Table 2: **p24**

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(132-140 SF2)	p24(1-6) NOTES:	NYPIVQNL	HIV-1 infection	human(A*2402)	[IkedaMoore97]
	The epitoDefined unchors iThis pept	The epitope starts in p17 and ends in p24 Defined using reverse immunogenetics – 59 HLA-A*2402 binding peptides were predicted by searching for A*2402 anchors in HIV proteins, (Tyr at 2, and Phe, Leu or IIe at the C term) – 53 of the 59 peptides bound A*2402 This peptide induced CTL in 1/4 HIV-1+ people tested	-A*2402 binding peptide or Ile at the C term) – 53 tested	s were predicted by search of the 59 peptides bound <i>i</i>	ing for A*2402 A*2402
	NYPIVQ presented	NYPIVQNL bound to A*2402 with medium strength, the epitope can be processed in a vaccinia construct and presented – two specific CTL clones were obtained	rength, the epitope can led	be processed in a vaccinia	a construct and
p24(140-152 IIIB)	p24(8-20)	GQMVHQAISPRTL	HIV-1 infection	human(Cw3)	[Littaua91]
	 Fine spec 	 Fine specificity of human Cw3 restricted Gag CTL epitope 	L epitope		
p24(140-159)	p24(8-27) NOTES:	GQMVHQAISPRTLNAWVKVV	HIV-1 infection	human(B14)	[Musey97]
	 CTL spec 	• CTL specific for this epitope were found in the peripheral blood but not cervical mucosa of one donor	eripheral blood but not ce	rvical mucosa of one done	or
p24(143-164 BH10)	p24(11-32)	VHQAISPRTLNAWVKVV- EEKAF	HIV-1 infection	human(Bw57)	[Johnson91]
	NOTES: • Gag CTL	OTES: Gag CTL response studied in three individuals			
p24(145-155 LAI)	p24(13-23)	QAISPRTLNAW		human(A5)	[KuranePerCom]
p24(147-155 IIIB)	p24(15-23)	ISPRTLNAW	HIV-1 infection	human(B*5801, B*57)	[Goulder96]
	NOTES: • Five slow • Peptide d	TES: Five slow progressors made a response to this epitope, and in two it was the dominant response Peptide defined on the basis of B*5801 binding motif, yet not cross-restricted except at high concentrations	tope, and in two it was th	e dominant response ted except at high concent	rations

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(148-156)	p24(16-24)	SPRTLNAWV		human(B7)	[Brander97]
	• Optimal	 Optimal peptide mapped by titration, per. comm. from D. Lewinsohn to C. 	from D. Lewinsohn to C	. Brander and B. Walker	
p24(151-159)	p24(19-27) NOTES:	TLNAWVKVV	HIV-1 infection	human(A2)	[Parker92, Parker94]
	• Study of	• Study of sequence motifs preferred for peptide binding to class I HLA-A2	nding to class I HLA-A2		
p24(153-174 BH10)	p24(21-42)	NAWVKVVEEKAFSPEVI- PMFSA	HIV-1 infection	human(Bw57)	[Johnson91]
	NOTES: • Gag CTI	OTES: Gag CTL response studied in three individuals			
p24(153-172 SF2)	p24(21-40) NOTES:	NAWVKVVEEKAFSPEVIPMF	HIV-1 infection	human	[Lieberman97]
	 Of 25 pa 12 subjec One of th The resp	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A2, B21	han 1 HIV-1 protein ia expressed LAI gag		
p24(153-172 SF2)	p24(21-40)	NAWVKVVEEKAFSPEVIPMF	HIV-1 Pr55gag VLP with anchored gp120 or V3+CD4 linear domains	Macaca mulatta	[Wagner98]
	NOTES: • A VLP is VLPs bo Ab respo not V3+(SHIV ch	TES: A VLP is a non-infectious virus-like particle self-assembled from HIV Pr55 gag — macaques were immunized with VLPs bound to either gp120 or V3+CD4 linear domains — gag and env specific CTL were stimulated in each case, and Ab response to gag and gp120 and was elicited, but the gp120 neutralizing response occurred only with whole gp120, not V3+CD4 — despite the CTL and Ab response, immunized macaques were infected by intervenous challenge with SHIV chimeric challenge stock [Wagner98] CTL specific for this epitope could be found both before and after SHIV challenge	-assembled from HIV Pr5 mains – gag and env speci at the gp120 neutralizing n immunized macaques we	5 gag – macaques were immunized with fic CTL were stimulated in each case, and esponse occurred only with whole gp120, re infected by intervenous challenge with hallenge	munized with each case, and whole gp120, hallenge with
p24(160-179)	p24(28-47) NOTES: • Cervical	(28-47) EEKAFSPEVIPMFSALSEGA HIV-1 infection human(B27) TES: Cervical and peripheral blood derived CTL clones from an HIV infected woman recognized this epitope	HIV-1 infection s from an HIV infected w	human(B27)	[Musey97]

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(162-172 LAI)	p24(30-40) NOTES:	KAFSPEVIPMF	HIV-1 infection	human(B*57)	[Goulder96]
	This peptPeptide dThis epit	This peptide was recognized by CTL from five slow progressors Peptide defined on the basis of B*5801 binding motif, yet not cross-restricted except at high concentrations This epitope is highly conserved	ow progressors otif, yet not cross-restrict	ed except at high concentr	ations
p24(163-182)	p24(31-50) NOTES:	AFSPEVIPMFSALSEGATPQ	HIV infection	human	[Lieberman95]
	• HIV-spec	• HIV-specific CTL lines developed by $ex vivo$ stimulation with peptide	ulation with peptide		
p24(163-182 SF2)	p24(31-50) NOTES:	AFSPEVIPMFSALSEGATPQ	HIV infection	human	[Lieberman97]
	 Of 25 pat 12 subjec One of th The responsation	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A2, B21	an 1 HIV-1 protein a expressed LAI gag		
p24(163-182 SF2)	p24(31-50) NOTES: • CTL expa	.(31-50) AFSPEVIPMFSALSEGATPQ HIV-1 infection OTES: • CTL expanded ex איזיס were later infused into HIV-1 infected patients	HIV-1 infection -1 infected patients	human	[Lieberman97b]
p24(167-175 LAI)	p24(35-43)	EVIPMFSAL		human(A26)	[Goulder96b]
	IdentifiedRelativelySuspected	Identified as optimal epitope within Gag sequence AFSPEVIPMFSALSEGATPQ Relatively conserved epitope within B clade and in other clades Suspected binding motif for HLA-A26 includes T or V anchor at position 2, negative charge at position 1	AFSPEVIPMFSALSEC n other clades or V anchor at position 2	ATPQ, negative charge at positi	on 1
p24(168-175 LAI)	p24(36-43)	VIPMFSAL		human(Cw*0102)	[Goulder97f]

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(169-184 LAI)	p24(37-52) NOTES:	IPMFSALSEGATPQDL	HIV-1 infection	human(B12(44))	[Buseyne93]
	 Clusterin 	 Clustering of Gag p24 CTL epitopes recognized in 29 HIV infected people 	in 29 HIV infected people		
p24(173-192 SF2)	p24(41-60) NOTES:	SALSEGATPQDLNTMLNTVG	HIV-1 infection	human	[Lieberman97]
	 Of 25 pat 12 subjec Three of The response	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag Three of these 12 had CTL response to this peptide The responding subjects were HLA-A3, A32, B7, B14; and HLA-A2, A3, B14, B	han 1 HIV-1 protein ia expressed LAI gag de ', B14; and HLA-A2, A3,	B14, B44	
p24(173-192 SF2)	p24(41-60) NOTES:	SALSEGATPQDLNTMLNTVG	HIV-1 infection	human	[Lieberman97b]
	• CTL exp	• CTL expanded ex vivo were later infused into HIV-1 infected patients	V-1 infected patients		
p24(173-194 BH10)	p24(41-62) NOTES: • Gag CTL	94(41-62) SALSEGATPQDLNTMLN- TVGGH OTES: Gag CTL response studied in three individuals	HIV-1 infection	human(B14)	[Johnson91]
p24(173-192)	p24(41-60) NOTES:	SALSEGATPQDLNMMLNIVG	HIV-1 infection	human(B*8101)	
	Clade A	Clade A epitope, per. comm. S. Rowland-Jones			
p24(181-192)	p24(47-58) NOTES:	CTPYDINQMLNC?	HIV-2 infection	human(B58)	[BertolettiPerComm98]
	• HIV-2 ep	HIV-2 epitope defined from an infection in the Gambia, Bertoletti, Per. Comm	ambia, Bertoletti, Per. Co	mm	
p24(180-187 IIIB)	p24(48-55) NOTES:	TPQDLNTM	HIV-1 infection	human(B7)	[Walkerpercom96]
	• Epitope of study	Epitope defined in the context of the Pediatric AIDS Foundation ARIEL Project, study	IDS Foundation ARIEL F	roject, a mother-infant HIV transmission	V transmission

p24	p24(183-191 LAI)	p24(183-191 LAI)	p24(183-202 SF2)	p24(181-189)	Location
NOTES: • A CTL r epitopes and confe • The A su	p24(51-59) NOTES: • No minin	p24(51-59) NOTES: • Review o	p24(51-70) NOTES:	p24(49-57) NOTES: • 82 HIV-1 • A sustain a polyclo • Despite tl could rec	WEAU
TES: A CTL response was found in exposed but uninfected prostitutes from Nairobi using previously defined B clade epitopes that tended to be conserved in A and D clades – such cross-reactivity could protect against both A and D and confer protection in Nairobi where both subtypes are circulating The A subtype consensus is identical to the B clade epitope The D subtype consensus is dLNmMLNiV	.4(51-59) DLNTMLNTV HIV-1 infection huma OTES: No minimal epitope shown, could possibly be HLA-Cw4 (C. Brander, per. comm.)	94(51-59) DLNTMLNTV HIV-1 infection huma OTES: • Review of HIV CTL epitopes – defined by B14 motif found within a larger peptide	(51-70) DLNTMLNTVGGHQAAMQMLK HIV-1 infection TIES: Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A26, A30, B38	YTES: NHV-1 infection human(B14) [Lubaki97] NES: R2 HIV-1-specific CTL clones from 5 long term non-progressors were isolated and analyzed for breadth of response A sustained Gag, Env and Nef response was observed, and clones were restricted by multiple HLA epitopes, indicating a polyclonal response Despite this being a well defined conserved epitope, none of the 11 gag-specific clones from a B-14 positive subject could recognize either it or p24 RAEQASQEV (C. Brander reported this is actually a Cw8 epitope)	Sequence
HIV-1 exposure Infected prostitutes from It clades – such cross-react types are circulating the epitope	HIV-1 infection A-Cw4 (C. Brander, per.	HIV-1 infection notif found within a large	HIV-1 infection han 1 HIV-1 protein ia expressed LAI gag	HIV-1 infection non-progressors were isolved, and clones were restripe, none of the 11 gag-sp. C. Brander reported this i	Immunogen
human(B14) [RowlandJonation RowlandJonation RowlandJonation	human(B14?) comm.)	human(B14) r peptide	human	human(B14) ated and analyzed for brea cted by multiple HLA epit ecific clones from a B-14 s actually a Cw8 epitope)	Species(HLA)
[RowlandJones98] defined B clade st both A and D	[Nixon88, Johnson92]	[McMichael94]	[Lieberman97]	[Lubaki97] idth of response opes, indicating positive subject	References

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(193-214 BH10)	p24(61-82) NOTES: • Gag CTI	94(61-82) GHQAAMQMLKETINEEA- AEWDR OTES: • Gag CTL response studied in three individuals	HIV-1 infection	human(Bw52)	[Johnson91]
p24(193-212 SF2)	p24(61-80) NOTES:	GHQAAMQMKETINEEAAEW	HIV-1 infection	human	[Lieberman97]
	Of 25 par12 subjectOne of theThe response	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A26, A30, B38	nan 1 HIV-1 protein a expressed LAI gag		
p24(193-203 BRU)	p24(61-71)	GHQAAMQMLKE	HIV-1 infection	human(A2)	[Claverie88]
,	NOTES: • 1 of 4 ep	TES: 1 of 4 epitopes first predicted, then shown to stimulate HLA-A2 restricted CTL line	ulate HLA-A2 restricted	CTL line	
p24(193-201 LAI)	p24(61-69) NOTES: • Optimal	 Q4(61-69) GHQAAMQML Optimal peptide defined by titration, I. Kurane and K. West, pers. comm. 	d K. West, pers. comm.	human(B39)	[KuranePerCom]
p24(194-202 LAI)	p24(62-70) NOTES: • P. Goulde	24(62-70) HQAAMQMLK OTES: P. Goulder, pers. comm.		human(B52)	[Brander96]
p24(199-207 SF2)	p24(65-73)	AMQMLKETI	DNA plasmid immunization	$\mathrm{murine}(\mathrm{H-}2\mathrm{K}^d)$	[Selby97]
	NOTES: • Murine CTL regene regulated • CTL response resoluble protein	Murine CTL response to peptide observed after immunization with DNA plasmid containing HIV-1 (SF2) p55gag gene regulated by bacteriophage T7 promoter CTL response required coadministration of rec vaccinia virus expressing T7 RNA polymerase or T7 RNA polymerase soluble protein	immunization with DNA cinia virus expressing T7	plasmid containing HIV-1 (SF2) p55gag RNA polymerase or T7 RNA polymerase	NA polymerase

Location p24(199-207 SF2)	WEAU p24(65-73)	Sequence AMQMLKETI	Immunogen vaccinia expressing	Species(HLA) murine(H-2K ^d)	References [Doe97]
	NOTES: • Immuno • Optimal	YTES: Immunodominant murine CTL response to this peptide observed after immunization with vaccine VV gagpol Optimal peptide was defined	eptide observed after imm	unization w	/ith vaccine V
p24(203-212)	p24(71-80) NOTES:	ETINEEAAEW	HIV-1 infection	human(A25)	A25)
	The epitIt is in aDTINEE	The epitope was defined through direct stimulation of PBMC with 20-mer peptides It is in a conserved region, ETINEEAAEW is found in most B, D, and E subtype is DTINEEAAEW is found in A and some D subtype sequences	on of PBMC with 20-mer und in most B, D, and E su pe sequences	peptides btype iso	es isolates
p24(203-212)	p24(71-80) NOTES:	ETINEEAAEW	HIV-1 infection	huma	human(A25)
	• Conserve of HIV-2	Conserved between B and D subtypes, variable in other clades; a consensus of clades A,C, F, G, and H and a peptide of HIV-2ROD over this region were not recognized by CTL recognizing the index peptide	other clades; a consensus ed by CTL recognizing th	of clade index	es A,C, F, G, and peptide
p24(203-222 SF2)	p24(71-90) NOTES:	ETINEEAAEWDRVHPVVHAGP	HIV-1 infection	human	h
	 Of 25 pa 12 subje One of tl The resp	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A2, B21	han 1 HIV-1 protein ia expressed LAI gag e		
p24(215-223 IIIB)	p24(83-92) NOTES:	VHPVHAGPIA	HIV-1 infection	huma	human(B55)
	HIV IIIB protein with HIV-1 IIIB LHPVHAGPVA LHPVHAGPIA LHPVHAGPIT, LHPAQAGPIA,	HIV IIIB proteins were used to define the range of CTL epitopes recognized by 3 lab worker with HIV-1 IIIB LHPVHAGPVA, a variant found in HIV-1 PH136, was also recognized LHPVHAGPIA, a variant found in HIV-1 RF, was also recognized LHPVHAGPIT, a variant found in HIV-1 MN, was also recognized LHPVHAGPIA, a variant found in HIV-1 JH3, was recognized at high peptide concentrations	of CTL epitopes recognized 6, was also recognized 1s also recognized 2s also recognized 2s recognized at high pept		3 lab workers accidentally infected numbers accidentally infected numbers.

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(219-233 BRU)	p24(87-101)	HAGPIAPGQMREPRG	HIV-1 infection	human(A2)	[Claverie88]
	NOTES: • 1 of 4 epitc	OTES: • 1 of 4 epitopes predicted then shown to stimulate HLA-A2 restricted CTL line	HLA-A2 restricted CTL	line	
p24(223-242 SF2)	p24(91-110) NOTES:	IAPGQMREPRGSDIAGTTST	HIV-1 infection	human	[Lieberman97]
	 Of 25 patie 12 subjects One of thes The respon	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A2, A24, B13, B35	an 1 HIV-1 protein a expressed LAI gag B35		
p24(233-252 SF2)	p24(101-120) NOTES:	GSDIAGTTSTLQEQIGWMTN	HIV-1 infection	human	[Lieberman97]
	 Of 25 patie 12 subjects One of thes The respon	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A26, A30, B38	an 1 HIV-1 protein a expressed LAI gag		
p24(240-249 LAI)	p24(108-117)	TSTLQEQIGW	HIV-1 infection	human(B*57, B*5801)	[Goulder96]
	NOTES: • Response to • For one doi • This epitop	TES: Response to this epitope was found in 4 slow progressing HLA-B*57 individuals, in For one donor (from Zimbabwe) this was defined as the optimal peptide This epitope can be presented in the context of the closely related HLA molecules	essing HLA-B*57 indivas the optimal peptide closely related HLA mo	iduals, in 2 it was dominant or very strong blecules B*5801 and B*57	or very strong
p24(241-250)	p24(108-117) NOTES:	TSTVEEQQW	HIV-2 infection	human(B58)	[BertolettiPerComm98]
	HIV-2 epiteAll HIV-2 s	HIV-2 epitope defined from an infection in the Gambia, Bertoletti, Per. Comm All HIV-2 sequences from the database are TSTVEEQIQW in this region, not TSTVEEQQW	mbia, Bertoletti, Per. Cc EEQIQW in this region,	mm not TSTVEEQQW	

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(253-274 BH10)	p24(121-142)	NPPIPVGEIYKRWIILGLNKIV	HIV-1 infection	human(B8)	[Johnson91]
	NOTES: • Gag CTL r	OTES: Gag CTL response studied in three individuals			
p24(253-272)	p24(121-140) NOTES: • HIV-specifi	4(121-140) NPPIPVGEIYKRWIILGLNK HIV infection OTES: HIV-specific CTL lines developed by ex vivo stimulation with peptide	HIV infection	human	[Lieberman95]
p24(253-272 SF2)	p24(121-140) NOTES:	NPPIPVGEIYKRWIILGLNK	HIV infection	human	[Lieberman97]
	 Of 25 patie 12 subjects Two of thes The respon	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag Two of these 12 had CTL response to this peptide The responding subjects were HLA-A2, A3, B8, B62, and HLA-A1, B8, B18	n 1 HIV-1 protein expressed LAI gag 62, and HLA-A1, B8, B1	8	
p24(253-272 SF2)	p24(121-140) NOTES: • CTL expan	(121-140) NPPIPGEIKRWIILGNIK HIV-1 infection TTES: CTL expanded <i>ex vivo</i> were later infused into HIV-1 infected patients	HIV-1 infection 1 infected patients	human	[Lieberman97b]
p24(253-267)	p24(121-135) NOTES: • High freque	(121-135) NPPIPVGEIYKRWII HIV. TES: High frequency of memory and effector Gag specific CTL	HIV-1 infection ic CTL	human(B8)	[Gotch90]
p24(255-274 SF2)	p24(121-140) NOTES: • Gag CTL e	(121-140) NPPIPVGEIYKRWIILGLNK HIV-1 infection hungres: Gag CTL epitope precursor frequencies were estimated and peptide mapping was	HIV-1 infection atted and peptide mappin	human g was performed	[vanBaalen93]

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(255-274 SF2)	p24(121-135) NOTES: • Longitudin: relative to F • [Goulder97 and that HI	I(121-135) NPPIPVGEIYKRWII HIV-1 infection human(B8) [Phillips91, NTES: Longitudinal study of CTL escape mutants – little variation was observed in the immunodominant B27 epitope, relative to B8 epitopes, which varied over time, in people with the appropriate HLA types [Goulder97e] is a review of immune escape that points out that there may be a protective effect associated with B27, and that HLA-B8 individuals tend to progress more rapidly than HLA B27 patients	HIV-1 infection ittle variation was observe in people with the approproints out that there may be ore rapidly than HLA B27	human(B8) d in the immunodominan late HLA types e a protective effect associ patients	[Phillips91, Goulder97e] t B27 epitope, ated with B27,
p24(260-268 LAI)	p24(122-130) NOTES: • Defined as	4(122-130) PPIPVGDIY HIV-1 or -2 human(B35) [Rowla infection OTES: Defined as minimal peptide by titration curve, PPIPVGEIY and HIV-2 form NPVPVGNIY are also recognized	HIV-1 or -2 infection PIPVGEIY and HIV-2 for	human(B35) n NPVPVGNIY are also n	[RowlandJones95] ecognized
p24(260-268 LAI)	p24(122-130) NOTES:	PPIPVGDIY	none	human(B35)	[Lalvani97]
	 A peptide b important could be ob This peptid activity usin 	A peptide based protocol was optimized for restimulation of CTLp using optimized peptide and IL-7 concentrations – importantly this protocol does not stimulate a primary response, only secondary – peptide-specific CTLp counts could be obtained via staining with peptide-Class I tetramers This peptide was one of the B35 presented test peptides used in control experiments showing that the assay gave no activity using lymphocytes from 21 healthy B35 seronegative donors	imulation of CTLp using o primary response, only se is I tetramers septides used in control experience of the control expe	ptimized peptide and IL-7 concentrations condary – peptide-specific CTLp counts periments showing that the assay gave no	concentrations c CTLp counts assay gave no
p24(260-268 LAI)	p24(122-130) NOTES: • Review of I	.4(122-130) PPIPVGDIY OTES: • Review of HIV CTL epitopes	HIV-1 infection	human(B35)	[McMichael94]
p24(256-270 LAI)	p24(124-138) NOTES:	94(124-138) IPVGEIYKRWIILGL HIV-1 infection OTES:	HIV-1 infection	human(B8)	[Buseyne93]
p24(261-269)	p24(127-135) NOTES: • Predicted e	(127-135) GEIYKRWII HIV-1 infection human(B8 FES: Predicted epitope based on B8 binding motifs, from larger peptide NPPIPVGEIYKRWII	HIV-1 infection rom larger peptide NPPIP	human(B8) /GEIYKRWII	[Sutton93]

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(259-267 LAI)	p24(127-135) NOTES: • Naturally o	24(127-135) GEIYKRWII HIV-1 inf OTES: Naturally occurring variant GDIYKRWII may act as antagonist	HIV-1 infection santagonist	human(B8)	[Klenerman94]
p24(259-267)	p24(127-135) NOTES: • Longitudin: fluctuated	4(127-135) GEIYKRWII HIV-1 infection human(B8) [Nowak95] > TES: - Longitudinal study of CTL response and study of immune escape – GDIYKRWII could also stimulate CTL, reactivity fluctuated	HIV-1 infection mune escape – GDIYKRV	human(B8) VII could also stimulate C	[Nowak95] CTL, reactivity
p24(259-267)	p24(127-135) NOTES: • Equivalent	######################################	HIV-1 infection by CTL from some dono	human(B8) rs	[McAdam95]
p24(259-267 SF2)	p24(127-135) NOTES: • GDIYKRW	### HIV-1 inf OTES: • GDIYKRWII specific CTL clone also recognized GEIYKRWII	HIV-1 infection EIYKRWII	human(B*0801)	[McAdam98]
p24(260-267 LAI)	p24(128-135) NOTES: • Defined in :	(128-135) EIYKRWII TES: Defined in a study of the B8 binding motif		human(B8)	[Goulder97c]
p24(265-280 BRU)	p24(130-148) NOTES: • Used as a p	(130-148) YKRWIILGLNKIVRMYSPT TES: Used as a positive control for HLA specificity	HIV-1 infection	human(B27)	[Dadaglio91]
p24(260-269 HIV- 2)	p24(131-140)	RRWIQLGLQK		human(B27)	[Brander96]
,	NOTES: • HIV-2, HL	TES: HIV-2, HLA-B*2703, S. Rowland-Jones, pers. comm.	im.		

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(263-270 SF2)	p24(129-136) NOTES:	IYKRWIIL	HIV-1 infection	human(A*2402)	[IkedaMoore97]
	 Defined usi anchors in I This peptide IYKRWIIL two speci 	Defined using reverse immunogenetics – 59 HLA-A*2402 binding peptides were predicted by searching for A*2402 anchors in HIV proteins, (Tyr at 2, and Phe, Leu or IIe at the C term) – 53 of the 59 peptides bound A*2402 This peptide induced CTL in 1/4 HIV-1+ people tested IYKRWIIL bound to A*2402 with medium strength, the epitope can be processed in a vaccinia construct and presented – two specific CTL clones were obtained	A*2402 binding peptides Ile at the C term) – 53 of sted , the epitope can be proce	were predicted by searching for A*2402 of the 59 peptides bound A*2402 ssed in a vaccinia construct and presented	ng for A*2402 *2402 and presented
p24(263-272 SF2)	p24(129-138) NOTES:	IYKRWIILGL	HIV-1 infection	human(A*2402)	[IkedaMoore97]
	 Defined using anchors in I This peptide 	Defined using reverse immunogenetics – 59 HLA-A*2402 binding peptides were predicted by searching for A*2402 anchors in HIV proteins, (Tyr at 2, and Phe, Leu or IIe at the C term) – 53 of the 59 peptides bound A*2402 This peptide induced CTL in 1/4 HIV-1+ people tested	$\Lambda*2402$ binding peptides · He at the C term) – 53 of sted	were predicted by searching for fife 59 peptides bound A*2402	ng for A*2402 .*2402
	• IYKRWIIL presented –	IYKRWIILGL bound to A*2402 with medium strength, the epitope can be processed in a vaccinia construct and presented – two specific CTL clones were obtained	rength, the epitope can l	be processed in a vaccinia	construct and
p24(263-284 BH10)	p24(131-152)	KRWIILGLNKIVRMYSPTSILD	HIV-1 infection	human(Bw62)	[Johnson91]
,	NOTES: • Gag CTL re	TES: Gag CTL response studied in three individuals			
p24(265-284 SF2)	p24(131-150) NOTES: • Gag CTL e	(131-150) KRWIILGLNKIVRMYSPTSIOTES:Gag CTL epitope precursor frequencies estimated	HIV-1 infection	human(Bw62?)	[vanBaalen93]
p24(263-282 SF2)	p24(131-150) NOTES:	KRWIILGLNKIVRMYSPTSI	HIV-1 infection	human	[Lieberman97]
	 Of 25 paties 12 subjects One of thes The response	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 A-2 had CTL response to this peptide The responding subject was HLA-A3, A32, B51, B62	ın 1 HIV-1 protein expressed LAI gag .ide 362		

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(266-277)	p24(131-145) NOTES:	KRWIILGLNKIVRMY	rec gag-vaccinia	human(B27)	[Nixon88]
	 Gag CTL e This was th	Gag CTL epitope mapped with rec gag-vaccinia and synthetic peptides. This was the first HIV-1 epitope to be mapped	d synthetic peptides		
p24(263-277 LAI)	p24(131-145) NOTES:	KRWIILGLNKIVMRY	HIV-1 infection	human(A33)	[Buseyne93]
	• Clustering	Clustering of Gag p24 CTL epitopes recognized in 29 HIV infected people	29 HIV infected people		
p24(266-277 LAI)	p24(131-145)	KRWIILGLNKIVMRY	HIV-1 infection	human(B27)	[Meyerhans91]
	 Longitudina 	 Longitudinal study showing persistence of epitope despite CTL activity 	despite CTL activity		
p24(265-279)	p24(131-145) NOTES:	KRWIILGLNKIVRMY	HIV-1 infection	human(B27)	[Nixon90]
	HIV-1 and l	HIV-1 and HIV-2 cross-reactive CTL clone, highly conserved epitope	conserved epitope		
p24(265-279C)	p24(131-146) NOTES:	KRWIILGLNKIVRMYC	HIV-1 infection	human(B27)	[Bouillot89]
	• HLA-B27 r	HLA-B27 restricted epitope also binds to HLA-A2 and HLA-B37 in solid phase assay	and HLA-B37 in solid p	hase assay	
p24(265-276)	p24(131-142) NOTES:	KRWIILGLNKIV	no CTL shown	human(B27)	[Jardetzky91]
	• Epitope exa	Epitope examined in the context of peptide binding to HLA-B27	to HLA-B27		
p24(263-274 LAI)	p24(131-142) NOTES:	KRWIILGLNKIV	HIV-1 infection	human(B27)	[Fan97]
	• The capacit studied	The capacity of dendritic cells to process and present antigen and stimulate anti-H studied	nt antigen and stimulate a	ınti-HIV-1 CTL memory responses was	esponses was

Location	WEAU	Sequence	Immunogen	${\bf Species(HLA)}$	References
p24(263-272 LAI)	p24(131-140) NOTES: • The capacit studied	4(131-140) KRWIILGLNK HIV-1 infection hun TES: The capacity of dendritic cells to process and present antigen and stimulate anti-Hi studied	HIV-1 infection ent antigen and stimulate	human(B27) [Fan97] anti-HIV-1 CTL memory responses was	[Fan97] y responses was
p24(263-272 SF2)	p24(131-139) NOTES: • Epitope inv	4(131-139) KRWIILGLNK YTES: Epitope invariant across clades A, B, C, and D	HIV-1 infection	human(B*27)	[McAdam98]
p24(263-272 LAI)	p24(131-140) NOTES:	KRWIILGLNK	HIV-1 infection	human(B27)	[Wilson98]
	 HIV+ individuals v and clonal expansio Seven HIV+ people uninfected controls Three patients wer increases 	HIV+ individuals were followed longitudinally using MHC tetramers in combination with 14 anti-BV chain MAbs, and clonal expansion of HIV-specific T cells was followed <i>in vivo</i> Seven HIV+ people were studied, and all showed expansions of particular TCR BV clones, often several, relative to uninfected controls Three patients were followed in detail, TCR VB expansions persisted for 2 to 3 years, with occasional transient increases	ing MHC tetramers in coolilowed in vivo expansions of particular expansions persisted for	mbination with 14 anti-BV chain MAbs, TCR BV clones, often several, relative to 2 to 3 years, with occasional transient	V chain MAbs, /eral, relative to sional transient
p24	p24(131-139) NOTES: • Described i	4(131-139) KRWIILGLNK HIV infec YTES: Described in this review as the first identified HIV CTL epitope	HIV infection CTL epitope	human(B27)	[RowlandJones97]
p24(263-272 LAI)	p24(131-140) NOTES:	KRWIILGLNK	HIV-1 infection	human(B*2705)	[Goulder97d, Goulder97e]
	 HLA-B*27 11/11 HLA This is a hig The HLA-E [Goulder97 of immune yet the K2 v 24 hours - 1 	HLA-B*2705 is associated with slow HIV disease progression 11/11 HLA-B*2705 donors make a response to this epitope, usually an immunodominant response This is a highly conserved epitope The HLA-B*2705 binding motif includes R at position 2, and L in the C-term position [Goulder97e] is a review on CTL immune escape that discusses this epitope in the context of the difficulty in detection of immune escape – KRWIILGLNK and a R2K change, KKWIILGLNK, show little difference in titration curves, yet the K2 variants fail to bind to targets for more than 1 hour, while the R2 form can sensitize lysis by CTL for over 24 hours – minigene transfection experiments confirmed the importance of this for the CTL response	progression is epitope, usually an im ition 2, and L in the C-to ition 2, and L in the C-to ition 2, and L in the R- ition 2, and L in the R- ition 2, and L in the C-to ition 2, and L in the C-to ition 2, and L in the C- ition 2, and L in the C- ition 3, and L in the C- ition 3, and L in the C- ition 4, and L in the C- ition 2, and L in the C- ition 2, and L in the C- ition 3, and L in the C- ition 4, and L in the C- ition 4, and L in the C- ition 2, and L in the C- ition 2, and L in the C- ition 2, and L in the C- ition 3, and L in the C- ition 4, and L in the C- ition 5, and L in the C- ition 6, and L in the C-	nunodominant response rm position in the context of the difficu show little difference in ti form can sensitize lysis b this for the CTL response	ulty in detection titration curves, y CTL for over

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(263-272 LAI)	p24(131-140) NOTES:	KRWIILGLNK	HIV-1 infection	human(B27)	[Buseyne93]
	• Clustering	 Clustering of Gag p24 CTL epitopes recognized in 29 HIV infected people 	nized in 29 HIV infected peopl	e	
p24(263-272 LAI)	p24(131-140) NOTES:	KRWIILGLNK	HIV-1 infection	human(B27)	[McMichael94]
	• Review of I	Review of HIV CTL epitopes			
p24(263-272)	p24(131-140)	KRWIIMGLNK	HIV-1 infection	human(B27)	[Klenerman94]
	• Naturally o	Naturally occurring variant KRWIILGLNK may act as antagonist	may act as antagonist		
p24(263-272)	p24(131-140)	KRWIIMGLNK	HIV-1 infection	human(B27)	[Klenerman95]
	Naturally o	 Naturally occurring variant KRWIILGLNK may act as antagonist 	may act as antagonist		
p24(265-274)	p24(131-140) NOTES:	KRWIILGLNK	HIV infection	human(B27)	[Moss95]
	In one indivTCR usageCTL clones	In one individual, TCR usage changed over time indicating that new populations of CTL can be recruited TCR usage showed a CTL clonal response to this epitope that persisted over 5 years CTL clones specific for HIV epitopes may represent between 0.2 and 1% of the total CD8+ population of T cells	time indicating that new poputo this epitope that persisted over the persisted over the persent between 0.2 and 1% of the persent between 0.2	lations of CTL can be rec er 5 years of the total CD8+ popula	ruited tion of T cells
p24(265-276)	p24(131-140) NOTES:	KRWIILGLNK		human(B27)	[Carreno92]
	Tools de la III A DOZ biodine montide commentition che de				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(265-274 SF2)	p24(131-140) NOTES:	KRWIILGLNK	HIV-1 infection	human(B27)	[Phillips91, Goulder97e]
	 Longitudinal study of relative to B8 epitope [Goulder97e] is a reviand that HLA-B8 indianal study of the properties of t	Longitudinal study of CTL escape mutants – little variation was observed in the immunodominant B27 epitope, relative to B8 epitope [Goulder97e] is a review of immune escape that points out that there may be a protective effect associated with B27, and that HLA-B8 individuals tend to progress more rapidly than HLA B27 patients	le variation was observed bints out that there may be re rapidly than HLA B27	I in the immunodominant a protective effect associa patients	B27 epitope, sted with B27,
p24(263-272)	p24(131-140) NOTES:	KRWIILGLNK	HIV-1 infection	human(B27)	[Nietfeld95, Goulder97e]
	Single poin anchor posi[Goulder97	Single point mutations were introduced and viral viability and CTL recognition anchor position P2 abrogates binding to B27, but doesn't change viral viability <i>in</i> [Goulder97e] is a review of immune escape that summarizes this study	viability and CTL recog doesn't change viral viabi ammarizes this study	nition tested – an Arg to Lys change at lity <i>in vitro</i>	Lys change at
p24(263-272)	p24(131-139) NOTES:	KRWIIMGNK	HIV-1 infection	human(B27)	[Nowak95]
	 Longitudinal s stimulate CTL 	Longitudinal study of CTL response and immune escape – the form KRWIILGNK was also found, and both forms stimulate CTL	escape – the form KRWI	ILGNK was also found, an	nd both forms
gag(263-272)	p24(131-139) NOTES:	KRWIILGNK	HIV-1 infection	human(B27)	[Durali98]
	 Cross-clade and 1 AG re to different to different Pol reactivi Gag reactivi Nef reactivi Env reactivi One of the J 	Cross-clade CTL response was studied by determining the CTL activity in seven patients from Bangui, (6 A subtype, and 1 AG recombinant infections) and one A subtype infection from a person living in France originally from Togo, to different antigens expressed in vaccinia Pol reactivity: 8/8 had CTL to A subtype, and 7/8 to B subtype, and HIV-2 Pol was not tested Gag reactivity: 7/8 reacted with A or B subtype gag, 3/8 with HIV-2 Gag Nef reactivity: 7/8 reacted with A subtype, and 5/8 with B subtype, none with HIV-2 Nef Env reactivity: 3/8 reacted with A subtype, 1/8 with B subtype, none with HIV-2 Env One of the patients was shown to react to this epitope: KRWIILGNK	ning the CTL activity in so ype infection from a perso to B subtype, and HIV-2 ag, 3/8 with HIV-2 Gag 8 with B subtype, none with th B subtype, none with I ope: KRWIILGNK	wen patients from Bangui, n living in France original Pol was not tested th HIV-2 Nef IIV-2 Env	ly from Togo,

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(263-272)	p24(131-139) NOTES:	KRWIIMGLNK	HIV-1 infection	human(B27)	[Goulder97b, Goulder97e]
	 Six HLA-B27 donor In 4/6 cases, this wa Two of the cases har following their asym The arginine to lysin to the B27 molecule [Goulder97e] is a re 	Six HLA-B27 donors studied make a strong response to this epitope In 4/6 cases, this was the immunodominant or only CTL response Two of the cases had an epitope switch to the form KKWIIMGLNK during a period of rapid decline to AIDS, following their asymptomatic period The arginine to lysine switch is in an anchor residue, and results in immune escape due to severely diminished binding to the B27 molecule [Goulder97e] is a review of immune escape that summarizes this study in the context of CTL escape to fixation	se to this epitope CTL response rm KKWIIMGLNK duri and results in immune es mmarizes this study in th	ing a period of rapid decline to AIDS, cape due to severely diminished binding e context of CTL escape to fixation	line to AIDS, nished binding to fixation
p24(268-277 LAI)	p24(136-145)	LGLNKIVRMY	Predicted from larger peptide	human(Bw62)	[McMichael94]
	Review ofAlso P. Joh	Also P. Johnson, per. comm.			
p24(271-281)	p24(136-146) NOTES:	LGLNKIVRMYS	HIV-1 infection	human(B62)	[Lubaki97]
	 82 HIV-1-specific CT A sustained Gag, Env. a polyclonal response A subject who was Eunknown epitope The two clones that re- 	 82 HIV-1-specific CTL clones from 5 long term non-progressors were isolated and analyzed for breadth of response A sustained Gag, Env and Nef response was observed, and clones were restricted by multiple HLA epitopes, indicating a polyclonal response A subject who was B62+ had CTL that recognized this peptide, p17 KIRLRPGGKKKYKL, and one additional unknown epitope The two clones that recognized this enitone used two different Vβ genes, further demonstrating a polyclonal response 	a-progressors were isolat d, and clones were restrict d this peptide, p17 KIR	ed and analyzed for breadth of response ed by multiple HLA epitopes, indicating LRPGGKKKYKL, and one additional	th of response pes, indicating one additional
p24(272-280)	p24(137-145) NOTES:	GLNKIVRMY	HIV-1 infection	human(B62)	[Goulder97e]
	 This paper is a revito SLYNTVATL, to SLYNTVATL, to As long as a strong dominanted the viresponse shifted to the dominant form 	This paper is a review of CTL and immune evasion, but it presents a study of a shift from an HLA-A*0201 response to SLYNTVATL, to a B62 response to GLNKIVRMY As long as a strong CTL response to SLYNTVATL was evident, the epitope variants SLFNTVATL or SLYNTIATL dominanted the viral population – eventually the CTL response to the index peptide became undetectable, the CTL response shifted to a focus on GLNKIVRMY, and the index peptide SLYNTVATL once again established itself as the dominant form	AY Was evident, the epitope TL response to the index the index peptide SLYN	f a shift from an HLA-A* variants SLFNTVATL o peptide became undetec TVATL once again estab	0201 response r SLYNTIATL table, the CTL lished itself as

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(273-282 IIIB)	p24(143-150) NOTES: • Epitope defi	4(143-150) RMYSPTSI HIV-1 infection h TES: Epitope defined in the context of the Pediatric AIDS Foundation ARIEL Project	HIV-1 infection Foundation ARIEL Pro	human(B52) ject	[Walkerpercom96]
p24(283-302 SF2)	p24(151-170)	LDIRQGPKEPFRDYVDRFYK	HIV-1 infection	human	[McAdam98]
p24 (287-309)	p24 (155-177)	QGPKEPFRDYVDRFYKT- LRAEQA	Peptide vaccination	murine	[Nakamura97]
	NOTES: • Mice immu • The amino and be correct • The CTL ep	TIES: Mice immunized with this synthetic peptide generated specific CTLs, a proliferative response, and antibodies The amino acids shown in the epitope field were based on the numbering provided by Nakamura et al., and m be correct The CTL epitope was shown to be located in positions 291-300	ted specific CTLs, a prol sed on the numbering pro ons 291-300	iferative response, and antibodies ovided by Nakamura et al., and may not	ibodies , and may not
p24(290-309)	p24(157-178) NOTES:	PKEPFRDYVDRFYKTLRAEQAS	HIV-1 infection	human(B14)	[Musey97]
	Cervical and	Cervical and peripheral blood derived CTL clones from an HIV infected woman recognized this epitope	rom an HIV infected wo	man recognized this epito	pe
p24(293-312 SF2)	p24(161-180) NOTES:	FRDYVDRFYKTLRAEQASQD	HIV-1 infection	human	[Lieberman97]
	 Of 25 patier 12 subjects One of these The respond	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A2, A3, B8, B62	n 1 HIV-1 protein expressed LAI gag		
p24(293-312 SF2)	p24(161-180) NOTES: • CTL expand	(161-180) FRDYVDRFYKTLRAEQASQD HIV-1 infection VTES: CTL expanded ex vivo were later infused into HIV-1 infected patients	HIV-1 infection 1 infected patients	human	[Lieberman97b]
p24(293-312 SF2)	p24(161-180)	FRDYVDRFYKTLRAEQASQD	HIV-1 infection	human(B71)	[McAdam98]

p24		p24(298-306 HXB2)		p24(298-306 IIIB)			p24(298-306 IIIB)		p24(298-306)	p24(293-312 SF2)	Location
p24(166-174) NOTES: • A CTL res epitopes th and confer • The D subt • The A subt	NOTES: • A chimeric signaling d • The respon occuring re • A CTL clo	p24(166-174)	The conserThe conser	p24(166-174) NOTES:	study • DRFYKILI • DQFYKTI	• Epitope de	p24(166-174)	NOTES: • CTL from	p24(164-172)	p24(162-180)	WEAU
 4(166-174) DRFWKTLRA HIV-1 exposure human(B14) [RowlandJo OTES: A CTL response was found in exposed but uninfected prostitutes from Nairobi using previously defined B clade epitopes that tended to be conserved in A and D clades – such cross-reactivity could protect against both A and D and confer protection in Nairobi where both subtypes are circulating The D subtype consensus is identical to the B clade epitope The A subtype consensus is drFfKtLRA 	 A chimeric universal T-cell receptor was created by linking CD4 or an HIV-specific anti-gp41 Ig sequence to the signaling domain of the T cell receptor chain ζ, and transducing into CD8+ cells The response using universal-receptor-bearing CD8+ cells to lyse infected cells <i>in vitro</i> was comparable to the natural occurring responses of CTL-clones from HIV+ individuals in terms of kinetics and efficiency A CTL clone specific for this epitope was used for the comparison 	DRFYKTLRA	The consensus peptide for clades B and D is DRFYKTLRA and it is equally reactive	DRFYKTLRA	study DRFYKILRA, a naturally occurring variant, was found in mother, and is recognized although less reactive DQFYKTLRA, a naturally occurring variant, was found in infant and is not recognized	 Epitope defined in the context of the Pediatric AIDS Foundation ARIEL Project, 	DRFYKTLRA	OTES: • CTL from Clade B infection reacts with clade A epitope (S. Rowland-Jones, per.	YVDRFFKTL	RDYVDRFYKTL	Sequence
HIV-1 exposure fected prostitutes from N clades – such cross-react pes are circulating de epitope	by linking CD4 or an H nd transducing into CD8+ 18+ cells to lyse infected of lividuals in terms of kinet or the comparison	HIV-1 infection	YKTLRA FKTLRA and it is equall	HIV-1 infection	found in mother, and is re found in infant and is no	DS Foundation ARIEL P	HIV-1 infection	epitope (S. Rowland-Jone	HIV-1 infection, clade B	HIV-1 infection	Immunogen
human(B14) [RowlandJo airobi using previously defined B clade wity could protect against both A and D	IV-specific anti-gp41 Ig societs sells in vitro was comparablics and efficiency	human(B14)	y reactive	human(B14)	cognized although less rest t recognized	roject, a mother-infant HIV transmission	human(B14)	s, per. comm.)	human(A26 or B70)	human(A26 or B70)	Species(HLA)
[RowlandJones98] sfined B clade both A and D	equence to the	[Yang97b]		[Cao97]	ıctive	transmission	[Walkerpercom96]		[Dorrell98]	[Ogg98b]	References

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(298-306 LAI)	p24(166-174)	DRFYKTLRA	HIV-1 infection	human(B14)	[Harrer96b]
gag(298-306)	p24(166-174) NOTES: • CD4+ cell 1	(166-174) DRFYKTLRA HIV-1 infection human(B14) TES: CD4+ cell lines acutely infected with HIV were studied to determine their susceptibility to lysis by CTL Clones specific for RT lysed HIV-1 infected cells at lower levels than Env or Gag specific clones	HIV-1 infection died to determine their s	human(B14) usceptibility to lysis by Cr	[Yang96] TL
	• CTL can ly:	CTL can lyse infected cells early after infection, possibly prior to viral production	ssibly prior to viral prod	uction	
gag(298-306)	p24(166-174) NOTES:	DRFYKTLRA	HIV-1 infection	human(B14)	[Yang97]
	CTL inhibitCTL productCTL suppre	CTL inhibit HIV-1 replication at effector cell concentrations comparable to those found <i>in vivo</i> CTL produced HIV-1-suppressive soluble factors – MIP-1 α , MIP-1 β , RANTES, after antigen-specific activation CTL suppress HIV replication more efficiently in HLA-matched cells	ILA-matched cells	those found <i>in vivo</i> TES, after antigen-specific	e activation
p24(305-313)	p24(173-181) NOTES:	RAEQASQEV	HIV-1 infection	human(Cw8)	[Johnson91]
	Originally rThought to	Originally reported as HLA-B14 restricted, but subsequently found not to be presented by cells transfected with B14 Thought to be HLA-Cw8 restricted (C. Brander and B. Walker)	sequently found not to be 1 B. Walker)	presented by cells transfe	cted with B14
p24	p24(173-181) NOTES:	RAEQASQEV	HIV-1 exposure	human(Cw8)	[RowlandJones98]
	 A CTL respect that epitopes that and confer part of the A subtraction. 	A CTL response was found in exposed but uninfected prostitutes from Nairobi using previously defined B clade epitopes that tended to be conserved in A and D clades – such cross-reactivity could protect against both A and D and confer protection in Nairobi where both subtypes are circulating The A subtype consensus is RAeOAtOEV	cted prostitutes from Na ades – such cross-reactives are circulating	irobi using previously defined B clade ity could protect against both A and D	fined B clade both A and D
	The D subtyThought to	The D subtype consensus is RAEQsQdV Thought to be HLA-Cw8 restricted, not B14 as originally reported (C. Brander, B	ginally reported (C. Brau	nder, B. Walker, and S. Rowland-Jones,)wland-Jones,
	+				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(305-313)	p24(173-181) NOTES:	RAEQASQEV	HIV-1 infection	human(B14?)	[Price95]
	Study of cyThought to personal cc	Study of cytokines released by HIV-1 specific activated CTL Thought to be HLA-Cw8 restricted, not B14 as originally reported (C. Brander, personal communication)	ated CTL ginally reported (C. Bra	ınder, B. Walker, and S. Rowland-Jones,	Rowland-Jones,
p24(305-313)	p24(173-181) NOTES:	RAEQASQEV	HIV-1 infection	human	[Lubaki97]
	 82 HIV-1-s A sustained 	82 HIV-1-specific CTL clones from 5 long term non-progressors were isolated and analyzed for breadth of response A sustained Gag, Env and Nef response was observed, and clones were restricted by multiple HLA epitopes, indicating a relivelengle response	1-progressors were isola 1, and clones were restric	ted and analyzed for breated by multiple HLA epit	dth of response opes, indicating
	a polyclonal responseDespite this being a wclones from a B-14 po	a polyclonal response Despite this being a well defined conserved epitope, and thought to be presented by B14, none of the 11 gag-specific clones from a B-14 positive subject could recognize either it or p24 PODLNTMLN	and thought to be press	ented by B14, none of the NTMLN	11 gag-specific
	 Thought to personal co 	Thought to be HLA-Cw8 restricted, not B14 as originally reported (C. Brander, personal communication)	ginally reported (C. Bra	ander, B. Walker, and S. Rowland-Jones,	Rowland-Jones,
p24(306-316 LAI)	p24(174-184) NOTES:	AEQASQDVKNW		human(B44)	[Brander97]
	• Per. comm	• Per. comm. from D. Lewinsohn to C. Brander and B. Walker	B. Walker		
p24(309-317 LAI)	p24(176-184) NOTES:	QASQEVKNW	HIV-1 infection	human(B*57)	[Goulder96]
	RecognitionPeptide def	Recognition of this peptide by two long term non-progressors Peptide defined on the basis of B*5801 binding motif, yet not cross-restricted except at high concentrations	rogressors tif, yet not cross-restrict	ed except at high concen	rations
p24(308-316 LAI)	p24(176-184) NOTES:	QASQEVKNW	HIV-1 infection	human(Cw*0401)	[Buseyne97]
	 Minimal se This is a re HLA-Cw*(this epitope 	Minimal sequence determined through epitope mapping This is a relatively conserved epitope HLA-Cw*0401 was defined as the restricting element, but cells that carry Cw*0401 varied in their ability to present this epitope – this could be the result of diminished cell-surface expression of Cw*0401 in some cells	ping nt, but cells that carry (cell-surface expression	\w*0401 varied in their a	bility to present

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(313-322 LAI)	p24(181-190) VKNWM NOTES: • P. Johnson pers. comm	VKNWMTETLL pers. comm.		human(B8)	[Brander96]
p24(323-342 SF2)	p24(191-210) NOTES: Of 25 patie 12 subjects Three of the	(191-210) VQNANPDCKTILKALGPAAT HIV-1 infection hTES: Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag Three of these 12 had CTL response to this peptide The responding subjects were HLA-A3, A24, B8, B55; HLA-A1, A11, B8, B27	HIV-1 infection an 1 HIV-1 protein a expressed LAI gag le B55; HLA-A1, A11, B	human 8, B27	[Lieberman97]
p24(323-342 SF2)	p24(191-210) NOTES: • CTL expan	4(191-210) VQNANPDCKTILKALGPAAT HIV-1 infection OTES: • CTL expanded ex vivo were later infused into HIV-1 infected patients	HIV-1 infection 7-1 infected patients	human	[Lieberman97b]
p24(323-337)	p24(191-205) NOTES: • Two CTL e	4(191-205) VQNANPDCKTILKAL OTES: Two CTL epitopes defined (see also p17(21-35))	HIV-1 infection	human(B8)	[Nixon91]
p24(325-339 SF2)	p24(191-205) NOTES: • Longitudinarelative to t • [Goulder97 and that HI	TES: Longitudinal study of CTL escape mutants – little variation was observed in the immunodominant B27 epitope, relative to the B8 epitopes, which varied over time, in people with the appropriate HLA types [Goulder97e] is a review of immune escape that points out that there may be a protective effect associated with B27, and that HLA-B8 individuals tend to progress more rapidly than HLA B27 patients	HIV-1 infection le variation was observe, in people with the appoints out that there may re rapidly than HLA B2	human(B8) /ed in the immunodomina. propriate HLA types be a protective effect assoc // patients	[Phillips91, Goulder97e] nt B27 epitope, ciated with B27,
p24(325-333 IIIB)	p24(193-201) NOTES: • Epitope def	 A(193-201) NANPDCKTI HIV-1 infection hum Epitope defined in the context of the Pediatric AIDS Foundation ARIEL Project, a study 	HIV-1 infection DS Foundation ARIEL	human(B51) [Walkerper Project, a mother-infant HIV transmission	[Walkerpercom96] IV transmission

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(329-337 LAI)	p24(197-205) NOTES:	DCKTILKAL		human(B8)	[Sutton93]
	 Predicted e 	 Predicted epitope based on B8 binding motifs, from larger peptide VQNANPDCKTILKAL 	larger peptide VQNAN	PDCKTILKAL	
p24(329-337)	p24(197-205) NOTES:	DCKTILKAL	HIV-1 infection	human(B8)	[Nowak95]
	 In a longitudinal stud but is not recognized 	In a longitudinal study of CTL response and immune escape – the variant DCRTILKAL was also found, binds to B8, but is not recognized	e escape – the variant DC	RTILKAL was also foun	d, binds to B8,
p24(329-337)	p24(197-205) NOTES:	DCKTILKAL		human(B8)	[McAdam95]
	• Demica as	Ethica as minima cprope by duadon and binding studies	stutics		
p24(197-205)	p24(197-205) NOTES: • Included in	(197-205) DCKTILKAL TINCIUDE Included in a study of the B8 binding motif		human(B8)	[Goulder97c]
p24(345-364 SF2)	p24(211-230) NOTES:	LEEMMTACQGVGGPGHKARV	HIV-1 infection	human	[vanBaalen93]
	• Gag CTL e	Gag CTL epitope precursor frequencies estimated, peptide mapping	peptide mapping		
p24(343-362 SF2)	p24(211-230)	LEEMMTACQGVGGPGHKARV	HIV-1 infection	human(B7)	[McAdam98]
p24(343-362 SF2)	p24(211-231)	LEEMMTACQGVGGPGHK- ARVL	HIV-1 infection	human	[Lieberman97]
	NOTES: Of 25 patie 12 subjects One of thes	Of 25 patients, most had CTL specific for more than 1 HIV-1 protein 12 subjects had CTL that could recognize vaccinia expressed LAI gag One of these 12 had CTL response to this peptide The responding subject was HLA-A1, A2, B50, B57	n 1 HIV-1 protein expressed LAI gag		

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(349-359 IIIB)	p24(217-227) NOTES:	ACQGVGGPGHK	HIV-1 infection	human(A11)	[Sipsas97]
	 HIV IIIB protein with HIV-1 IIIB ACQGVGGPSI 	HIV IIIB proteins were used to define the range of CTL epitopes recognized by three with HIV-1 IIIB ACQGVGGPSHK, a variant found in HIV RF, was also recognized	of CTL epitopes recognized was also recognized	by three lab workers acc	lab workers accidentally infected
p24(355-363 LAI)	p24(223-231) NOTES:	p24(223-231) GPGHKARVL NOTES:	HIV-1 infection	human(B7)	[Goulder97, Goulder97e]
	Identical twOne had a s[Goulder97	Identical twin hemophiliac brothers were both infected with the same batch of factor VII. One had a strong response to this peptide, the other a weak response [Goulder97e] is a review of immune escape that summarizes this study	infected with the same batch other a weak response at summarizes this study	of factor VIII	
p24	p24		p24-VLP virus-like particle	human	[Klein96]
	NOTES: • Immunizati short-lived • Two of fou	TIES: Immunization of HIV+ people with an HIV-1 p17/p24 Ty virus-like particle (p24-VLP) resulted in a marginal short-lived increased proliferative response to p24 and p17 and a transient elevation in viral load Two of four subjects that received 500 or 1000 µg of p24-VLP had an increase in gag-specific CTL	1 p17/p24 Ty virus-like par p24 and p17 and a transient	ticle (p24-VLP) resulte slevation in viral load	ed in a marginal,