Helper T-cell Epitopes – RT

Location	Epitope	Antigen	Species(HLA)	Reference
	Comments			
RT(36-52 BRU)	EICTEMEKEGKISKIGP	HIV infection	human(?)	[De Groot (1991)]
	9 out of 17 humans can make strong IL2 responses to this epitope			
RT(38-52 BRU)	CTEMEKEGKISKIGP	RT	murine(H-2^k)	[De Groot (1991)]
	T-cells from RT immunized mice have enhanced proliferative response with peptide			
RT(48-62 BRU)	SKIGPENPYNTPVFA	RT	murine(H-2^k)	[De Groot (1991)]
	T-cells from RT immunized mice have enhanced proliferative response with peptide			
RT(62-77 BRU)	AIKKKDSTKWRKLVDF	RT	murine(H-2^k)	[De Groot (1991)]
	T-cells from RT immunized mice have enhanced proliferative response with peptide			
RT(88-102 BRU)	WEVQLGIPHPAGLKK	RT	murine(H-2^{t4})	[De Groot (1991)]
	T-cells from RT immunized mice have enhanced proliferative response with peptide			
RT(133-147 BRU)	PSINNETPGIRYQYN	RT	murine(H-$2^{k,i5}$)	[De Groot (1991)]
	T-cells from RT immunized mice have enhanced proliferative response with peptide			
RT(144-158 BRU)	YQYNVLPQGWKGSPA	RT	murine(H-2^{t4})	[De Groot (1991)]
	T-cells from RT immunized mice have enhanced proliferative response with peptide			
RT(528-543 BRU)	KEKVYLAWVPAHKGIG	peptide	murine(H-$2^{f,k,d}$)	[Haas (1991)]
	T-cells from peptide primed mice could be restimulated by native RT			
RT(720-730 LAI)	IDKAQDEHEKY	HIV infection	human(?)	[Schrier (1989)]
	Stimulates T-cell proliferation in HIV-infected donors; boundaries may be imprecise, based only on numbering			
RT(899-913 LAI)	NFKRKGGIGGYSAGE	HIV infection	human(?)	[Schrier (1989)]
	Stimulates T-cell proliferation in HIV-infected donors; boundaries may be imprecise, based only on numbering			
RT(923-937 LAI)	IQTKELQKQITKIQN	HIV infection	human(?)	[Schrier (1989)]
	Stimulates T-cell proliferation in HIV-infected donors; boundaries may be imprecise, based only on numbering			
RT(942-954 LAI)	YRNSRNPLWKGPA	HIV infection	human(?)	[Schrier (1989)]
	Stimulates T-cell proliferation in HIV-infected donors; boundaries may be imprecise, based only on numbering			

Epitopes and protein variability:

This plot shows a score that is a measure of variability for each position in the RT protein alignment, and the relative positions of regions with defined helper epitopes as seen on the helper epitope map. The solid lines are positions where the most common character in a gp41 protein alignment is an amino acid; the dashed lines represent regions where the most common character is an insertion (dash) incorporated to maintain the alignments. The alignment used corresponds to the 1995 gp41 protein alignment, publically available at the Human Retroviruses and AIDS database, totaling 21 sequences. See the "how to use the helper section" information for more details on the variability measure. The higher scores indicate more variation; 0 is perfectly conserved. The different protein alignments (gp120, gp41, p24, p15, p17, Nef and RT) used to create these plots contain different sets of sequences; therefore each plot is internally consistent, but cannot be compared to other protein plots.

Most common amino acid in each position in the RT protein is shown below. The numbering corresponds to the numbering in the variability plot for the RT protein.

RT CONSENSUS:

FFREDLAFPQGKAREF----------SSEQTRANSPTRRELQVWGRDN 50

NSLS----EAGADRQGTVSFSFPQITLWQRPLVTIKIGGQLKEALLDTGA 100

DDTVLEEMNLPGRWKPKMIGGIGGFIKVRQYDQILIEICGHKAIGTVLVG 150

PTPVNIIGRNLLTQIGhelperNFPISPIETVPVKLKPGMDGPKVKQWPLTEE 200

KIKALVEICTEMEKEGKISKIGPENPYNTPVFAIKKKDSTKWRKLVDFRE 250

LNKRTQDFWEVQLGIPHPAGLKKKKSVTVLDVGDAYFSVPLDKDFRKYTA 300

FTIPSINNETPGIRYQYNVLPQGWKGSPAIFQSSMTKILEPFRKQNPDIV 350

IYQYMDDLYVGSDLEIGQHRTKIEELRQHLLRWGFTTPDKKHQKEPPFLW 400

MGYELHPDKWTVQPIVLPEKDSWTVNDIQKLVGKLNWASQIYAGIKVKQL 450

CKLLRGTKALTEVIPLTEEAELELAENREILKEPVHGVYYDPSKDLIAEI 500

QKQGQGQWTYQIYQEPFKNLKTGKYARMRGAHTNDVKQLTEAVQKIATES 550

IVIWGKTPKFKLPIQKETWEAWWTEYWQATWIPEWEFVNTPPLVKLWYQL 600

EKEPIVGAETFYVDGAANRETKLGKAGYVTDRGRQKVVSLTDTTNQKTEL 650

QAIHLALQDSGLEVNIVTDSQYALGIIQAQPDKSESELVSQIIEQLIKKE 700

KVYLAWVPAHKGIGGNEQVDKLVSAGIRKVLFLDGIDKAQEEHEKYHSNW 750

RAMASDFNLPPVVAKEIVASCDKCQLKGEAMHGQVDCSPGIWQLDCTHLE 800

GKVILVAVHVASGYIEAEVIPAETGQETAYFLLKLAGRWPVKTIHTDNGS 850

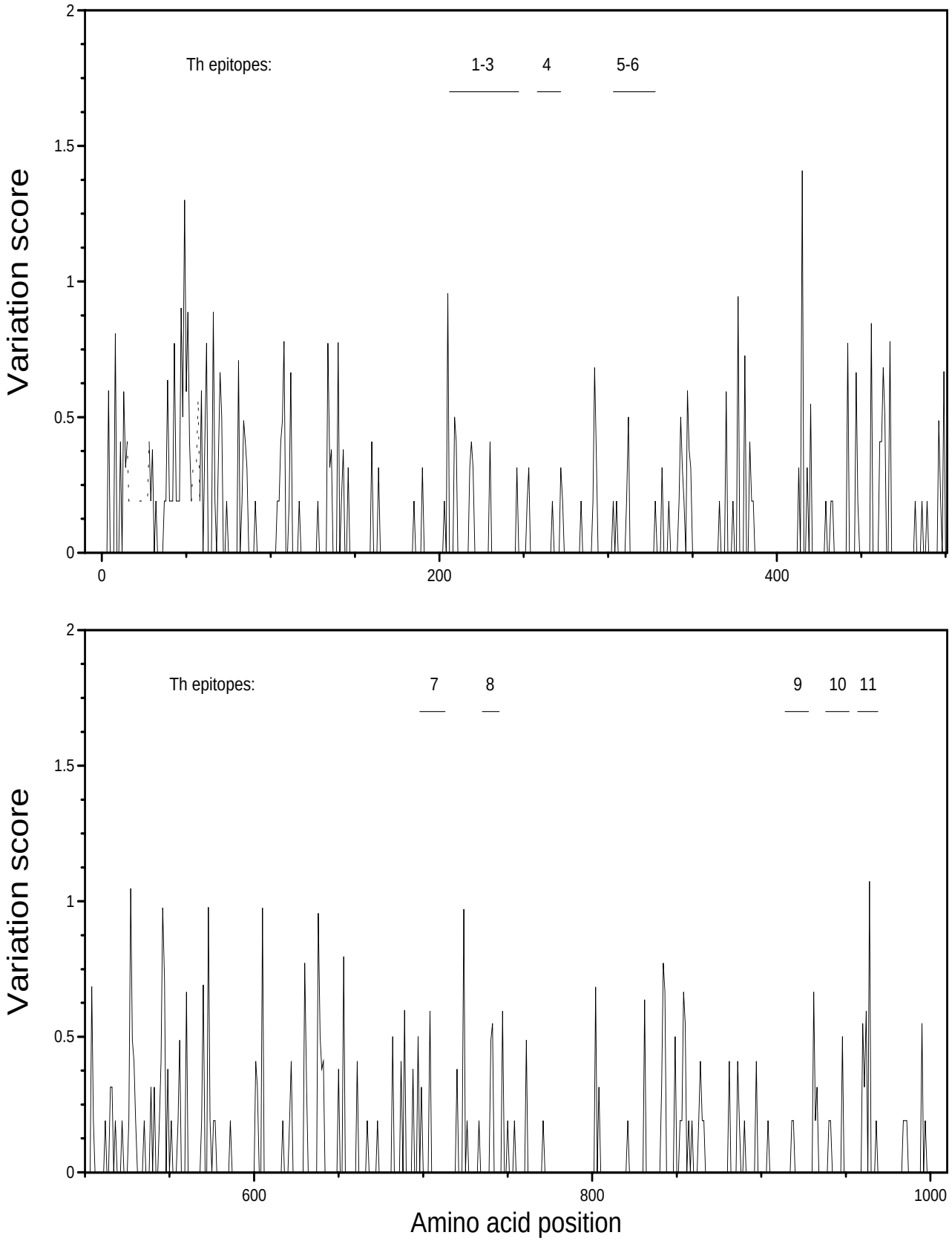
NFTSTTVKAACWWAGIKQEFGIPYNPQSQGVVESMNKELKKIIGQVRDQA 900

EHLKTAVQMAVFIHNFKRKGGIGGYSAGERIVDIIATDIQTKELQKQITK 950

IQNFRVYYRDSRDPLWKGPAKLLWKGEGAVVIQDNSDIKVVPRRKAKIIR 1000

DY

Variation in positions in the RT protein



RT Helper Epitope 1

CONSENSUS-B	**CTEMEKEGKISKIGP**
Epitope1	----------
CONSENSUS-A	**-?----------**
HIVU455	-N----------
HIVIBNG	----------
CONSENSUS-B	**----------**
HIVLAI	----------
HIVHXB2R	----------
HIVMN	----------
HIVJRCSF	----------
HIVJRFL	----------
HIVOYI	----------V--
HIVSF2	----------
HIVNY5CG	----------
HIVNL43	----------
HIVCAM1	----------
HIVHAN	----------
HIVD31	----------
HIVRF	----------
HIVYU2	----------
HIVBCSG3C	----------
HIVP896	----------
HIVLW123	----------
HIVMANC	----------
HIVRET7	----------
HIVVE1RT	--K----------
HIVVE2RT	---L----------
HIVVE3RT	----------
HIVVE4RT	---L----------
HIVVE5RT	----------
HIVVE6RT	----------
HIVVE7RT	----------
HIVVE8RT	----------
HIVHX330BC	----------
HIVHX660BC	----------
HIVHXBCRT	----------
HIVPD165BC	----------
HIVPD330BC	----------
HIVPD495BC	----------
HIVPD660BC	----------
HIVPDBCRT	----------
CONSENSUS-D	**----------R---**
HIVELI	--D--------R---
HIVZ2Z6	----------RV--
HIVNDK	----------R---
CONSENSUS-O	**-Q---Q-----R---**
HIVANT70	-Q---Q-----R---
HIVMVP5180	-Q---Q-----R---
HIVMAL	-KD-------L----
SIVCPZGAB	-Q----------

RT Helper Epitope 2

CONSENSUS-B	**SKIGPENPYNTPVFA**
Epitope2	----------
CONSENSUS-A	**----------**
HIVU455	----------
HIVIBNG	----------
CONSENSUS-B	**----------**
HIVLAI	----------
HIVHXB2R	----------
HIVMN	----------
HIVJRCSF	----------
HIVJRFL	----------
HIVOYI	--V----------
HIVSF2	----------
HIVNY5CG	----------
HIVNL43	----------
HIVCAM1	----------
HIVHAN	----------
HIVD31	----------
HIVRF	----------
HIVYU2	----------
HIVBCSG3C	----------
HIVP896	----------
HIVLW123	----------
HIVMANC	----------
HIVRET7	----------
HIVVE1RT	----------I--
HIVVE2RT	----------
HIVVE3RT	----------
HIVVE4RT	----------
HIVVE5RT	----------
HIVVE6RT	----------
HIVVE7RT	----------
HIVVE8RT	----------
HIVHX330BC	----------
HIVHX660BC	----------
HIVHXBCRT	----------
HIVPD165BC	----------
HIVPD330BC	----------
HIVPD495BC	----------
HIVPD660BC	----------
HIVPDBCRT	----------
CONSENSUS-D	**-R----------I--**
HIVELI	-R----------I--
HIVZ2Z6	-RV---------I--
HIVNDK	-R----------I--
CONSENSUS-O	**-R----------I--**
HIVANT70	-R----------I--
HIVMVP5180	-R----------I--
HIVMAL	L----------
SIVCPZGAB	----------I--

RT Helper Epitope 3

```
CONSENSUS-B     AIKKKDSTKWRKLVDF
Epitope3        ----------------

CONSENSUS-A     ----------------
HIVU455         ----------------
HIVIBNG         ----------------

CONSENSUS-B     ----------------
HIVLAI          ----------------
HIVHXB2R        ----------------
HIVMN           ----------------
HIVJRCSF        ----------------
HIVJRFL         ----------------
HIVOYI          ----------------
HIVSF2          ----------------
HIVNY5CG        ----------------
HIVNL43         ----------------
HIVCAM1         ----------------
HIVHAN          ----------------
HIVD31          ----------------
HIVRF           ----------------
HIVYU2          ----------------
HIVBCSG3C       ----------------
HIVP896         ----------------
HIVLW123        ----------------
HIVMANC         ----------------
HIVRET7         ----------------
HIVVE1RT        ----------------
HIVVE2RT        ----------------
HIVVE3RT        ----------------
HIVVE4RT        ----------------
HIVVE5RT        ----------------
HIVVE6RT        ----------------
HIVVE7RT        ----------------
HIVVE8RT        ----------------
HIVHX330BC      ----------------
HIVHX660BC      ----------------
HIVHXBCRT       ----------------
HIVPD165BC      ----------------
HIVPD330BC      ----------------
HIVPD495BC      ----------------
HIVPD660BC      ----------------
HIVPDBCRT       ----------------


CONSENSUS-D     ----------------
HIVELI          ----------------
HIVZ2Z6         ----------------
HIVNDK          ----------------

CONSENSUS-O     ----------------
HIVANT70        ------G---------
HIVMVP5180      ----------------
HIVMAL          --------------N-

SIVCPZGAB       ----------------
```

RT Helper Epitope 4

```
CONSENSUS-B     WEVQLGIPHPAGLKK
Epitope4        ---------------

CONSENSUS-A     ---------?-----
HIVU455         ---------T-----
HIVIBNG         ---------------

CONSENSUS-B     ---------------
HIVLAI          ---------------
HIVHXB2R        ---------------
HIVMN           ---------------
HIVJRCSF        ---------------
HIVJRFL         ---------------
HIVOYI          ---------------
HIVSF2          ---------------
HIVNY5CG        --------------Q
HIVNL43         --------------Q
HIVCAM1         ---------------
HIVHAN          ---------------
HIVD31          ---------------
HIVRF           ---------------
HIVYU2          ---------------
HIVBCSG3C       ---------------
HIVP896         ---------------
HIVLW123        ---------------
HIVMANC         ---------------
HIVRET7         S--------------
HIVVE1RT        ------------V--
HIVVE2RT        ---------------
HIVVE3RT        ---------------
HIVVE4RT        ---------------
HIVVE5RT        ---------------
HIVVE6RT        ---------------
HIVVE7RT        ---------------
HIVVE8RT        ---------------
HIVHX330BC      ---------------
HIVHX660BC      ---------------
HIVHXBCRT       ---------------
HIVPD165BC      ----I----------
HIVPD330BC      -K-------------
HIVPD495BC      -K-------------
HIVPD660BC      -K-------------
HIVPDBCRT       ---------------


CONSENSUS-D     ---------------
HIVELI          ---------------
HIVZ2Z6         ---------------
HIVNDK          ---------------

CONSENSUS-O     ----------G---Q
HIVANT70        ----------G---Q
HIVMVP5180      ----------G---Q
HIVMAL          ---------------

SIVCPZGAB       ---------------
```

RT Helper Epitope 5

```
CONSENSUS-B     PSINNETPGIRYQYN
Epitope5        ---------------

CONSENSUS-A     --?------?-----
HIVU455         ---------V-----
HIVIBNG         --V------------

CONSENSUS-B     ---------------
HIVLAI          ---------------
HIVHXB2R        ---------------
HIVMN           ---------------
HIVJRCSF        ---------------
HIVJRFL         ---------------
HIVOYI          ---------------
HIVSF2          ---------------
HIVNY5CG        ---------------
HIVNL43         ---------------
HIVCAM1         --T------------
HIVHAN          ---------------
HIVD31          ---------V-----
HIVRF           --------R------
HIVYU2          ---------T-----
HIVBCSG3C       ---------------
HIVP896         ---------------
HIVLW123        ---------------
HIVMANC         ------A--V-----
HIVRET7         --T------------
HIVVE1RT        --V------------
HIVVE2RT        --V------------
HIVVE3RT        ---------------
HIVVE4RT        --T------------
HIVVE5RT        ---------------
HIVVE6RT        ---------V-----
HIVVE7RT        ---------------
HIVVE8RT        --T------------
HIVHX330BC      ---------------
HIVHX660BC      ---------------
HIVHXBCRT       ---------------
HIVPD165BC      ---------------
HIVPD330BC      ---------------
HIVPD495BC      ---------------
HIVPD660BC      ---------------
HIVPDBCRT       ---------------

CONSENSUS-D     ---------------
HIVELI          S--------------
HIVZ2Z6         ---------------
HIVNDK          ---------------

CONSENSUS-O     --V------------
HIVANT70        --V------------
HIVMVP5180      --V------V-----
HIVMAL          ---------------

SIVCPZGAB       ---------V-----
```

RT Helper Epitope 6

```
CONSENSUS-B     YQYNVLPQGWKGSPA
Epitope6        ---------------

CONSENSUS-A     --------------?
HIVU455         --------------S
HIVIBNG         ---------------

CONSENSUS-B     ---------------
HIVLAI          ---------------
HIVHXB2R        ---------------
HIVMN           ---------------
HIVJRCSF        ---------------
HIVJRFL         ---------------
HIVOYI          ---------------
HIVSF2          ---------------
HIVNY5CG        ---------------
HIVNL43         ---------------
HIVCAM1         ---------------
HIVHAN          ---------------
HIVD31          ---------------
HIVRF           ---------------
HIVYU2          ---------------
HIVBCSG3C       ---------------
HIVP896         ---------------
HIVLW123        ---------------
HIVMANC         ---------------
HIVRET7         ---------------
HIVVE1RT        ---------------
HIVVE2RT        ---------------
HIVVE3RT        ---------------
HIVVE4RT        ---------------
HIVVE5RT        ---------------
HIVVE6RT        ---------------
HIVVE7RT        ---------------
HIVVE8RT        ---------------
HIVHX330BC      ------------A--
HIVHX660BC      ------------A--
HIVHXBCRT       ---------------
HIVPD165BC      ---------------
HIVPD330BC      ---------------
HIVPD495BC      ---------------
HIVPD660BC      ---------------
HIVPDBCRT       ---------------

CONSENSUS-D     ---------------
HIVELI          ---------------
HIVZ2Z6         ---------------
HIVNDK          ---------------

CONSENSUS-O     ---------------
HIVANT70        ---------------
HIVMVP5180      ---------------
HIVMAL          ---------------

SIVCPZGAB       --------------S
```

RT Helper Epitope 7

```
CONSENSUS-B     KEKVYLAWVPAHKGIG
Epitope7        ----------------

CONSENSUS-A     -?----S---------
HIVU455         ------S---------
HIVIBNG         -D----S---------

CONSENSUS-B     ----------------
HIVLAI          ----------------
HIVHXB2R        ----------------
HIVMN           ----------------
HIVJRCSF        ----------------
HIVJRFL         ----------------
HIVOYI          ----------------
HIVSF2          ----------------
HIVNY5CG        ----------------
HIVNL43         ----------------
HIVCAM1         ----------------
HIVHAN          ----------------
HIVD31          ------T---------
HIVRF           ----------------
HIVYU2          ----------------
HIVBCSG3C       ----------------
HIVP896         ----------------
HIVLW123        ----------------
HIVMANC         ----------------
HIVVE1RT        ----------------
HIVVE2RT        ----------------
HIVVE3RT        ----------------
HIVVE4RT        ----------------
HIVVE5RT        ----------------
HIVVE6RT        ----------------
HIVVE7RT        ----------------
HIVVE8RT        ----------------
HIVHX330BC      ----------------
HIVHX660BC      ----------------
HIVHXBCRT       ----------------
HIVPD165BC      ----------------
HIVPD330BC      ----------------
HIVPD495BC      ----------------
HIVPD660BC      ----------------
HIVPDBCRT       ----------------


CONSENSUS-D     ----------------
HIVELI          ----------------
HIVZ2Z6         ----------------
HIVNDK          ----------------

CONSENSUS-O     --?---T---------
HIVANT70        --Q---T---------
HIVMVP5180      --R---T---------
HIVMAL          -D----S---------

SIVCPZGAB       ---I--S---------
```

RT Helper Epitope 8

```
CONSENSUS-B     IDKAQEEHEKY
Epitope8        -----D-----

CONSENSUS-A     ------?--?-
HIVU455         ------D----
HIVIBNG         ---------R-

CONSENSUS-B     -----------
HIVLAI          -----D-----
HIVHXB2R        -----D-----
HIVMN           ------D----
HIVJRCSF        ------D----
HIVJRFL         ------D----
HIVOYI          -----------
HIVSF2          -----------
HIVNY5CG        -----------
HIVNL43         -----------
HIVCAM1         -----------
HIVHAN          ------D----
HIVD31          -----D-----
HIVRF           -----D-----
HIVYU2          -----------
HIVBCSG3C       -----------
HIVP896         -----------
HIVLW123        -----D-----
HIVMANC         -----------

CONSENSUS-D     -----------
HIVELI          -----------
HIVZ2Z6         -----------
HIVNDK          -----------

CONSENSUS-O     --Q---D----
HIVANT70        --Q---D----
HIVMVP5180      --Q---D----
HIVMAL          -----------

SIVCPZGAB       --R------R-
```

RT Helper Epitope 9

```
CONSENSUS-B     NFKRKGGIGGYSAGE
Epitope9        ---------------

CONSENSUS-A     ---------------
HIVU455         ---------------
HIVIBNG         ---------------

CONSENSUS-B     ---------------
HIVLAI          ---------------
HIVHXB2R        ---------------
HIVMN           ---------------
HIVJRCSF        ---------------
HIVJRFL         ---------------
HIVOYI          ---------------
HIVSF2          ---------------
HIVNY5CG        ---------------
HIVNL43         ---------------
HIVCAM1         ---------------
HIVHAN          ---------------
HIVD31          ---------------
HIVRF           ---------------
HIVYU2          ---------------
HIVBCSG3C       ---------------
HIVP896         ---------------
HIVLW123        ---------- ----
HIVMANC         --------------G

CONSENSUS-D     ---------------
HIVELI          ----RR---------
HIVZ2Z6         ---------------
HIVNDK          ---------------

CONSENSUS-O     -----------T---
HIVANT70        -----------T---
HIVMVP5180      -----------T---
HIVMAL          ---------------

SIVCPZGAB       -----------T---
```

RT Helper Epitope 10

```
CONSENSUS-B     IQTKELQKQITKIQN
Epitope10       ---------------

CONSENSUS-A     ----------?----
HIVU455         ----------S----
HIVIBNG         ----------I----

CONSENSUS-B     ---------------
HIVLAI          ---------------
HIVHXB2R        ---------------
HIVMN           ---------------
HIVJRCSF        ---------------
HIVJRFL         ---------------
HIVOYI          ---------------
HIVSF2          ---------------
HIVNY5CG        --I------------
HIVNL43         ---------------
HIVCAM1         ---------------
HIVHAN          ---------------
HIVD31          ---------------
HIVRF           ---------------
HIVYU2          ---------------
HIVBCSG3C       ---------------
HIVP896         ---------------
HIVLW123        ---------------
HIVMANC         ---------------

CONSENSUS-D     ----------I----
HIVELI          ----------I----
HIVZ2Z6         ---------------
HIVNDK          ---R------I----

CONSENSUS-O     ---T------L-
HIVANT70        ---T------L-
HIVMVP5180      ---T------L--N-
HIVMAL          ---------------

SIVCPZGAB       ---S------L-V-K
```

RT Helper Epitope 11

```
CONSENSUS-B     YRDSRDPLWKGPA
Epitope11       --N--N-------

CONSENSUS-A     -------I-----
HIVU455         -------I-----
HIVIBNG         -------I-----

CONSENSUS-B     -------------
HIVLAI          -------------
HIVHXB2R        -----N-------
HIVMN           -------------
HIVJRCSF        ---N---I-----
HIVJRFL         -----E-------
HIVOYI          -----E-------
HIVSF2          ---NK--------
HIVNY5CG        -------V-----
HIVNL43         -------V-----
HIVCAM1         -------------
HIVHAN          -----E-F-----
HIVD31          -------------
HIVRF           -----------H-
HIVYU2          -------------
HIVBCSG3C       ---NK--------
HIVP896         -------------
HIVLW123        -----N-------
HIVMANC         -----N-------

CONSENSUS-D     -------I-----
HIVELI          -------I-----
HIVZ2Z6         -------I-----
HIVNDK          -------I-----

CONSENSUS-O     ---?---I-----
HIVMVP5180      -------I-----
HIVMAL          ---N---I-----

SIVCPZGAB       -------I-----
```