

Systematic Identification of Optimal HIV-1 CTL Epitopes

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Updated October 1997

Characterization of the cellular immune response against HIV has led to the identification of numerous HLA class I restricted CTL epitopes and many laboratories have contributed to the description of CTL epitopes in most of the HIV-1 proteins. Since the last update of this CTL epitope list in 1996, a number of new epitopes have been published and are included in the current update. References have also been updated for epitopes previously listed as personal communications which have since been published.

For this update, we maintained the same rigid criteria for inclusion in the list of optimal epitopes as in previous years. First, the peptide has to be involved in the natural immune response against HIV. Thus, only epitopes that have been shown to induce a specific CTL response upon HIV infection *in vivo* are included. Second, the peptides have to be truncated to the size of the optimal epitope, which is the shortest epitope that is recognized at the lowest peptide concentration; and third, the HLA class I restricting molecule has to be identified. We therefore excluded epitopes from the list of optimal epitopes if only the binding to a certain class I molecule has been shown but not the immunogenicity *in vivo*, or if no peptide titration assay with truncated peptides has been reported. However, those epitopes are included in the extended CTL epitope list in Part I of this database. Nine newly listed optimal epitopes are included this year, bringing the total number to 110. These epitopes add to the previously identified pattern of CTL epitopes being widely distributed over the expressed HIV proteins.

In order to keep this list updated it would be very helpful for us to receive information about newly identified epitopes as they become available. For comments and/or contributions to this CTL epitope list (C.B. or B.W.) or the main database (B.K.) please call, write, or mail us at:

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Optimal HIV-1 CTL Epitopes

Table 1 Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference	
HLA-A2				2 C	[Falk et al.(1991)]	
				L V		
				I L		
	p17	77-85	LAI	SLYNTVATL	[Johnson et al.(1991), Parker et al.(1992), Parker et al.(1994)]	
	RT	346-354	LAI	VIYQYMDDL	[Harrer et al.(1996a)]	
	RT	476-484	LAI	ILKEPVHGV	[Walker et al.(1989), Tsomides et al.(1991)]	
	A*0201	gp120	311-320	IIIB	RGPGRAFVTI	[Alexander-Miller et al.(1996)]
		gp41	818-827	LAI	SLLNATDIAV	[Dupuis et al.(1995)]
		nef	136-145	LAI	PLTFGWCYKL	[Haas et al.(1996)], B. Maier and B. Autran Per. comm.
		nef	180-189	LAI	VLEWRFDSRL	[Haas et al.(1996)], B. Maier and B. Autran Per. comm.
	nef	190-198	LAI	AFHHVAREL	[Hadida et al.(1995)], B. Autran Per. comm.	
HLA-A3.1				23 C	[DiBrino et al.(1993)]	
				IF K		
				L Y		
	p17	18-26	LAI	KIRLRPGGK	[Harrer et al.(1996b)]	
	p17	20-28	LAI	RLRPGGKKK	B. Culmann, D. Lewinsohn, D. Ruhl, S. Riddell, B. Wilkes, Per. comm. [Goulder et al.(1997a)]	
	p17	20-29	LAI	RLRPGGKKKY	B. Wilkes, D. Ruhl Per. comm.	
	RT	325-333	LAI	AIFQSSMTK	[Threlkeld et al.(1997)]	
	gp120	37-46	LAI	TVYYGVPVWK	[Johnson et al.(1994)]	
	gp41	775-785	LAI	RLRDLLLVTR	[Takahashi et al.(1991)]	
	nef	73-82	LAI	QVPLRPMTYK	[Koenig et al.(1990), Culmann et al.(1991)]	
HLA-A11				2 C	[Zhang et al.(1993)]	
				I K		
				L		
	p17	84-92	LAI	TLYCVHQRI	T. Harrer Per. comm.	
	p24	349-359	III-B	ACQGVGGPGGHK	[Sipsas et al.(1997)]	
	RT	325-333	LAI	AIFQSSMTK	[Johnson & Walker(1994), Zhang et al.(1993), Threlkeld et al.(1997)]	
	RT	508-517	LAI	IYQEPFKNLK	B. Culmann Per. comm.	
	nef	73-82	LAI	PLRPMTYK	[Culmann et al.(1991)]	
	nef	84-92	LAI	AVDLSHFLK	[Culmann et al.(1991)]	

Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference
HLA-A19					
A*7401	RT	71-79	Clade A/B/D	ITLWQRPLV	S. Rowland-Jones Per. comm.
HLA-A24					
	p17	28-36	LAI	KYKCLKHIVW	D. Lewinsohn Per. comm.
	gp120	53-62	LAI	LFCASDAKAY	[Lieberman et al.(1992), Shankar et al.(1996)]
	gp41	591-598	LAI	YTKDQQLL	[Dai et al.(1992)]
HLA-A25					
	p24	145-155	LAI	QAISPRTLNAW	I. Kurane, K. West Per. comm.
	p24	203-212	LAI	ETINEEAAEW	[Klenerman et al.(1996), van Baalen et al.(1996)]
HLA-A26					
	p24	167-175	LAI	EVIPMFSAL	[Goulder et al.(1996a)]
	RT	593-603	LAI	ETFYVDGAANR	B. Wilkes, D. Ruhl Per. comm.
HLA-A28					
A*6802	RT	71-79	Clade A/B/D	ITLWQRPLV	S. Rowland-Jones Per. comm.
A*6802	RT	85-93	Clade D	DTVLEEMNL	S. Rowland-Jones Per. comm.
HLA-A29					
	gp120	376-384	LAI	FNCGGEFFY	[Wilson et al.(1997)]
HLA-A31					
	gp41	775-785	LAI	RLRDLLLIVTR	[Safrin et al.(1994a), Safrin et al.(1994b)]
HLA-A32					
	RT	559-568	LAI	PIQKETWETW	[Harrer et al.(1996b)]
	gp120	419-427	HXB2	RIKQIINMW	[Harrer et al.(1996b)]
HLA-B7					
				123 C	[Englehard et al.(1993)]
				APR L	
	p24	148-156	LAI	SPRTLNAWV	D. Lewinsohn Per. comm.
	p24	179-187	LAI	ATPQDLNTM	B. Wilkes, D. Ruhl Per. comm.
	RT	323-332	LAI	SPAIFQSSMT	C. Hey and D. Ruhl, Per. comm.
	gp120	303-312	LAI	RPNNNTRKSI	[Safrin et al.(1994b)]
	gp41	843-851	LAI	IPRRIRQGL	B. Wilkes and D. Ruhl, Per. comm.
	nef	68-77	LAI	FPVTPQVPLR	[Haas et al.(1996)], B. Maier and B. Autran Per. comm.
	nef	77-85	LAI	RPMTYKAAL	[Bauer et al.(1997)]
	nef	128-137	LAI	TPGPGVRYPL	[Culmann-Penciolelli et al.(1994), Haas et al.(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				23 5 C P R L LK K I M	[Hill et al.(1992), Sutton et al.(1993)]
	p17	24-31	LAI	GGKKKYKL	[Rowland-Jones et al.(1993), Goulder et al.(1997a)]
	p17	74-82	LAI	ELRSLYNTV	[Goulder et al.(1997d)]
	p24	259-267	LAI	EIYKRWII	[Sutton et al.(1993), Goulder et al.(1997d)]
	gp120	2-10	III-B	RVKEKYQHL	[Sipsas et al.(1997)]
	gp41	591-598	LAI	YLKDQQLL	[Johnson et al.(1992), Shankar et al.(1996)]
	nef	13-20	LAI	WPTVRERM	[Goulder et al.(1997d)]
	nef	90-97	LAI	FLKEKGGL	[Culmann-Penciolelli et al.(1994), Price et al.(1997)]
HLA-B14				23 56 C RL RI L KY HL F	[DiBrino et al.(1994)]
	p24	183-191	LAI	DLNTMLNTV	[Nixon & McMichael(1988), Johnson et al.(1992)]
	p24	298-306	LAI	DRFYKTLRA	[Harrer et al.(1996b)]
	gp41	589-597	LAI	ERYLKDQQL	[Johnson et al.(1992)]
HLA-B15	gp120	375-383	LAI	SFNCGGEFF	[Wilson et al.(1997)]
HLA-B18	nef	135-143	LAI	YPLTFGWCY	[Culmann et al.(1991), Culmann-Penciolelli et al.(1994)]
HLA-B27				2 C R K R	[Jardetzky et al.(1991)]
	p17	18-27	LAI	KIRLRPGGKK	D. Lewinsohn Per. comm.
	p17	19-27	LAI	IRLRPGGKK	D. Lewinsohn Per. comm.
	p24	263-272	LAI	KRWIILGLNK	[Nixon et al.(1988), Buseyne et al.(1993)]
	gp41	590-597	LAI	RYLKDQQL	[Shankar et al.(1996)]
	gp41	791-799	LAI	GRRGWEALKY	[Lieberman et al.(1992)], J. Lieberman Per. comm.
B*2703	gag	260-269	HIV-2	RRWIQLGLQK	S. Rowland-Jones Per. comm.
B*2705	nef	105-114	LAI	RRQDILDWI	[Goulder et al.(1997b)]
	nef	73-82	LAI	QVPLRPMTYK	B. Culmann Per. comm.
	nef	134-141	LAI	RYPLTFGW	B. Culmann Per. comm.

Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference
HLA-B35				2 C P Y S	[Hill et al.(1992)]
	p17	124-132	LAI	NSSKVSQNY	[Rowland-Jones et al.(1995)]
	p17	36-44	LAI	WASRELERF	[Goulder et al.(1997c)]
	p24	254-262	LAI	PPIPVGDIY	[Rowland-Jones et al.(1995)]
	RT	262-270	LAI	TVLDVGDAY	B. Wilkes, D. Ruhl Per. comm.
	RT	273-282	III-B	VPLDEDFRKY	[Sipsas et al.(1997), Shiga et al.(1996)]
	RT	328-336	III-B	NPDIVIYQY	[Sipsas et al.(1997), Shiga et al.(1996)]
	RT	342-350	LAI	HPDIVIYQY	[Rowland-Jones et al.(1995)]
	gp120	42-52	LAI	VPVWKEATTTL	B. Wilkes, D. Ruhl Per. comm.
	gp41	611-619	LAI	TAVPWNASW	[Johnson et al.(1994)]
	nef	74-81	LAI	VPLRPMTY	[Culmann et al.(1991), Culmann-Penciolelli et al.(1994)]
	gag	245-253	HIV-2	NPVPVGNLY	[Rowland-Jones et al.(1995)]
	HLA-B37	nef	120-128	LAI	YFPDQNYT
HLA-B39	p24	193-201	LAI	GHQAAMQML	I. Kurane, K. West Per. comm.
HLA-B42	p17	20-29	LAI	RLRPGGKKKY	B. Wilkes, D. Ruhl Per. comm.
	RT	438-446	LAI	YPGIKVRQL	B. Wilkes, D. Ruhl Per. comm.
HLA-B44	p24	306-316	LAI	AEQASQDVKNW	Lewinsohn Per. comm.
	gp120	30-38	LAI	AENLWVTVY	[Borrow et al.(1997)]
HLA-B45	RT	591-600	LAI	GAETFYVDGA	B. Wilkes, D. Ruhl Per. comm.
HLA-B51	p24	325-333	LAI	NANPDCKTI	B. Wilkes, D. Ruhl Per. comm.
	RT	295-302	III-B	TAFTIPSI	[Sipsas et al.(1997)]
	gp41	557-565	III-B	RAIEAQQHL	[Sipsas et al.(1997)]
HLA-B52	p24	275-282	LAI	RMYSPTSI	B. Wilkes, D. Ruhl Per. comm.

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Table 1 (cont.) Best Defined HIV CTL Epitopes

HLA	Protein	AA	Isolate	Sequence	Reference
HLA-B53				2 C	[Hill et al.(1992)]
				P Y F W	
	HIV-2 gag	173-181	HIV-2	TPYDINQML	[Gotch et al.(1993)]
HLA-B55	gp120	42-51	LAI	VPVWKEATTT	[Shankar et al.(1996)]
HLA-B57	p24	147-155	III-B	ISPRTLNAW	[Johnson et al.(1991), Goulder et al.(1996b)]
	p24	140-149	LAI	TSTLQEIQIGW	[Goulder et al.(1996b)]
	p24	162-172	LAI	KAFSPEVIPMF	[Goulder et al.(1996b)]
	p24	240-249	LAI	TSTLQEIQIGW	[Goulder et al.(1996b)]
	p24	311-319	LAI	QASQEVKNW	[Goulder et al.(1996b)]
	p24	311-319	LAI	QASQDVKNW	[Goulder et al.(1996b)]
	nef	116-125	LAI	HTQGYFPDWQ	[Culmann et al.(1991)]
	nef	120-128	LAI	YFPDWQNYT	[Culmann et al.(1991)]
HLA-B58	p24	240-249	LAI	TSTLQEIQIGW	[Goulder et al.(1996b)]
HLA-B60	p17	93-101	LAI	EIKDTKEAL	A. Trocha and S. Kalams Per. comm.
HLA-Bw62	p17	20-29	LAI	RLRPGGKKKY	[Johnson et al.(1991)], B. Wilkes, D. Ruhl Per. comm.
	p24	268-277	LAI	LGLNKIVRMY	[Johnson et al.(1991)]
	RT	415-426	III-B	LVGKLNWASQIY	P. Johnson Per. comm.
	RT	476-485	LAI	ILKEPVHGVY	[Johnson et al.(1991)], P. Johnson Per. comm.
	nef	84-91	LAI	AVDLSHFL	[Culmann-Penciolelli et al.(1994)]
	nef	117-127	LAI	TQGYFPDWQNY	B. Culmann Per. comm.
HLA-Cw*01,02	p24	168-175	LAI	VIPMFSAL	P. Goulder in press <i>AIDS</i>
HLA-Cw4				2 C	[Falk et al.(1994)]
				Y F	
				P L	
				F M	
	gp120	380-388	LAI	SFNCGGEFF	[Johnson et al.(1993), Wilson et al.(1997)]
C*0401	p24	308-316	LAI	QASQEVKNW	[Buseyne et al.(1997)]

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