI	TPGPGVRYPL	[Culmann-Penciolelli (1994), Haas (1996)], B. Maier and B. Autran, Per. comm.

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Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference
HLA-B8	p17	24-31	LAI	GKKKKYKTL	[Rowland-Jones (1993), Goulder (1997)]
	p17	74-82	LAI	ELRSLYNTV	[Goulder (1997c)]
	p24	260-267	LAI	EIYKRWII	[Sutton (1993), Goulder (1997c)]
	gp120	2-10	III-B	RVKEREYQHL	[Sipsas (1997)]
	gp41	591-598	LAI	YLKDQQLL	[Johnson (1992), Shankar (1996)]
	nef	13-20	LAI	WPTVRERM	[Goulder (1997c)]
HLA-B14	nef	90-97	LAI	FLKEKGGI	[Culmann-Penciolelli (1994), Price (1997)]
				23 56 C	[DiBriño (1994)]
				RL RI L KY HL F	
HLA-B15	p24	298-306	LAI	DRFYKTLRA	[Harrer (1996b)]
	gp41	589-597	LAI	ERYLKKDQQL	[Johnson (1992)]
	gp120	375-383	LAI	SFNCGGEFF	[Wilson (1997)]
HLA-B18	p24	293-302	HIV-1 clade B/D	FRDYVDRFYK	[Ogg (1998)]
	nef	135-143	LAI	YPLTFGWCY	[Culmann (1991), Culmann-Penciolelli (1994)]

Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference	
HLA-B27	p17	18-27	LAI	KIRLRPGGKK	D. Lewinsohn, Per. comm.	
	p17	19-27	LAI	IRLRPGGKK	D. Lewinsohn, Per. comm.	
	p24	263-272	LAI	KRWIILGLNK	[Nixon (1988), Buseyne (1993)]	
	gp41	590-597	LAI	RYLKDQQL	[Shankar (1996)]	
	gp41	791-799	LAI	GRRGWEALKY	[Lieberman (1992)], J. Lieberman, Per. comm.	
	p24	265-274	HIV-2	RRWIQLGLQK	[Rowland-Jones (1998)]	
	B*2705	nef	105-114	LAI	RRQDILDLWI	[Goulder (1997a)]
		nef	73-82	LAI	QVPLRPMTYK	B. Culmann, Per. comm.
		nef	134-141	LAI	RYPLTFGW	B. Culmann, Per. comm.
		HLA-B35			2	C
				P	Y	
					S	
HLA-B35	p17	124-132	JH31	NSSKVSQNY	[Rowland-Jones (1995)]	
	p17	36-44	LAI	WASRELERF	[Goulder (1997b)]	
	p24	254-262	U455	PIPIVGDIV	[Rowland-Jones (1995)]	
	RT	262-270	LAI	TVLDVGDAY	B. Wilkes, D. Ruhl, Per. comm.	
	RT	273-282	III-B	VPLDEDFRKY	[Sipsas (1997), Shiga (1996)]	
	RT	328-336	III-B	NPDIVITYQY	[Sipsas (1997), Shiga (1996)]	
	RT	342-350	LAI	HPDIVITYQY	[Rowland-Jones (1995)]	
	gp120	42-52	LAI	VPVWKEATTTL	B. Wilkes, D. Ruhl, Per. comm.	
	gp41	611-619	LAI	TAVPWNASW	[Johnson (1994)]	
	nef	74-81	LAI	VPLRPMTTY	[Culmann (1991), Culmann-Penciolelli (1994)]	
	gag	245-253	HIV-2	NPVVPVGNITY	[Rowland-Jones (1995)]	

Optimal HIV-1 CTL Epitopes

Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference				
HLA-B37	nef	120-128	LAI	YFPDWQNYT	[Culmann (1991)] and Per. comm.				
				HLA-B39	p24	193-201	LAI	GHQAMQML	I. Kurane, K. West, Per. comm.
				HLA-B42				p17	20-29
HLA-B44	RT	438-446	LAI	YPGIKVRQL	B. Wilkes, D. Ruhl, Per. comm.				
				p24	306-316	SF2	AEQASQDYKMW	Lewinsohn, Per. comm.	
HLA-B45	gp120	30-38	SF33	AENLWTVVY	[Borow (1997)]				
				HLA-B*4402	p24	294-304	HIV-1 clade B	RDYVDRFYKTL	[Ogg (1998)]
HLA-B51	RT	591-600	LAI	GAETFYVDGA	B. Wilkes, D. Ruhl, Per. comm.				
				p24	325-333	LAI	NANPDCKTI	B. Wilkes, D. Ruhl, Per. comm.	
HLA-B52	RT	42-50	LAI	EKEGKISKI	[Haas (1998)]				
				RT	295-302	III-B	TAFTTIPSI	[Sipsas (1997)]	
				gp41	557-565	III-B	RAIEAQQHL	[Sipsas (1997)]	
HLA-B52	p24	275-282	LAI	RMYSPTSI	B. Wilkes, D. Ruhl, Per. comm.				

Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference		
HLA-B53				2	[Hill (1992)]		
				C			
				P			
				Y			
				F			
				W			
	HIV-2 gag	173-181	HIV-2	TPYDINQML	[Gotch (1993)]		
HLA-B55	gp120	42-51	LAI	VPVWKEAATTT	[Shankar (1996)]		
HLA-B57	p24	147-155	III-B	ISPRTLINAW	[Johnson (1991), Goulder (1996b)]		
				140-149	LAI	TSTLQEQIGW	[Goulder (1996b)]
				162-172	LAI	KAFSPPEVI PMF	[Goulder (1996b)]
				240-249	LAI	TSTLQEQIGW	[Goulder (1996b)]
				311-319	LAI	QASQEVKKNW	[Goulder (1996b)]
				311-319	LAI	QASQDVKKNW	[Goulder (1996b)]
				311-319	LAI	QASQDVKKNW	[Goulder (1996b)]
				116-125	LAI	HTQGYPFDWQ	[Culmann (1991)]
				120-128	LAI	YFPDWQNTT	[Culmann (1991)]
HLA-B58	p24	240-249	LAI	TSTLQEQIGW	[Goulder (1996b)]		
HLA-B60	p17	92-101	LAI	IEIKDKTEAL	A. Trocha and S. Kalams, Per. comm.		

Optimal HIV-1 CTL Epitopes

Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference
HLA-Bw62	p17	20-29	LAI	RLRPGKKKY	[Johnson (1991)], B. Wilkes, D. Ruhl, Per. comm.
	p24	268-277	LAI	LGLNKIVRMY	[Johnson (1991)]
	RT	415-426	III-B	LVGKLNWASQTY	P. Johnson, Per. comm.
	RT	476-485	LAI	ILKEPVHGVY	[Johnson (1991)], P. Johnson, Per. comm.
	nef	84-91	LAI	AVDLSHFL	[Culmann-Penciolelli (1994)]
	nef	117-127	LAI	TQGYFPDQNY	B. Culmann, Per. comm.
HLA-Cw*01,02	p24	168-175	LAI	VIPIFSAI	P. Goulder in press <i>AIDS</i>
				2	[Falk (1994)]
HLA-Cw4				Y	F
				P	L
				F	M
C*0401	gp120	380-388	LAI	SFNCGGEFF	[Johnson (1993), Wilson (1997)]
	p24	308-316	LAI	QASQEVKNW	[Buseyne (1997)]

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