HSQRRQDILDLWIYHTQGYF

QUERY	HSQRRQDILDLWIYHTQGYF
CONSENSUS_A	y-rk--E-----V-?-----
A.FR.HIV232956	Y-R---E-----V-N-----
A.FR.HIV232957	Y--K-RE-----V-N-----
A.FR.HIV232959	---K--E-----V-N-----
A.KE.Q23-CXC-CG	Y-RK--E-----V-------
A.SE.SE6594	Y-RK--E-----VH-I--F-
A.SE.SE7253	Y-R---E-----V-N-----
A.SE.SE7535	Y-KK--E-----VH------
A.SE.SE8131	Y-RK--E-----V-------
A.SE.SE8538	Y-RK--E-----V-N--x--
A.SE.SE8891	Y-R---E-----V-N-----
A.UG.92UG037	Y-KK--E-----V-------
A.UG.U455	---K--E-----V-----F-
CONSENSUS_B	y--k--------v-------
B.-.E90NEF	----------V-N-----
B.-.HIV232997	---K--E-----V-------
B.-.HIV233002	Y-PK-KE-----V-----F-
B.-.HIV233009	Y-PK--E-----V-----F-
B.-.HIV233016	---K--------V-------
B.-.HIV233020	---Q--------V-----F-
B.-.HIV233023	---G----------F-
B.-.HIV233029	Y--K--E----SV-------
B.-.HIV233030	Y--K-K------V-N-----
B.-.HIV233032	Y--K-K------V-------
B.-.HIV233037	Y----------
B.-.HIV233038	-F-Q--------V-------
B.-.HIV233043	Y--K--------V-------
B.-.HIV233045	Y-----G-----V-------
B.-.HIV233046	Y----------
B.AU.1062-1-NEF	---K--E----------
B.AU.93JW-3	---K--------V-------
B.AU.93LW-3	-T-K----------
B.AU.AF064660	Y--K--------V-------
B.AU.AF064667	W--K--------V-------
B.AU.AF064676	Y----------
B.AU.MBC200	Y--E--------V-D-----
B.AU.MBC925	Y--K----------
B.CN.AF033570	---K--------V-------
B.CN.AF033572	---K--------V-------
B.CN.PRC8	Y--K--------V-------
B.CN.RL42	Y----------V-------
B.DE.D31	---K--------V-------
B.DE.HAN	Y-PK--E-----V-------
B.DE.HEI28CS	Y--x--------V-N-----
B.DE.HEI3BL	Y--K--------V-------
B.DE.HEI4BL	W--K--------V-------
B.DE.HIVU52491	Y--K--E-----V-------
B.DE.NEFCC	Y--K--E-----V-------
B.DE.NEFCG	Y-----E-----V-------
B.DE.NH53	F--K--E----------
B.ES.89SP061	W--K--------VH------
B.ES.AF082355	Y--K----------
B.ES.AF082357	Y----------V-------
B.ES.AF082358	Y--K--------V-------
B.ES.AF082359	Y--K--------V-------
B.ES.AF082363	Y----------F-
B.ES.AF082364	Y-PK--E-----V-N-----
B.ES.AF082366	Y----------V-------
B.ES.AF082368	Y--K--------V-------
B.ES.AF082370	Y----------V-------
B.ES.AF082375	Y--K--------V-------
B.ES.AF082376	Y--K----------N-----
B.ES.AF082377	---K----------
B.ES.AF082378	Y--K--------V-------
B.ES.AF082380	---K--------V-------
B.ES.AF082383	Y--K--------V-------
B.ES.AF082386	Y-HK--------V-----F-
B.FR.HIV232961	---K--------V-------
B.FR.HIV232962	Y--K-RE-----V-N-----
B.FR.HIV232963	C--K--E----------
B.FR.HIV232964	W--Q--E-----V-N---F-
B.FR.HIV232965	---K--------V-------
B.FR.HXB2	----------
B.FR.NE100	---K--E-----V-------
B.FR.SWB884	---K--E-----V-------
B.GA.OYI	Y--K--------V-------
B.GB.001GH-93(1)	---K--------V-N-----
B.GB.002EM-93(1)	W--K--------V-------
B.GB.003PW-93(1)	Y--K--------V-N-----
B.GB.005PF1-93(1)	Y--Q--E-----V------L
B.GB.006DC-93(1)	Y----------V-------
B.GB.010JW-93(1)	Y--K--------V-------
B.GB.011JR-93(4)	Y--K--------V-------
B.GB.012WM-93(1)	Y-RK--E-----V-------
B.GB.013PP-94(2)	---Q--------V-------
B.GB.016GB-93(1)	Y--K--------V-----F-
B.GB.023PA-93(1)	----------V-----F-
B.GB.025JN-93(1)	Y--K--------V-------
B.GB.027SL-93(1)	---K--E-----FH------
B.GB.028JH-94(1)	Y--K--------V-------
B.GB.030JG-93(1)	--LK--E---------P---
B.GB.031DA-93(1)	W--K--------V-N-----
B.GB.032AN-93(1)	---K--------V-------
B.GB.037BS-94(2)	Y--K------Q-V-------
B.GB.039NM-94(1)	Y-LK--------V-------
B.GB.044C1-94(2)	Y--K--------V-------
B.GB.046JM-94(1)	W----------V-N-----
B.GB.048AD-94(1)	---KG-------V-------
B.GB.056RP-94B(1)	---K--------V-------
B.GB.057DR-94(1)	Y-RK--E-----V-N-----
B.GB.065RK-94(1)	---K--------V-------
B.GB.067MM-94(2)	Y--K--------V-------
B.GB.068JB-94(1)	---K--------V-----F-
B.GB.098MS-94(1)	Y-HK--------V-------
B.GB.103CD-94(1)	Y----------V---E---
B.GB.104RT-94(1)	Y--Q--------V-N-----
B.GB.105AS-94(1)	W--K--E----------
B.GB.112CR-94(2)	Y-PK--E-----V-------
B.GB.117CH-94(2)	---Q----------
B.GB.122PS-95(1)	Y--K--------V-------
B.GB.124PD-95(1)	Y--K--------V-------
B.GB.127RG-96(1)	Y--K----------
B.GB.130WDC-95(1)	Y--Q--------V-------
B.GB.131MVS-95(1)	Y-----E----------
B.GB.143PL-95(1)	---K--------V-------
B.GB.151DH-95(1)	Y----------VH----F-
B.GB.157GT-95(1)	Y--K--------V-------
B.GB.160KO-95(1)	Y----------N-----
B.GB.161KC-95(1)	Y--Q--------V-N--D--
B.GB.162BB-95(1)	Y----------
B.GB.163NG-95(1)	Y-----E-----V-------
B.GB.164SZ-95(1)	Y--K--------V-------
B.GB.165DH-95(1)	Y-RK--E-----V-------
B.GB.166PW-95(1)	Y--K--E-----V-------
B.GB.167RW-95(1)	Y-RK--E-----M-------
B.GB.168MB-95(1)	Y--K--------V-------
B.GB.CAM1	Y----------
B.GB.GLNEF1	-A----------
B.GB.MANC	Y--K--------V-------
B.GB.NEF2	---K--------V-------
B.GB.NEF3	---K--------V-------
B.GB.NEF5	Y--K----------
B.IN.HIVP35A	Y--K--------V-------
B.IT.AF011471	----------V-------
B.IT.AF011474	---K--------V-------
B.IT.AF011477	Y--K--------V-------
B.IT.AF011478	Y--K--------V-N--ASS
B.IT.AF011480	----------V-------
B.IT.AF011482	---K--------V-------
B.IT.AF011483	Y--K--------V----xF-
B.IT.AF011486	----------V-------
B.IT.AF011488	Y----------V---E---
B.IT.AF011492	Y--K--------V-------
B.IT.AF047080	Y--K--------V-----F-
B.IT.AF047081	Y--Q--------V-N-----
B.IT.B.IT-L1	Y--Q--------V-N---F-
B.IT.B.IT-L2	Y----------V-------
B.IT.B.IT-L3	Y--K--E-----V-N-----
B.IT.B.IT-L4	Y--K--------V-------
B.IT.B.IT-L5	---K--x-----V-------
B.IT.B.IT-R1	Y--Q-K------V-------
B.IT.B.IT-R2	Y-----E-----V-------
B.IT.B.IT-R3	---K--------V-------
B.IT.B.IT-R4	----------VH------
B.IT.B.IT-R5	W--K----------
B.KR.AF063915	Y--K--------V-------
B.KR.AF063916	Y-PK--------V-----F-
B.KR.AF063919	---K--------V-------
B.KR.AF063921	Y--K--------V-------
B.KR.AF063926	Y--K--------V-N-----
B.KR.AF063927	Y--K--------V-------
B.KR.AF063931	Y--K--------V-------
B.KR.HIVZ98019	Y--K--------V-------
B.KR.HIVZ98022	---K--------V-------
B.KR.HIVZ98024	Y--K--------V-------
B.KR.HIVZ98025	---K--------V------L
B.KR.HIVZ98027	Y--K--------V#----F-
B.KR.HIVZ98029	Y--K--------V-------
B.KR.HIVZ98030	Y--KS----------

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B.KR.HIVZ98032        Y--K--------V-------
B.KR.HIVZ98034        Y--K--------------F-
B.NL.3202A21          Y-------------------
B.NL.NEFA             Y--K-K------V-------
B.NL.NEFD             Y--K-K------V-------
B.NL.NEFE             ------------V-------
B.SE.AF047082         Y--K-RE-------N-----
B.SE.AF047083         Y--K--------V-------
B.SE.AF047085         ------------V-------
B.TH.28-19            ---K--E-----V-------
B.TH.AF082838         Y--K--------V-------
B.TH.AF082839         --HK--------V-------
B.TH.AF082841         F--K--------V-------
B.TW.LM49             Y--KKE------------F-
B.US.HIV1U03375       Y--------E--V-------
B.US.005PF-96(1)      Y--Q--E-------N-----
B.US.AD-93(1)         Y----R------V-N-----
B.US.AD8              ---K--E-----V-------
B.US.BC               F-----------T-------
B.US.BIB              Y--N----------------
B.US.BJ-93(1)         Y--Q--------V-------
B.US.BO1              -------------------
B.US.BRVA             ---Q--------V-------
B.US.BT-94(1)         Y--Q-R------V-------
B.US.CD1              Y--K-----N--V-------
B.US.D8511            Y--K--------V-------
B.US.DH1              Y----------$V-------
B.US.DH123            Y--K--------V-N-----
B.US.DJ-93(1)         ---K--------------F-
B.US.E1               Y--K--------V-------
B.US.E81NEF           ------------V-------
B.US.E88NEF           -------------------
B.US.EP-94(1)         Y-RK--E-----V-------
B.US.FA-93(1)         Y--K--------V-N-----
B.US.HIV1U16893       Y-------------------
B.US.HIV1U24455       Y--K--------V-------
B.US.HIV1U26074       ---K----------------
B.US.HIV1U26098       Y--K----------------
B.US.HIV1U26112       Y--K--------V-------
B.US.HIV1U26119       Y--K-R------V-------
B.US.HIV1U26141       Y-----------V-------
B.US.HIVU44444        -------------------
B.US.HIVU44450        Y--K--------V-N-----
B.US.HIVU44456        ---K------M$--------
B.US.HIVU44465        Y-----E-----V-------
B.US.HIVU44468        ---K----------------
B.US.HP87B1           Y-RK--E-----V-------
B.US.HS-93(1)         Y--K--E-----V-------
B.US.JRCSF            Y--K----------------
B.US.JRFL             ---K--------V-------
B.US.LM1              Y-----------V-------
B.US.LT-87-1(1)       Y--K-R------V-------
B.US.MB-94(1)         Y--K--------V-------
B.US.MNCG             Y--K--------V-------
B.US.NC7              W-------------------
B.US.NEF              -------------------
B.US.NEF164B          Y--K--E-----V-------
B.US.NEF166E          Y--K----------------
B.US.NEF179C          Y--Q--------V-N-----
B.US.NEF226B          ---Q--------V-------
B.US.P102A13          ------E-----V-------
B.US.P233A17          Y--K--------V-N-----
B.US.P248A01          Y--K--------V-------
B.US.P357A01          ---K--G-----V-------
B.US.P896             ---K--------V-----F-
B.US.PC-93(1)         Y--K----------------
B.US.PRISO(1)         ---Q--------V-N-----
B.US.RF               F--K--------V-------
B.US.RP12             Y--K--------V-------
B.US.RR1              Y--K--------V-N-----
B.US.SC               -------------------
B.US.SF2              W-----E-------------
B.US.U16917           ---K----------------
B.US.WEAU160          Y--K--------V-----F-
B.US.WR27             Y--K--------V-------
B.US.YU2              ---Q--------V-------

CONSENSUS_C           Y-kk--e-----v-------
C.BR.92BR025          Y-KK--------V-N-----
C.BW.96BW01B21        Y-KK--E-----V-N---V-
C.BW.96BW0402         Y-KK--------V-N-----
C.BW.96BW0502         Y-KK--E-----V-----F-
C.BW.96BW1104         Y-RK--E-----V-----F-
C.BW.96BW1210         Y-KK--E-----V-N-----
C.BW.96BW15B03        Y-PK--E-----V-----F-
C.BW.96BW16B01        Y-KK--------V-N-R-FL
C.BW.96BW17A09        Y-KK--E-----V-----F-
C.ET.ETH2220          Y-KK--E-----V-N---F-
C.FR.HIV232966        Y-R---E-----V-----F-
C.FR.HIV232967        Y-KK-KE-----V-N-----
C.FR.HIV232968        Y-KK--E-----V-----F-
C.FR.HIV232969        Y-KK--E-----V-N---F-
C.FR.HIV232970        Y-KK--E-----V-------
C.FR.HIV232971        Y-KN--E-----V-------
C.FR.HIV232972        Y-RK--E-----V-----F-
C.FR.HIV232973        Y-KK--E-----V-----F-
C.FR.HIV232976        Y-KQ--------V-N---F-
C.FR.HIV232977        Y-KK--E-------------
C.FR.HIV232978        Y-KK--------V-------
C.FR.HIV232979        Y-KK--E-----V-N-----
C.FR.HIV232980        Y--K--------V-----F-
C.FR.HIV232996        Y--K--E-----V-N-----
C.IN.21068            Y-KK--E-----V-------
C.IN.301904           Y-KK--E-----V-------
C.IN.301999           Y-KK--E-----V-----F-
C.IN.94IN11246        Y-KK--E-----V-------
C.IN.HIVY15117        Y-KK--E-----V-------
C.IN.HIVY17884        Y-KK--E-----V-------
C.IN.HIVY17891        Y-KK--E-----V-------
C.IN.HIVY17892        Y-KK--E-----V-------

CONSENSUS_D           w-kK--e-----V-?---?-
D.CD.84ZR085          Y--K--------V-----F-
D.CD.ELI              W-KK--E-----V-N---I-
D.CD.NDK              W-KK--E-----V-N---I-
D.UG.94UG1141         W-PK--E-----V-----F-

CONSENSUS_F           Y-kK--E-----V-------
F.CM.HIV232985        Y-KK--E-----V-------
F.CM.HIV232986        Y-RK--E-----V-------
F.FR.HIV232987        Y-KK--E-----V-----F-

CONSENSUS_F1          Y-Kk--e-----v-------
F1.BE.VI850           Y-KK-G-T----V-------
F1.BR.93BR020.1       Y-K---E-----V-------
F1.FI.FIN9363         Y-KK--E-----L-------
F1.FR.MP411           Y-KK--E-----V-----F-

CONSENSUS_F2          Y-?K--E-----V-------
F2.CM.MP255           Y-KK--E-----V-------
F2.CM.MP257           Y-RK--E-----V-------

CONSENSUS_G           y-Kk--------V-n---f-
G.BE.DRCBL            Y-KK--E-----V-----F-
G.FI.HH8793           Y-KK--------V-N---F-
G.ML.HIV232990        --KQ--------V-N---F-
G.NG.92NG083          Y-K---------V-N---F-
G.NG.HIV232991        Y-KQ----P---V-N-----
G.NG.HIV232992        Y-KK--E-----V-N---F-
G.SE.SE6165           Y-KK--E-----V-N-----

CONSENSUS_H           Y-Kk--e-----V-N-----
H.BE.VI991            Y-KK--E-----V-N-----
H.BE.VI997            Y-KK--E-----V-N-----
H.CD.HIV232994        Y-KK--E-----V-N---F-
H.CD.HIV232995        Y-KK--E---F-V-N-----
H.CF.90CF056          Y-KQ--------V-N-----

CONSENSUS_J           Y-KK--E-----VHN-----
J.SE.SE9173           Y-KK--E-----VHN-----
J.SE.SE9280           Y-KK--E-----VHN-----

CONSENSUS_K           Y-K?--E-----V-----F-
K.CD.EQTB11C          Y-K---E-----V-----F-
K.CM.MP535            Y-KK--E-----V-----F-
N.CM.YBF30            W-RK--------M-----IL

CONSENSUS_O           Y-HK-AE-----?-?---F-
O.CM.ANT70C           Y-HK-AE-----V-N---F-
O.CM.MVP5180          Y-HK-AE-----------F-
CRF01_AE.CF.90CF402   --K---E-----VHN-----
CRF01_AE.FR.232982    Y-K---E-----V-N---F-
CRF01_AE.FR.232983    Y-KK--E-----V-----F-
CRF01_AE.FR.232984    Y-KK--E-----V-N---F-
CRF01_AE.TH.1-2       Y-K---E-----V-N---F-
CRF01_AE.TH.1-3       Y-K---E-----V-N---F-
CRF01_AE.TH.11-25     Y-K---E-----V-N---F-
CRF01_AE.TH.11-31     Y-K---E-----V-N---F-
CRF01_AE.TH.122-21    Y-K---E-----V-N---F-
CRF01_AE.TH.18-47     Y-KK--E-----V-N---F-
CRF01_AE.TH.235-3     Y-K---E-----V-N---F-
CRF01_AE.TH.235-32    Y-K---E-----V-N---F-
CRF01_AE.TH.24-54     --KK--E-----V-N---FL
CRF01_AE.TH.240-12    Y-KK--E-----V-N---F-
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CRF01_AE.TH.26-3      Y-K---E-----V-----F-
CRF01_AE.TH.35-6      Y-K---E-----V-N---F-
CRF01_AE.TH.6-9       Y-K---E-----V-N---F-
CRF01_AE.TH.73-44     Y-KK--E-----V-N---F-
CRF01_AE.TH.74-26     Y-KK--E-----V-N---F-
CRF01_AE.TH.89-30     Y-KK--E-----V-N---F-
CRF01_AE.TH.9-3       Y-K---E-----V-N---F-
CRF01_AE.TH.93TH253   Y-KK--E-----V-----F-
CRF01_AE.TH.98-4      Y-KK--E-----V-N---F-
CRF01_AE.TH.CM240     Y-KK--E-----V-N---F-
CRF01_AE.TH.TH022     Y-KK--E-----V-N---F-
CRF01_AE.TH.TH047     Y-KK--E-----V-N---F-
CRF02_AG.FR.DJ263     Y-KK--E-----V-----F-
CRF02_AG.FR.DJ264     Y-KK--E-----V-----F-
CRF02_AG.NG.IBNG      Y-KK--E-----V-N---F-
CRF03_AB.RU.KAL1532   Y-KK--E-----V-------
CRF04_cpx.CY.94CY03   Y-KK--E-----V-----F-
CRF04_cpx.GR.97PVCH   Y-KQ--------V-N-----
CRF04_cpx.GR.97PVMY   Y-KK--E-----V-N-----
AC.IN.21301           Y-RK--E-----V-----F-
AC.RW.92RW009         Y-KK--------V-N-----
AC.SE.SE9488          Y--Q--------V-N-----
AC.ZM.ZAM184          Y-----E-----V-------
ACD.SE.SE8603         Y-KK--------V-N---F-
AD.SE.SE6954          W-PK--E-----V-------
AD.SE.SE7108          Y-RK-A------V-----F-
ADHU.NO.NOGIL3        Y-KK--E-----VHN---F-
ADU.CD.MAL            W-PK--E-----V-------
AF.GA.HIV232981       Y-RK--E-----V-------
AG.NG.G3              Y-KK--------V-N-----
AG.SE.SE7812          Y-KK--E-----V-----F-
AGHU.GA.VI354         ---K--------V-------
AGJ.AU.BFP90          Y-KK--E-----V-N---F-
AGJ.ML.95ML84         Y-KK--------V-----F-
AGU.CD.Z321           Y-KK--E-----V-----F-
BF.BR.93BR029.4       Y-KK--E-----V-------
DF.BE.VI961           W-RK--K-----V-N-----
GH.GA.HIV232993       Y-KK--E-----V-----F-
GU.FR.HIV232974       Y-KK--E-----V-N---F-
U.CD.VI1126           Y-KK--E-----V-N-----
U.CM.HIV232988        Y-KK--E-----V-----F-
U.FR.HIV232958        Y-KK--E-----V-------
U.FR.HIV232960        Y-KK--E-----V-------

CONSENSUS_CPZ         Y-R---E-----V-----?-
CPZ.GA.CPZGAB         Y-R---E-----V-----F-
CPZ.US.CPZUS          Y-R---E-----V-----I-
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PQVPLRPMTYKAAVDLSHFL

QUERY	PQVPLRPMTYKAAVDLSHFL
CONSENSUS_A	----------g-f------
A.FR.HIV232956	---------F-G-L------
A.FR.HIV232957	---------F-G-F---F--
A.FR.HIV232959	---------F-G-F---F--
A.KE.Q23-CXC-CG	----------G--------
A.SE.SE6594	----------
A.SE.SE7253	-H---------G-L------
A.SE.SE7535	----------G-L------
A.SE.SE8131	----------G-L------
A.SE.SE8538	----------G-F------
A.SE.SE8891	----------G--------
A.UG.92UG037	----------F--GF--
A.UG.U455	----------F---F--
CONSENSUS_B	----------
B.-.E90NEF	----------G--------
B.-.HIV232997	----------L------
B.-.HIV233002	----------L------
B.-.HIV233009	----------G-L------
B.-.HIV233016	-K---------V---M----
B.-.HIV233020	----------
B.-.HIV233023	--I----------
B.-.HIV233029	----------G-L------
B.-.HIV233030	----------G--------
B.-.HIV233032	----------G--------
B.-.HIV233037	----------G-L------
B.-.HIV233038	----------
B.-.HIV233043	----------G--------
B.-.HIV233045	----------G-L------
B.-.HIV233046	----------G-L------
B.AU.1062-1-NEF	----------
B.AU.93JW-3	----------P--
B.AU.93LW-3	----------
B.AU.AF064660	----------G-F--N---
B.AU.AF064667	---------FR---------
B.AU.AF064676	----------L-I----
B.AU.MBC200	----------
B.AU.MBC925	----------
B.CN.AF033570	----------G-L------
B.CN.AF033572	----------G-L--N---
B.CN.PRC8	---------F---L------
B.CN.RL42	----------G-L------
B.DE.D31	----------
B.DE.HAN	----------G-L------
B.DE.HEI28CS	---------x-G-x------
B.DE.HEI3BL	----------G-L------
B.DE.HEI4BL	----------
B.DE.HIVU52491	----------G-L------
B.DE.NEFCC	---------SR--R------
B.DE.NEFCG	---x-------G-L------
B.DE.NH53	----------
B.ES.89SP061	----------G-L------
B.ES.AF082355	----------
B.ES.AF082357	----------G-L------
B.ES.AF082358	----------G-L------
B.ES.AF082359	----------F----
B.ES.AF082363	----------M-I----
B.ES.AF082364	----------
B.ES.AF082366	----------G-L------
B.ES.AF082368	----------G-L------
B.ES.AF082370	----------G--------
B.ES.AF082375	----------F---F--
B.ES.AF082376	----------G--------
B.ES.AF082377	----------
B.ES.AF082378	----------
B.ES.AF082380	----------
B.ES.AF082383	----------G-F------
B.ES.AF082386	----------
B.FR.HIV232961	----------
B.FR.HIV232962	----------G--------
B.FR.HIV232963	---------F-G-L------
B.FR.HIV232964	--------S----L------
B.FR.HIV232965	----------
B.FR.HXB2	----------
B.FR.NE100	---------RR--I------
B.FR.SWB884	---------RR--I------
B.GA.OYI	----------G-L------
B.GB.001GH-93(1)	----------G-M------
B.GB.002EM-93(1)	----------G-LN-----
B.GB.003PW-93(1)	-------I-----L------
B.GB.005PF1-93(1)	----------
B.GB.006DC-93(1)	----------G-F------
B.GB.010JW-93(1)	----------G-L------
B.GB.011JR-93(4)	----------G-L------
B.GB.012WM-93(1)	----------F------
B.GB.013PP-94(2)	--I-------Q--L------
B.GB.016GB-93(1)	----V-----R--R-F----
B.GB.023PA-93(1)	L----------F------
B.GB.025JN-93(1)	----------G-F---Y--
B.GB.027SL-93(1)	----------
B.GB.028JH-94(1)	----------G-L------
B.GB.030JG-93(1)	----------L------
B.GB.031DA-93(1)	----V------G-L------
B.GB.032AN-93(1)	----------R--L------
B.GB.037BS-94(2)	----------R---------
B.GB.039NM-94(1)	--I--------G-L------
B.GB.044C1-94(2)	----------G--------
B.GB.046JM-94(1)	----------L------
B.GB.048AD-94(1)	----------G-L------
B.GB.056RP-94B(1)	--------I--G-F------
B.GB.057DR-94(1)	----------G--------
B.GB.065RK-94(1)	----------
B.GB.067MM-94(2)	----------G-F---Y--
B.GB.068JB-94(1)	L----------
B.GB.098MS-94(1)	----------
B.GB.103CD-94(1)	----------G-L------
B.GB.104RT-94(1)	----------G--------
B.GB.105AS-94(1)	----------G-L--T---
B.GB.112CR-94(2)	--------I--G-L------
B.GB.117CH-94(2)	----------
B.GB.122PS-95(1)	----------G-L------
B.GB.124PD-95(1)	----------
B.GB.127RG-96(1)	--------D--G--------
B.GB.130WDC-95(1)	----------L------
B.GB.131MVS-95(1)	----------I----
B.GB.143PL-95(1)	-H----------L------
B.GB.151DH-95(1)	----------
B.GB.157GT-95(1)	--------N--G--------
B.GB.160KO-95(1)	----------
B.GB.161KC-95(1)	----------G-L------
B.GB.162BB-95(1)	----------
B.GB.163NG-95(1)	-------I--R--L------
B.GB.164SZ-95(1)	----------G-I------
B.GB.165DH-95(1)	----------G-L------
B.GB.166PW-95(1)	----------G-L------
B.GB.167RW-95(1)	---------F-G-L------
B.GB.168MB-95(1)	----------G--------
B.GB.CAM1	----------L-I----
B.GB.GLNEF1	----------
B.GB.MANC	---------F-G-L------
B.GB.NEF2	----V----------
B.GB.NEF3	----------
B.GB.NEF5	----------
B.IN.HIVP35A	----------G-L------
B.IT.AF011471	--E----------
B.IT.AF011474	----------G-F------
B.IT.AF011477	----------RG-L------
B.IT.AF011478	----------RGxL------
B.IT.AF011480	-----x----------
B.IT.AF011482	T----------L------
B.IT.AF011483	----------G-L------
B.IT.AF011486	----------Q--L------
B.IT.AF011488	x---------R--R------
B.IT.AF011492	----------G-L------
B.IT.AF047080	----------S--------
B.IT.AF047081	----------G--------
B.IT.B.IT-L1	--------x----L------
B.IT.B.IT-L2	----------
B.IT.B.IT-L3	---------HR--I------
B.IT.B.IT-L4	----------M----
B.IT.B.IT-L5	---x-------S-----x--
B.IT.B.IT-R1	----------L------
B.IT.B.IT-R2	----------G-L------
B.IT.B.IT-R3	----------Q--xN-----
B.IT.B.IT-R4	----------G--------
B.IT.B.IT-R5	-------x-CR--I------
B.KR.AF063915	----------G-L------
B.KR.AF063916	----------
B.KR.AF063919	----------G-F------
B.KR.AF063921	----------I
B.KR.AF063926	----------G-L------
B.KR.AF063927	----------
B.KR.AF063931	----------L------
B.KR.HIVZ98019	----------
B.KR.HIVZ98022	----------G--------
B.KR.HIVZ98024	----------G-L------
B.KR.HIVZ98025	----------
B.KR.HIVZ98027	----------G-L------
B.KR.HIVZ98029	----------G-L------
B.KR.HIVZ98030	----------S-------

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B.KR.HIVZ98032        -----------G-S------
B.KR.HIVZ98034        --------D--SS-------
B.NL.3202A21          -----------G-L------
B.NL.NEFA             -------------L------
B.NL.NEFD             -----------G-L------
B.NL.NEFE             -------------F------
B.SE.AF047082         -------------L------
B.SE.AF047083         -----------G--------
B.SE.AF047085         -------------F------
B.TH.28-19            -----------G-L------
B.TH.AF082838         -----------G-L------
B.TH.AF082839         --------------------
B.TH.AF082841         -------------F------
B.TW.LM49             --------D--G-I------
B.US.HIV1U03375       -----------G-L------
B.US.005PF-96(1)      --------------------
B.US.AD-93(1)         -----------G-L------
B.US.AD8              --------------------
B.US.BC               -------I-------I----
B.US.BIB              -----------G-R---W--
B.US.BJ-93(1)         --------------------
B.US.BO1              --------------------
B.US.BRVA             --------------------
B.US.BT-94(1)         -R------------------
B.US.CD1              --------------------
B.US.D8511            -----------G-L------
B.US.DH1              -----------G-L------
B.US.DH123            --I----------L------
B.US.DJ-93(1)         --------------------
B.US.E1               -----------G-L------
B.US.E81NEF           -----------G--------
B.US.E88NEF           -----------G--------
B.US.EP-94(1)         ---------W---L------
B.US.FA-93(1)         -----------G--------
B.US.HIV1U16893       -------------L------
B.US.HIV1U24455       -----------G--------
B.US.HIV1U26074       --------------------
B.US.HIV1U26098       --------------------
B.US.HIV1U26112       -----------G-L------
B.US.HIV1U26119       --------------------
B.US.HIV1U26141       --------------------
B.US.HIVU44444        ---------------I----
B.US.HIVU44450        -----------G-L------
B.US.HIVU44456        -----------G--------
B.US.HIVU44465        -----------G-L------
B.US.HIVU44468        --------------------
B.US.HP87B1           -----------G-L------
B.US.HS-93(1)         -------------L------
B.US.JRCSF            -------------I------
B.US.JRFL             -----------G--------
B.US.LM1              -----------G-L------
B.US.LT-87-1(1)       -----------G-L------
B.US.MB-94(1)         -------V---G--------
B.US.MNCG             -------------L------
B.US.NC7              ------------GI------
B.US.NEF              --------------------
B.US.NEF164B          -------------I-M----
B.US.NEF166E          -----------G-L------
B.US.NEF179C          -----------G-L------
B.US.NEF226B          -------V------------
B.US.P102A13          --------------------
B.US.P233A17          -----------G-L------
B.US.P248A01          --------------------
B.US.P357A01          -----------G-L------
B.US.P896             --------------------
B.US.PC-93(1)         -----------G--------
B.US.PRISO(1)         -H------------------
B.US.RF               ---------F----------
B.US.RP12             --------------------
B.US.RR1              --------------------
B.US.SC               --------------------
B.US.SF2              -------------L-I----
B.US.U16917           --------S------I----
B.US.WEAU160          -------------H-----#
B.US.WR27             --------------------
B.US.YU2              ---------H---M------

CONSENSUS_C           -----------g-f---f--
C.BR.92BR025          ------------V----F--
C.BW.96BW01B21        -----------G-F--GF--
C.BW.96BW0402         -----------------F--
C.BW.96BW0502         -----------G-F--GF--
C.BW.96BW1104         -------------FG--F--
C.BW.96BW1210         -----------G-F---F--
C.BW.96BW15B03        -----------G-----F--
C.BW.96BW16B01        -----------E-F---F--
C.BW.96BW17A09        -------------F---F--
C.ET.ETH2220          -------------F---L--
C.FR.HIV232966        ---------F-G-F---F--
C.FR.HIV232967        ---------F-G-F--GF--
C.FR.HIV232968        --------S----F---F--
C.FR.HIV232969        --------S--S-F---F--
C.FR.HIV232970        --------S----F---F--
C.FR.HIV232971        -------------F--GF--
C.FR.HIV232972        -------------F-FGF--
C.FR.HIV232973        -----------------W--
C.FR.HIV232976        -------------F---F--
C.FR.HIV232977        -----------------W--
C.FR.HIV232978        -------------F---F--
C.FR.HIV232979        -----------G-F---F--
C.FR.HIV232980        -----------------F--
C.FR.HIV232996        -----------G-F---F--
C.IN.21068            ---------F-G-L---F--
C.IN.301904           ---------F-E-----F--
C.IN.301999           ---------F-G-F---F--
C.IN.94IN11246        ---------F-G-F---F--
C.IN.HIVY15117        -----------G-F---F--
C.IN.HIVY17884        ---------F-G-F---F--
C.IN.HIVY17891        ---------F-G-F---F--
C.IN.HIVY17892        ---------F-G-F---F--

CONSENSUS_D           -----------e--------
D.CD.84ZR085          --------------------
D.CD.ELI              -----------E-L------
D.CD.NDK              -----------E--------
D.UG.94UG1141         -----------E--------

CONSENSUS_F           --------------------
F.CM.HIV232985        --------------------
F.CM.HIV232986        -------------L------
F.FR.HIV232987        ---------F----------

CONSENSUS_F1          -----------?--------
F1.BE.VI850           ----V---------------
F1.BR.93BR020.1       -----------G--------
F1.FI.FIN9363         -----------G-F---Q-x
F1.FR.MP411           ---------F----------

CONSENSUS_F2          -------------?------
F2.CM.MP255           --------------------
F2.CM.MP257           -------------L------

CONSENSUS_G           -------------f---F--
G.BE.DRCBL            -------------F---F--
G.FI.HH8793           ----V--------F---F--
G.ML.HIV232990        -------------L---F--
G.NG.92NG083          -------------F---F--
G.NG.HIV232991        --L--------G-F---F--
G.NG.HIV232992        -----------G-F---F--
G.SE.SE6165           ---------F-G-F---F--

CONSENSUS_H           -----------g-f------
H.BE.VI991            -----------G-F------
H.BE.VI997            -------------L------
H.CD.HIV232994        -----------E-F-F-F--
H.CD.HIV232995        ----V------G-L-F----
H.CF.90CF056          -----------G-F------

CONSENSUS_J           --?--------G-?---F--
J.SE.SE9173           --x--------G-F---F--
J.SE.SE9280           --I--------G-----F--

CONSENSUS_K           ---------?-?-F--GF--
K.CD.EQTB11C          ---------F-G-F--GF--
K.CM.MP535            -------------F--GF--
N.CM.YBF30            -------I---Q-F---F--

CONSENSUS_O           ---------?-?-F---F--
O.CM.ANT70C           -----------G-F---F--
O.CM.MVP5180          ---------F---F---F--
CRF01_AE.CF.90CF402   -----------G-F---F--
CRF01_AE.FR.232982    -----------G-F---F--
CRF01_AE.FR.232983    -----------G-F---F--
CRF01_AE.FR.232984    ---------F-E-F---F--
CRF01_AE.TH.1-2       ---------F-E-F---F--
CRF01_AE.TH.1-3       ---------F-E-F---F--
CRF01_AE.TH.11-25     -H-------F-G-F---F--
CRF01_AE.TH.11-31     ---------F-G-F---F--
CRF01_AE.TH.122-21    -----------G-F---F--
CRF01_AE.TH.18-47     -------------F---F--
CRF01_AE.TH.235-3     -----------G-F---F--
CRF01_AE.TH.235-32    -----------G-F---F--
CRF01_AE.TH.24-54     -----------G-F---F-F
CRF01_AE.TH.240-12    -----------G-F-F-F--
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CRF01_AE.TH.26-3      -----------G-F---F--
CRF01_AE.TH.35-6      -----------G-F---F--
CRF01_AE.TH.6-9       -----------G-F---F--
CRF01_AE.TH.73-44     ---------F-G-F---F--
CRF01_AE.TH.74-26     -------------F---F--
CRF01_AE.TH.89-30     ---------F-G-F---F--
CRF01_AE.TH.9-3       -----------G-F---F--
CRF01_AE.TH.93TH253   -----------G-F---F--
CRF01_AE.TH.98-4      -----------G-F---F--
CRF01_AE.TH.CM240     -----------G-F---F--
CRF01_AE.TH.TH022     -----------G-F---F--
CRF01_AE.TH.TH047     ---------F-E-F---F--
CRF02_AG.FR.DJ263     -------------F--GF--
CRF02_AG.FR.DJ264     -----------G-F--GF--
CRF02_AG.NG.IBNG      -----------G--------
CRF03_AB.RU.KAL1532   -----------G-F------
CRF04_cpx.CY.94CY03   ---------F-G-L------
CRF04_cpx.GR.97PVCH   ---------F---L------
CRF04_cpx.GR.97PVMY   --------------------
AC.IN.21301           -----------G-L---F--
AC.RW.92RW009         -----------------F--
AC.SE.SE9488          -----------G-L------
AC.ZM.ZAM184          -----------G--------
ACD.SE.SE8603         -----------------F--
AD.SE.SE6954          -----------G--------
AD.SE.SE7108          --------------------
ADHU.NO.NOGIL3        --------------------
ADU.CD.MAL            -----------G-F------
AF.GA.HIV232981       -----------G-F------
AG.NG.G3              Q------------F---F--
AG.SE.SE7812          --------------------
AGHU.GA.VI354         --L------F-G-F--GF--
AGJ.AU.BFP90          ----V--------F---F--
AGJ.ML.95ML84         ---------F-G-F---F--
AGU.CD.Z321           ---------F-G-F---F--
BF.BR.93BR029.4       -----------G-L------
DF.BE.VI961           ---------F-G-L------
GH.GA.HIV232993       -----------G-F--GF--
GU.FR.HIV232974       -----------G-F------
U.CD.VI1126           -----------G-F-----I
U.CM.HIV232988        -------------F--GF--
U.FR.HIV232958        -----------G-F--GF--
U.FR.HIV232960        -----------G-F--GF--

CONSENSUS_CPZ         ----?------?-F--??--
CPZ.GA.CPZGAB         ----T--------F------
CPZ.US.CPZUS          -----------Q-F--GF--
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LRPGGKKKYKLKHIVWASRE

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QUERY                LRPGGKKKYKLKHIVWASRE

CONSENSUS_A          ---------r---l------
A.KE.Q23-CXC-CG      ---------RM--LI-----
A.SE.SE6594          ---------R---L------
A.SE.SE7253          ---------RM--L------
A.SE.SE7535          -------Q-R---L------
A.SE.SE8131          -----N---R---L------
A.SE.SE8538          ---------RM--L------
A.SE.SE8891          -------------M---R--
A.UG.92UG037         ---------R---L------
A.UG.U455            -----N---R---L------

CONSENSUS_B          --------------------
B.AU.AF128998        -------T-Q----------
B.-.NL43E9           -------L------I-----
B.AU.MBC18           --------------------
B.AU.MBC200          -------Q-R----------
B.AU.MBC925          ---R-----Q----------
B.AU.MBCC54          ---------Q----------
B.AU.MBCC98          ---------Q----------
B.AU.MBCD36          -----R---Q----------
B.CN.RL42            ---------R---L------
B.DE.D31             ---------R----------
B.DE.HAN             ---------Q----------
B.ES.89SP061         ---------R---L------
B.FR.HXB2            --------------------
B.GA.OYI             ---------Q----------
B.GB.CAM1            --------------------
B.GB.MANC            --------------------
B.JP.JH31            --------------------
B.NL.3202A21         -------R------------
B.TW.LM49            ---------R---L------
B.US.85WCIPR54       --------------------
B.US.AD8             --------------------
B.US.BC              -------------L------
B.US.DH123           --------------------
B.US.JRCSF           ---------R----------
B.US.JRFL            ---------R----------
B.US.MNCG            -------------V------
B.US.NC7             ---------M----------
B.US.NY5CG           -------Q-R----------
B.US.P896            --------------------
B.US.RF              ---R---R------------
B.US.SF2             --------------------
B.US.WC001           --------------------
B.US.WEAU160         -----N--------------
B.US.WR27            ---------R---L------
B.US.YU2             -------Q-R----------

CONSENSUS_C          -------h-m---l------
C.BR.92BR025         -K-----H-MM--L------
C.BW.96BW01B22       -------C-M---L------
C.BW.96BW0402        -------Q-RI--L------
C.BW.96BW0502        -------H-M---L------
C.BW.96BW1104        -------R-MI--L------
C.BW.96BW1210        -------R-MM--L------
C.BW.96BW15B03       S------C-M----------
C.BW.96BW1626        -------R-M---L------
C.BW.96BW17A09       -------H-M---L------
C.ET.ETH2220         -------H-M---L---N--
C.IN.93IN904         -------H-M---L------
C.IN.93IN905         -------H-M---L------
C.IN.93IN999         -------H-M---L------
C.IN.94IN11246       -------H-M---L------
C.IN.95IN21068       -------R-M---L------

CONSENSUS_D          ---------r---l------
D.CD.84ZR085         --------------------
D.CD.ELI             ---------R----------
D.CD.NDK             ---------A---LI-----
D.CD.Z2Z6            ---------R---L------
D.UG.94UG1141        ---------R---L------

CONSENSUS_F          ---------rm--L------
F.BR.BZ162           ---------R---L------
F.CD.VI174           ---------RM--L------
F.RW.VI69            -----R----M--LI-----

CONSENSUS_F1         ---------rm--L------
F1.BE.VI850          -------R--M--LI-----
F1.BR.93BR020.1      ---------R---L------
F1.FI.FIN9363        -------Q-RI--L------
F1.FR.MP411          ---------RM--L------

CONSENSUS_F2         -?-----?-R---?------
F2.CM.MP255          -K-----R-R---L------
F2.CM.MP257          ---------R----------

CONSENSUS_G          -----x---xx--L------
G.BE.DRCBL           -------R-RM--L------
G.FI.HH8793          ---------R---L------
G.NG.92NG083         -----R--------------
G.SE.SE6165          -----R-S--I--L------

CONSENSUS_H          ---------R---L------
H.BE.VI991           -----R---R---L------
H.BE.VI997           ---------R----------
H.CF.90CF056         ---------R---L------

CONSENSUS_J          -------?-RI--L------
J.SE.SE9173          -------Q-RI--L------
J.SE.SE9280          ---------RI--L------

CONSENSUS_K          ---------r---L------
K.BE.VI325           -----S---R---L------
K.CD.EQTB11C         ---------R---L------
K.CM.MP535           -------------L------
N.CM.YBF30           ---------RM--L------

CONSENSUS_O          -?--S--?-R---L------
O.CM.ANT70C          -K--S----R---L------
O.CM.MVP5180         ----S--A-R---L------
CRF01-AE.CF.90CF40   -------Q-RM--L------
CRF01-AE.TH.93TH25   ----------M--L------
CRF01-AE.TH.CM240    -----R---R---L------
CRF01-AE.TH.TH022    -----R---RM--L------
CRF01-AE.TH.TH047    -----R---H----------
CRF02_AG.FR.DJ263    ---------R---L------
CRF02_AG.FR.DJ264    ---A-----R---L------
CRF02_AG.NG.IBNG     ---------R---L------
CRF03_AB.RU.KAL15    ------E--RI--L------
CRF04_cpx.CY.94CY0   ---------R---L------
CRF04_cpx.GR.97PVC   ---------R---L------
CRF04_cpx.GR.97PVM   -------R-RI--LI-----
AC.ET.E3099G         -----N---R---L------
AC.IN.21301          -------H-MI--L------
AC.RW.92RW009        -K-----T-MM--L------
AC.SE.SE9488         ---------RM--L------
AC.ZM.ZAM174-21      -----S-R-MI--L------
AC.ZM.ZAM184         -------Q-RM--L------
AC.ZM.ZAM716-17      -------Q-RI--L------
ACD.SE.SE8603        ---------R---L------
AD.SE.SE6954         -------R-R----------
AD.SE.SE7108         -----R--------------
ADHU.NO.NOGIL3       -------Q-R---L------
ADU.CD.MAL           ---------R---L------
AG.NG.G3             ---------RM--L------
AG.SE.SE7812         ---------R---L------
AGHU.GA.VI354        ---------QI---------
AGJ.AU.BFP90         ----------M--L------
AGJ.ML.95ML8         ---------RM--L------
AGU.CD.Z321          -------Q------------
BF.BR.93BR029.4      -----H---R----------
DF.CD.VI961          ---------R----------
U.CD.VI1126          -----R---R---L------

CONSENSUS_CPZ        ---------Mm--L------
CPZ.CD.CPZANT        ---------MI--L---RS-
CPZ.GA.CPZGAB        -----R-R-MM--L------
CPZ.US.CPZUS         ---------MM--L------
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LKETINEEAAEWDRVHPVHA

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QUERY                LKETINEEAAEWDRVHPVHA

CONSENSUS_A          --D-----------l-----
A.KE.Q23-CXC-CG      --D-----------L-----
A.SE.SE6594          --D-----------L-----
A.SE.SE7253          --D-----------L--A--
A.SE.SE7535          --D-----------L-----
A.SE.SE8131          --D-----------T--I--
A.SE.SE8538          --D-----------L-----
A.SE.SE8891          --D-----------L-----
A.UG.92UG037         --D-----------L-----
A.UG.U455            --D-----------L-----

CONSENSUS_B          --------------l-----
B.AU.AF128998        --------------L--A--
B.-.NL43E9           --------------L-----
B.AU.MBC18           --------------L--AQ-
B.AU.MBC200          --------------L-----
B.AU.MBC925          --------------------
B.AU.MBCC54          ---------G----L--AQ-
B.AU.MBCC98          --------------L-----
B.AU.MBCD36          --------------L---Q-
B.CN.RL42            --------------L-----
B.DE.D31             --------------L-----
B.DE.HAN             --------------L-----
B.ES.89SP061         --------------L-----
B.FR.HXB2            --------------------
B.GA.OYI             --------------L-----
B.GB.CAM1            --------------L-----
B.GB.MANC            --------------L-----
B.JP.JH31            --------------L--AQ-
B.NL.3202A21         --------------L-----
B.TW.LM49            --------------L-----
B.US.85WCIPR54       --------------L-----
B.US.AD8             --------------L-----
B.US.BC              --------------L---Q-
B.US.DH123           --------------L-----
B.US.JRCSF           --------------L-----
B.US.JRFL            --------------L-----
B.US.MNCG            --------------L-----
B.US.NC7             ------------------Q-
B.US.NY5CG           --------------L-----
B.US.P896            --------------L---Q-
B.US.RF              --------------L-----
B.US.SF2             --------------------
B.US.WC001           --------------L---Q-
B.US.WEAU160         --------------L-----
B.US.WR27            ------D-------L---Q-
B.US.YU2             --------------L-----

CONSENSUS_C          --D-----------l-----
C.BR.92BR025         --D-----------L-----
C.BW.96BW01B22       --D-----------T-----
C.BW.96BW0402        --D-----------L-----
C.BW.96BW0502        --D-----------L---Q-
C.BW.96BW1104        --D-----------L-----
C.BW.96BW1210        --D-------G---L-----
C.BW.96BW15B03       --D-----------L-----
C.BW.96BW1626        --D-----------------
C.BW.96BW17A09       --D-----------L-----
C.ET.ETH2220         --D-----------L-----
C.IN.93IN904         --D-----------L--I--
C.IN.93IN905         --D-----------L-----
C.IN.93IN999         --D-----------L-----
C.IN.94IN11246       --D-----------I-----
C.IN.95IN21068       --D-----------L---P-

CONSENSUS_D          --------------L-----
D.CD.84ZR085         --------------L---Q-
D.CD.ELI             --------------L-----
D.CD.NDK             ------D-------L-----
D.CD.Z2Z6            --------------L-----
D.UG.94UG1141        --D-----------L-----

CONSENSUS_F          --D-----------L---q-
F.BR.BZ162           --D-----------L--AQ-
F.CD.VI174           --D-----------L---Q-
F.RW.VI69            --D-----------L-----

CONSENSUS_F1         --D-----------L-----
F1.BE.VI850          --D-----------L-----
F1.BR.93BR020.1      --D-----------L--TQ-
F1.FI.FIN9363        --D-----------L-----
F1.FR.MP411          --D-----------L--A--

CONSENSUS_F2         --D-----------L-----
F2.CM.MP255          --D-----------L-----
F2.CM.MP257          --D-----------L-----

CONSENSUS_G          --D---x-------x--xQ-
G.BE.DRCBL           ------D-------L--QQ-
G.FI.HH8793          --D-----------M--PQ-
G.NG.92NG083         --D---D-------I--QQ-
G.SE.SE6165          --D-----------M--QQ-

CONSENSUS_H          --D-----------L-----
H.BE.VI991           --D-----------L-----
H.BE.VI997           --D-----------L-----
H.CF.90CF056         --D-----------------

CONSENSUS_J          --D-----------------
J.SE.SE9173          --D-----------------
J.SE.SE9280          --D-----------------

CONSENSUS_K          --d-----------l-----
K.BE.VI325           --D-----------L-----
K.CD.EQTB11C         --D-----------M---Q-
K.CM.MP535           --D---D-------L-----
N.CM.YBF30           ---V------D---T---PV

CONSENSUS_O          ---V-----?----T--P??
O.CM.ANT70C          ---V-----V----T--PPV
O.CM.MVP5180         ---V----------T--PAM
CRF01-AE.CF.90CF40   --D-----------------
CRF01-AE.TH.93TH25   --------------------
CRF01-AE.TH.CM240    --------P-----------
CRF01-AE.TH.TH022    --------------------
CRF01-AE.TH.TH047    --------P-----------
CRF02_AG.FR.DJ263    --D-----------------
CRF02_AG.FR.DJ264    --D-----------------
CRF02_AG.NG.IBNG     --D-----------------
CRF03_AB.RU.KAL15    --D-----------L--AQ-
CRF04_cpx.CY.94CY0   --D-------D---T-----
CRF04_cpx.GR.97PVC   --D------S----A-----
CRF04_cpx.GR.97PVM   --D--------------A--
AC.ET.E3099G         --------------------
AC.IN.21301          --D-----------L--AQ-
AC.RW.92RW009        --D---------------Q-
AC.SE.SE9488         --D-----------L--AQ-
AC.ZM.ZAM174-21      --D-----------L---Q-
AC.ZM.ZAM184         --D-----------------
AC.ZM.ZAM716-17      --D-----------L---Q-
ACD.SE.SE8603        --D-----------I-----
AD.SE.SE6954         ----------D---L-----
AD.SE.SE7108         --D-----------L-----
ADHU.NO.NOGIL3       --D-------D---L-----
ADU.CD.MAL           --D-------D---------
AG.NG.G3             --DS----------L--QQ-
AG.SE.SE7812         --D-----------------
AGHU.GA.VI354        --D-----------I---Q-
AGJ.AU.BFP90         --D-----------------
AGJ.ML.95ML8         --D-----------M---Q-
AGU.CD.Z321          --D--------------PQ-
BF.BR.93BR029.4      --------------------
DF.CD.VI961          -----------------AQ-
U.CD.VI1126          --D-----------L-----

CONSENSUS_CPZ        ---v----------l--t--
CPZ.CD.CPZANT        ---V----------L--T--
CPZ.GA.CPZGAB        ---V----------L--T--
CPZ.US.CPZUS         ---A------D$--T--L--
```

Study Subject ID:01RCH51
Study Subject Clone:
Study Subject HLA:A30,A68,B8,B72,Cw7,Cw8
Sequence: Known reactive 20Mer0: HSQRRQDILDLWIYHTQGYF Nef(102–121)

Possible HLA

A30	A*3001,A*3002,A*3003,A*3004
A68	A*6801,A*6802,A*6808
B72	B*1503,B*1546
B8	B*0801,B*0802,B*0803,B*0806
Cw7	Cw*0701,Cw*0702,Cw*0704,Cw*0706
Cw8	Cw*08,Cw*0801,Cw*0802,C*0802,Cw*0803

Possible Epitopes based on anchor residues

(1-9)	HSQRRQDIL	Cw*0702
(3-11)	QRRQDILDL	Cw*0702
(6-14)	QDILDLWIY	Cw*0702
(11-19)	LWIYHTQGY	Cw*0702
(12-20)	WIYHTQGYF	Cw*0702
(2-9)	SQRRQDIL	Cw*0702
(4-11)	RRQDILDL	Cw*0702
(7-14)	DILDLWIY	Cw*0702
(12-19)	WIYHTQGY	Cw*0702
(13-20)	IYHTQGYF	Cw*0702
(2-11)	SQRRQDILDL	Cw*0702
(5-14)	RQDILDLWIY	Cw*0702
(10-19)	DLWIYHTQGY	Cw*0702
(11-20)	LWIYHTQGYF	Cw*0702

Anchor Residues Searched

A*6801	X[VT]XXXXX[RK]
A*6801	X[VT]XXXXXX[RK]
A*6801	X[VT]XXXXXXX[RK]
B8	XX[K]X[KR]XXX[L]
B8	XX[K]X[KR]XX[L]
B8	XX[K]X[KR]XXXX[L]
Cw*0702	XXXXXXXX[YFL]
Cw*0702	XXXXXXX[YFL]
Cw*0702	XXXXXXXXX[YFL]

Study Subject ID:01RCH51
Study Subject Clone:
Study Subject HLA:A30,A68,B8,B72,Cw7,Cw8
Sequence: Known reactive 20Mer1: PQVPLRPMTYKAAVDLSHFL Nef(72–91)

Possible HLA

A30	A*3001,A*3002,A*3003,A*3004
A68	A*6801,A*6802,A*6808
B72	B*1503,B*1546
B8	B*0801,B*0802,B*0803,B*0806
Cw7	Cw*0701,Cw*0702,Cw*0704,Cw*0706
Cw8	Cw*08,Cw*0801,Cw*0802,C*0802,Cw*0803

Possible Epitopes based on anchor residues

(2-11)	QVPLRPMTYK	A*6801
(2-10)	QVPLRPMTY	Cw*0702
(8-16)	MTYKAAVDL	Cw*0702
(11-19)	KAAVDLSHF	Cw*0702
(12-20)	AAVDLSHFL	Cw*0702
(3-10)	VPLRPMTY	Cw*0702
(9-16)	TYKAAVDL	Cw*0702
(12-19)	AAVDLSHF	Cw*0702
(13-20)	AVDLSHFL	Cw*0702
(1-10)	PQVPLRPMTY	Cw*0702
(7-16)	PMTYKAAVDL	Cw*0702
(10-19)	YKAAVDLSHF	Cw*0702
(11-20)	KAAVDLSHFL	Cw*0702

Anchor Residues Searched

A*6801	X[VT]XXXXX[RK]
A*6801	X[VT]XXXXXX[RK]
A*6801	X[VT]XXXXXXX[RK]
B8	XX[K]X[KR]XXX[L]
B8	XX[K]X[KR]XX[L]
B8	XX[K]X[KR]XXXX[L]
Cw*0702	XXXXXXXX[YFL]
Cw*0702	XXXXXXX[YFL]
Cw*0702	XXXXXXXXX[YFL]

Study Subject ID:01RCH51
Study Subject Clone:
Study Subject HLA:A30,A68,B8,B72,Cw7,Cw8
Sequence: Known reactive 20Mer2: LRPGGKKKYKLKHIVWASRE p17(21–40)

Possible HLA

A30	A*3001,A*3002,A*3003,A*3004
A68	A*6801,A*6802,A*6808
B72	B*1503,B*1546
B8	B*0801,B*0802,B*0803,B*0806
Cw7	Cw*0701,Cw*0702,Cw*0704,Cw*0706
Cw8	Cw*08,Cw*0801,Cw*0802,C*0802,Cw*0803

Possible Epitopes based on anchor residues

(4-11)	GGKKKYKL	B8
(1-9)	LRPGGKKKY	Cw*0702
(3-11)	PGGKKKYKL	Cw*0702
(2-9)	RPGGKKKY	Cw*0702
(4-11)	GGKKKYKL	Cw*0702
(2-11)	RPGGKKKYKL	Cw*0702

Anchor Residues Searched

A*6801	X[VT]XXXXX[RK]
A*6801	X[VT]XXXXXX[RK]
A*6801	X[VT]XXXXXXX[RK]
B8	XX[K]X[KR]XXX[L]
B8	XX[K]X[KR]XX[L]
B8	XX[K]X[KR]XXXX[L]
Cw*0702	XXXXXXXX[YFL]
Cw*0702	XXXXXXX[YFL]
Cw*0702	XXXXXXXXX[YFL]

Study Subject ID:01RCH51
Study Subject Clone:
Study Subject HLA:A30,A68,B8,B72,Cw7,Cw8
Sequence: Known reactive 20Mer3: LKETINEEAAEWDRVHPVHA p24(69–88)

Possible HLA

A30	A*3001,A*3002,A*3003,A*3004
A68	A*6801,A*6802,A*6808
B72	B*1503,B*1546
B8	B*0801,B*0802,B*0803,B*0806
Cw7	Cw*0701,Cw*0702,Cw*0704,Cw*0706
Cw8	Cw*08,Cw*0801,Cw*0802,C*0802,Cw*0803

Possible Epitopes based on anchor residues

Anchor Residues Searched

A*6801	X[VT]XXXXX[RK]
A*6801	X[VT]XXXXXX[RK]
A*6801	X[VT]XXXXXXX[RK]
B8	XX[K]X[KR]XXX[L]
B8	XX[K]X[KR]XX[L]
B8	XX[K]X[KR]XXXX[L]
Cw*0702	XXXXXXXX[YFL]
Cw*0702	XXXXXXX[YFL]
Cw*0702	XXXXXXXXX[YFL]

This table lists epitopes that are experimentally observed to be presented by a HLA type carried by the patient, but the de£ned epitope has substitutions relative to the peptides from your reference strains and so might be missed by your reagents: in HXB2 for Gag, Pol; MN for Env; BRU for Nef, relative to most B clade Sequences in the database:

Protein	Epitope in Database	Epitope in Ref. strain	Epitope in Consensus B	HLA	Notes
p24(127–135)	GDIYKRWII	GEIYKRWII	GEIYKRWII	B*0801	
p24(128–135)	DIYKRWII	EIYKRWII	EIYKRWII	B8	
Protease(3–11)	ITLWQRPLV	VTLWQRPLV	ITLWQRPLV	A*6802	
Protease(3–11)	ITLWQRPLV	VTLWQRPLV	ITLWQRPLV	A*6802,A*7401,A19	
Protease(30–38)	DTVLEEMNL	DTVLEEMSL	DTVLEEMNL	A*6802	
Protease(30–38)	DTVLEDINL	DTVLEEMSL	DTVLEEMNL	A*6802	
Protease(30–38)	DTVLEEWNL	DTVLEEMSL	DTVLEEMNL	A*6802	
RT(364–372)	DVKQLTEVV	DVKQLTEAV	DVKQLTEAV	A28, A*6802	
Integrase(96–104)	ETAYFILKL	ETAYFLLKL	ETAYFLLKL	A*6802	
gp160(2–10)	RVKEKYQHL	RAIEAQQHM	GIRKNYQHL	B*0801	
gp160(2–10)	RVKEKYQHL	RAIEAQQHM	GIRKNYQHL	B8	
gp160(156–165)	NCSFNISTSI	NCSFNITTSI	NCSFNITTSI	Cw*08	
gp160(156–165)	NCSFNISTSI	NCSFNITTSI	NCSFNITTSI	Cw8	
gp160(239–247)	CTNVSTVQC	CKNVSTVQC	CTNVSTVQC	Cw8	
gp160(704–712)	IVNRNRQGY	IVNRVRQGY	IVNRVRQGY	A*3002	
gp160(777–785)	IVTRIVELL	IAARIVELL	IVTRIVELL	A*6802	
gp160(794–802)	KYCWNLLQY	KYWWNLLQY	KYWWNLLQY	A*3002	

Table 1: **p24**

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
p24(127–135)	p24(259–267 SF2)	GDIYKRWII	HIV-1 infection	human(B*0801)	[McAdam (1998)]
	• GDIYKRWII speci£c CTL clone also recognized GEIYKRWII				
p24(128–135)	p24()	DIYKRWII	HIV-1 infection	human(B8)	[Goulder (2000)]
	• The CTL-dominant response was focused on this epitope in a HIV+ South African – this epitope did not fall within the £ve most recognized peptides in the study • Three peptides GSEELRSLYNTVATL (p17 residues 71-85), SALSEGATPQDLNTMLNTVG (p24 41-60), and WEKIRLRPG-GKKKYKLK(p17 16-30) contained the dominant Gag-speci£c epitope in 31 out of 44 B-clade infected individuals from Boston who showed Gag-CTL responses • Five peptides RLRPGGKKHYMIKHLVW (p17 20-36), ELRSLYNTVATLYCV (p17Gag 74-88), SALSEGATPQDLNTMLNTVG (p24 41-60), FRDYVDRFFKTLRAEQA (p24 161-177), and SILDIKQGKEPFRDY (p24 149-164) contained dominant Gag-speci£c epitopes in 32 out of 37 C-clade infected subjects from South Africa			

Table 2: **Protease**

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
Protease(3–11)	RT(71–79 A/B/D)	ITLWQRPLV	?	human(A*6802)	[Brander & Goulder(2001)]
	• C. Brander notes this is an A*6802 epitope				
Protease(3–11)	Protease(71–79 LAI)	ITLWQRPLV		human(A*6802,A*7401,A*0201)	[Long (1998)]
	• Predicted on binding motif, no truncations analyzed • Clade A/B/D consensus, S. Rowland-Jones, pers. comm.				
Protease(30–38)	Pol()	DTVLEEMNL	HIV-1 exposure	human(A*6802)	[Rowland-Jones (1998)]
	• HIV-speci£c CTL were found in exposed seronegative prostitutes from Nairobi – these CTL may confer protection • Seroprevalence in this cohort is 90-95% and their HIV-1 exposure is among the highest in the world • Most isolated HIV strains are clade A in Nairobi, although clades C and D are also found – B clade epitopes are often cross-reactive, however stronger responses are frequently observed using A or D clade versions of epitopes • This epitope is conserved among B and D clade viruses • The Clade A version of the epitope: DTVLEDINL • This epitope was recognized by two different exposed and uninfected prostitutes • This epitope was identi£ed by screening 49 HIV-1 peptides with the predicted A*6802 anchor residue motif x(VT)xxxxxx(VL)				
Protease(30–38)	pol()	DTVLEDINL	HIV-1 exposed seronegative	human(A*6802)	[Kaul (2000)]
	• 11/16 heavily HIV exposed but persistently seronegative sex-workers in Nairobi had HIV-speci£c CD8 gamma-IFN responses in the cervix – systemic CD8+ T cell responses tended to be to the same epitopes but at generally lower levels than cervical CD8+ T cell responses • Low risk individuals did not have such CD8+ cells • CD8+ epitopes T cell DTVLEDINL (3 individuals), SLYNVATL (4 individuals), LSPRTLNAW (3 individuals) and YPLTFGWCF (4 individuals) were most commonly recognized by the HIV-resistant women				
Protease(30–38)	RT(85–93 Clade D)	DTVLEEWNL	?	human(A*6802)	[Brander & Goulder(2001)]
	• C. Brander notes this is an A*6802 epitope				

Table 3: **RT**

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
RT(364–372)	RT(518–526 U455)	DVKQLTEVV		human(A28, A*6802)	[Dong (1998), Menendez-Arias (1998)]
	• Predicted on binding motif, no truncations analyzed • Reacts with clade A consensus (U455), and with the peptide DVKQLAEAV, from the D clade				

Table 4: **Integrase**

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
Integrase(96–104)	Integrase(823–831)	ETAYFILKL		human(A*6802)	[Dong & Rowland-Jones(1998)]
	• Epitope found in clade A, B, and D – Pers. Comm. S. Rowland-Jones and T. Dong				

Table 5: **gp160**

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
gp160(2–10)	gp160(2–10 IIIB)	RVKEKYQHL	HIV-1 infection	human(B*0801)	[Brander & Goulder(2001)]
	• C. Brander notes this is a B*0801 epitope				
gp160(2–10)	gp160(2–10 IIIB)	RVKEKYQHL	HIV-1 infection	human(B8)	[Sipsas (1997)]
	• HIV IIIB proteins were used to de£ne the range of CTL epitopes recognized by 3 lab workers accidentally infected with HIV-1 IIIB • Type-speci£c epitope, unique to the LAI and IIIB because of a deletion of three amino acids that are present in all other subtype B HIV-1s • RVKGIRKNYQHL, a variant found in JRCSF, was not recognized • This epitope is in the signal sequence of gp120				
gp160(156–165)	gp120(156–165)	NCSFNISTSI	HIV-1 infection	human(Cw*08)	[Ferris (1999)]
	• Recognized by CTL clone LWF A5, isolated from a lab worker exposed to HIV-1 in 1985 • The processing of this epitope is TAP1/2-dependent, as are most Env epitopes, and it contains two N-linked glycosylation sites that are glycosylated in Env • Only peptide that has been deglycosylated, a process that changes asparagine (N) to aspartic acid (D) was recognized: the aspartic acid at position 5 was critical, position 1 could be either D or N • This peptide also contains a Cys involved in a disul£de linkage but reducing conditions did not effect recognition by CTL clone LWF A5 • The HIV-1 Env epitopes are typically processed by a TAP1/2 dependent mechanism, which involves cotranslational translocation into the ER, glycosylation, export back into the cytosol, and deglycosylation for processing, and retransport into the ER for the association with class I molecules • The particular pathway of generating an epitope may have an impact on the presentation of that epitope, quantitatively as well as qualitatively				
gp160(156–165)	gp120(156–165 IIIB)	NCSFNISTSI	HIV-1 infection	human(Cw8)	[Sipsas (1997)]
	• HIV IIIB proteins were used to de£ne the range of CTL epitopes recognized by 3 lab workers accidentally infected with HIV-1 IIIB • NCSFNITTSI, a variant found in HIV-1 MN, was not recognized, thus this epitope was type-speci£c • NCSFNISTSI contains two potential N-linked glycosylation sites and cysteine residue, possibly related to the requirement for a high sensitizing dose of peptide for CTL activity				
gp160(239–247)	gp120(241–249 LAI)	CTNVSTVQC	HIV-1 infection	human(Cw8)	[Sipsas (1997)]
	• HIV IIIB proteins were used to de£ne the range of CTL epitopes recognized by 3 lab workers accidentally infected with HIV-1 IIIB • CTNVSTVQC contains a potential N-linked glycosylation site and cysteine residues, possibly related to a requirement for a high sensitizing dose of peptide for CTL activity				

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
gp160(704–712)	gp160(704–712 LAI)	IVNRNRQGY		human(A*3002)	[Brander & Goulder(2001), Goulder (2001)]
	• C. Brander notes this is an A*3002 epitope				
gp160(777–785)	gp41(782–790 LAI)	IVTRIVELL	?	human(A*6802)	[Brander & Goulder(2001)]
	• C. Brander notes this is an A*6802 epitope				
gp160(794–802)	gp160(794–802 LAI)	KYCWNLLQY		human(A*3002)	[Brander & Goulder(2001), Goulder (2001)]
	• C. Brander notes this is an A*3002 epitope				

Table 6: **All De£ned Epitopes within the 20mer, regardless of HLA type**

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
Nef(102–115)	Nef(102–115 LAI)	HSQRRQDILDLWIY	HIV-1 infection	human(B7)	[Goulder (1997b), Goulder (1997a)]
	• Identical twin hemophiliac brothers were both infected with the same batch of factor VIII • One had a strong response to this peptide, the other did not • [Goulder (1997a)] is a review of immune escape that summarizes this study				
Nef(102–121)	Nef(101–120 SF2)	HSQRRQDILDLQIYHTQGYF	HIV-1 infection	human()	[Lieberman (1997)]
	• Of 25 patients, most had CTL speci£c for more than 1 HIV-1 protein • Eleven subjects had CTL that could recognize vaccinia-expressed LAI Nef • Two of these 11 had CTL response to this peptide • The responding subjects were HLA-A2, A3, B8, B62 and HLA-A2, B21				
Nef(105–114)	Nef(105–114 LAI)	RRQDILDLWI	HIV-1 infection	human(B*2705)	[Goulder (1997c)]
	• De£ned as optimal epitope from within reactive peptide HSQRRQDILDLWIYHTQGYF [Nef(102-121 LAI)] • HLA-B*2705 is associated with slow HIV disease progression • The HLA-B*2705 binding motif includes R at position 2, and L in the C-term position				
Nef(105–114)	Nef(105–114 LAI)	RRQDILDLWI	HIV-1 infection	human(B*2705)	[Brander & Goulder(2001)]
	• C. Brander notes this is a B*2705 epitope				
Nef(106–115)	()	RQDILDLWIY		(B7)	[Brander & Goulder(2001), Goulder(1999)]

Table 7: **All De£ned Epitopes within the 20mer, regardless of HLA type**

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
Nef(102–115)	Nef(102–115 LAI)	HSQRRQDILDLWIY	HIV-1 infection	human(B7)	[Goulder (1997b), Goulder (1997a)]
	• Identical twin hemophiliac brothers were both infected with the same batch of factor VIII • One had a strong response to this peptide, the other did not • [Goulder (1997a)] is a review of immune escape that summarizes this study				
Nef(102–121)	Nef(101–120 SF2)	HSQRRQDILDLQIYHTQGYF	HIV-1 infection	human()	[Lieberman (1997)]
	• Of 25 patients, most had CTL speci£c for more than 1 HIV-1 protein • Eleven subjects had CTL that could recognize vaccinia-expressed LAI Nef • Two of these 11 had CTL response to this peptide • The responding subjects were HLA-A2, A3, B8, B62 and HLA-A2, B21				
Nef(105–114)	Nef(105–114 LAI)	RRQDILDLWI	HIV-1 infection	human(B*2705)	[Goulder (1997c)]
	• De£ned as optimal epitope from within reactive peptide HSQRRQDILDLWIYHTQGYF [Nef(102-121 LAI)] • HLA-B*2705 is associated with slow HIV disease progression • The HLA-B*2705 binding motif includes R at position 2, and L in the C-term position				
Nef(105–114)	Nef(105–114 LAI)	RRQDILDLWI	HIV-1 infection	human(B*2705)	[Brander & Goulder(2001)]
	• C. Brander notes this is a B*2705 epitope				
Nef(106–115)	()	RQDILDLWIY		(B7)	[Brander & Goulder(2001), Goulder(1999)]

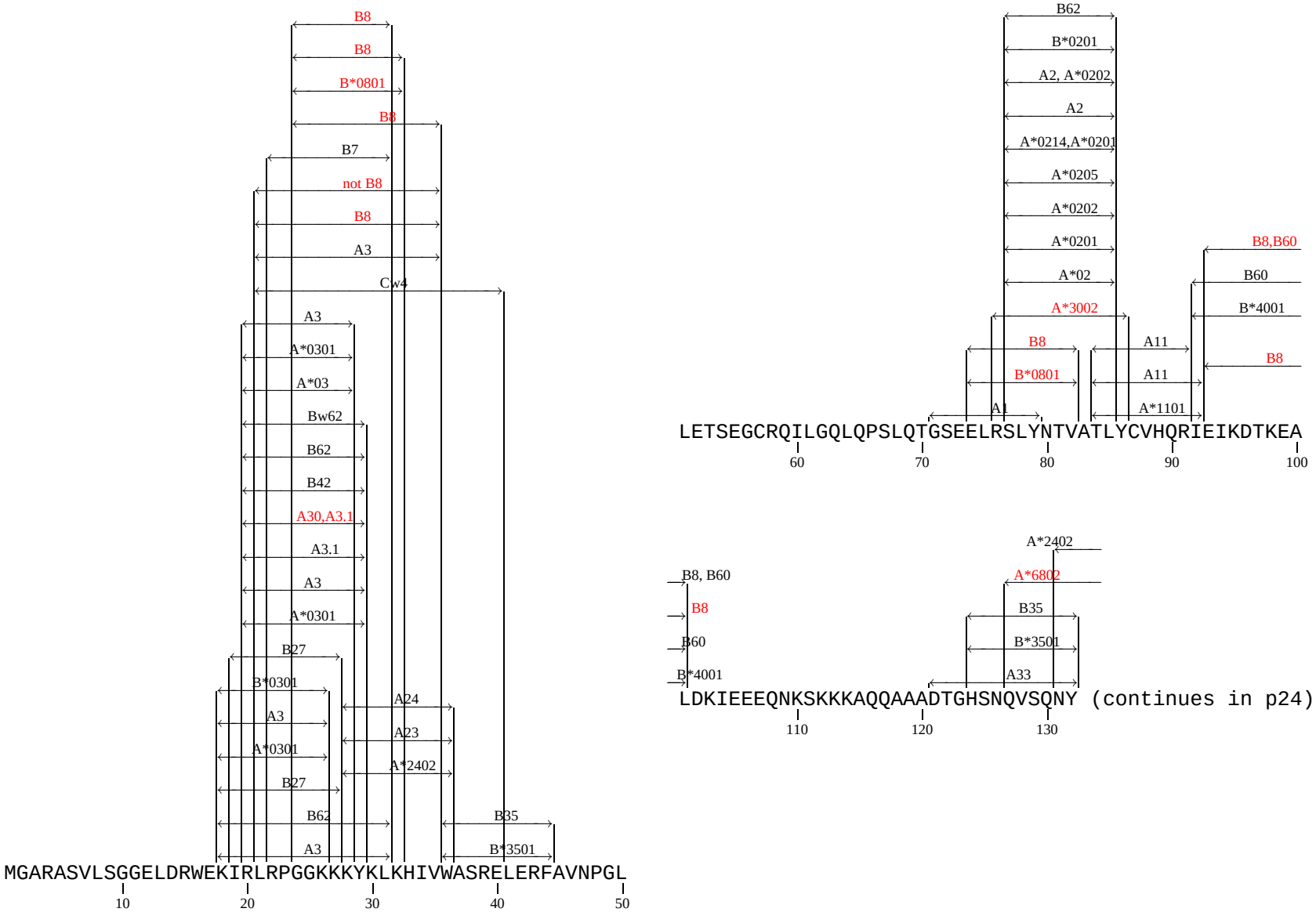
Table 8: **All De£ned Epitopes within the 20mer, regardless of HLA type**

HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
Nef(102–115)	Nef(102–115 LAI)	HSQRRQDILDLWIY	HIV-1 infection	human(B7)	[Goulder (1997b), Goulder (1997a)]
	• Identical twin hemophiliac brothers were both infected with the same batch of factor VIII • One had a strong response to this peptide, the other did not • [Goulder (1997a)] is a review of immune escape that summarizes this study				
Nef(102–121)	Nef(101–120 SF2)	HSQRRQDILDLQIYHTQGYF	HIV-1 infection	human()	[Lieberman (1997)]
	• Of 25 patients, most had CTL speci£c for more than 1 HIV-1 protein • Eleven subjects had CTL that could recognize vaccinia-expressed LAI Nef • Two of these 11 had CTL response to this peptide • The responding subjects were HLA-A2, A3, B8, B62 and HLA-A2, B21				
Nef(105–114)	Nef(105–114 LAI)	RRQDILDLWI	HIV-1 infection	human(B*2705)	[Goulder (1997c)]
	• De£ned as optimal epitope from within reactive peptide HSQRRQDILDLWIYHTQGYF [Nef(102-121 LAI)] • HLA-B*2705 is associated with slow HIV disease progression • The HLA-B*2705 binding motif includes R at position 2, and L in the C-term position				
Nef(105–114)	Nef(105–114 LAI)	RRQDILDLWI	HIV-1 infection	human(B*2705)	[Brander & Goulder(2001)]
	• C. Brander notes this is a B*2705 epitope				
Nef(106–115)	()	RQDILDLWIY		(B7)	[Brander & Goulder(2001), Goulder(1999)]

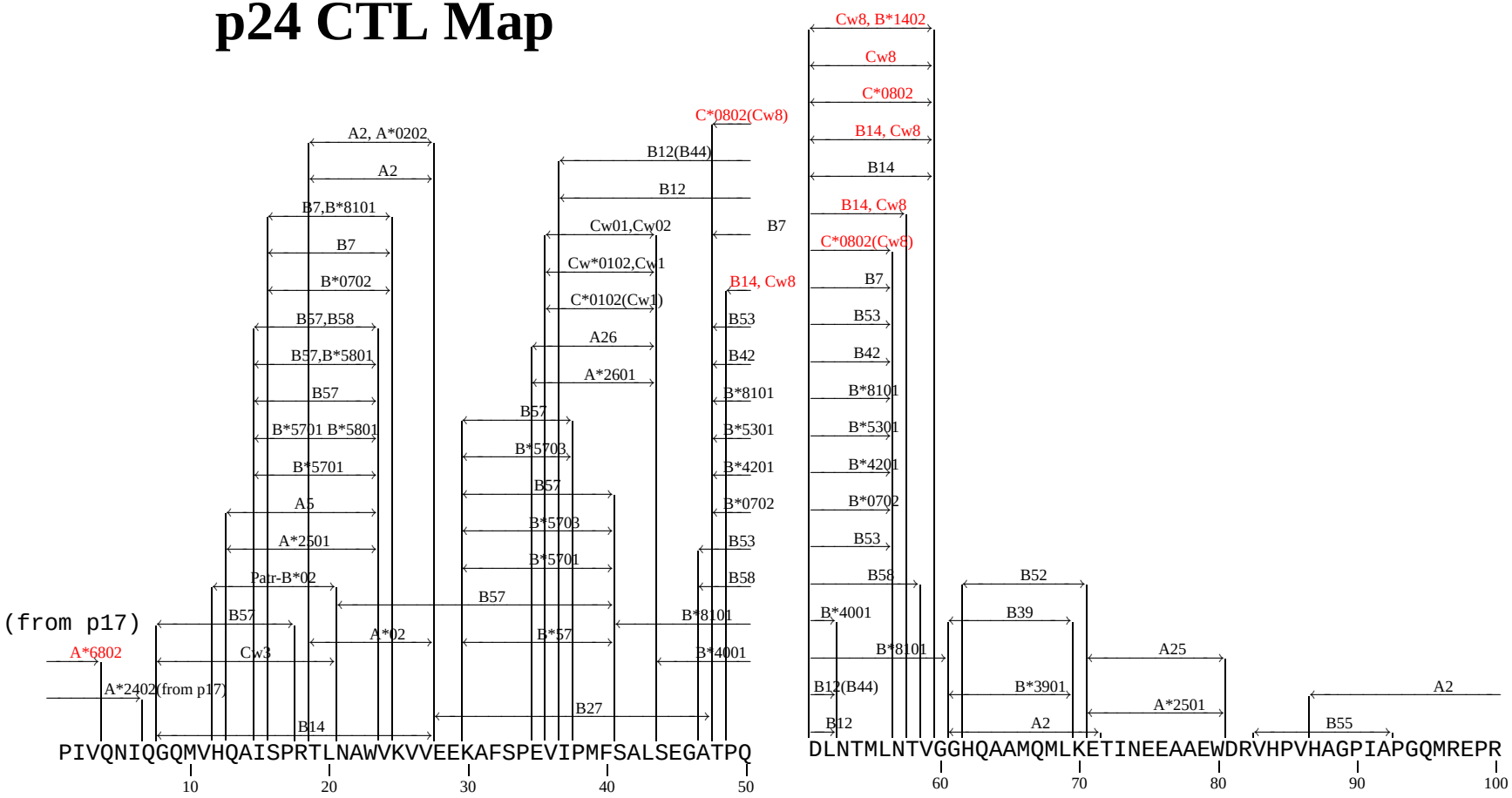
Table 9: **All De£ned Epitopes within the 20mer, regardless of HLA type**

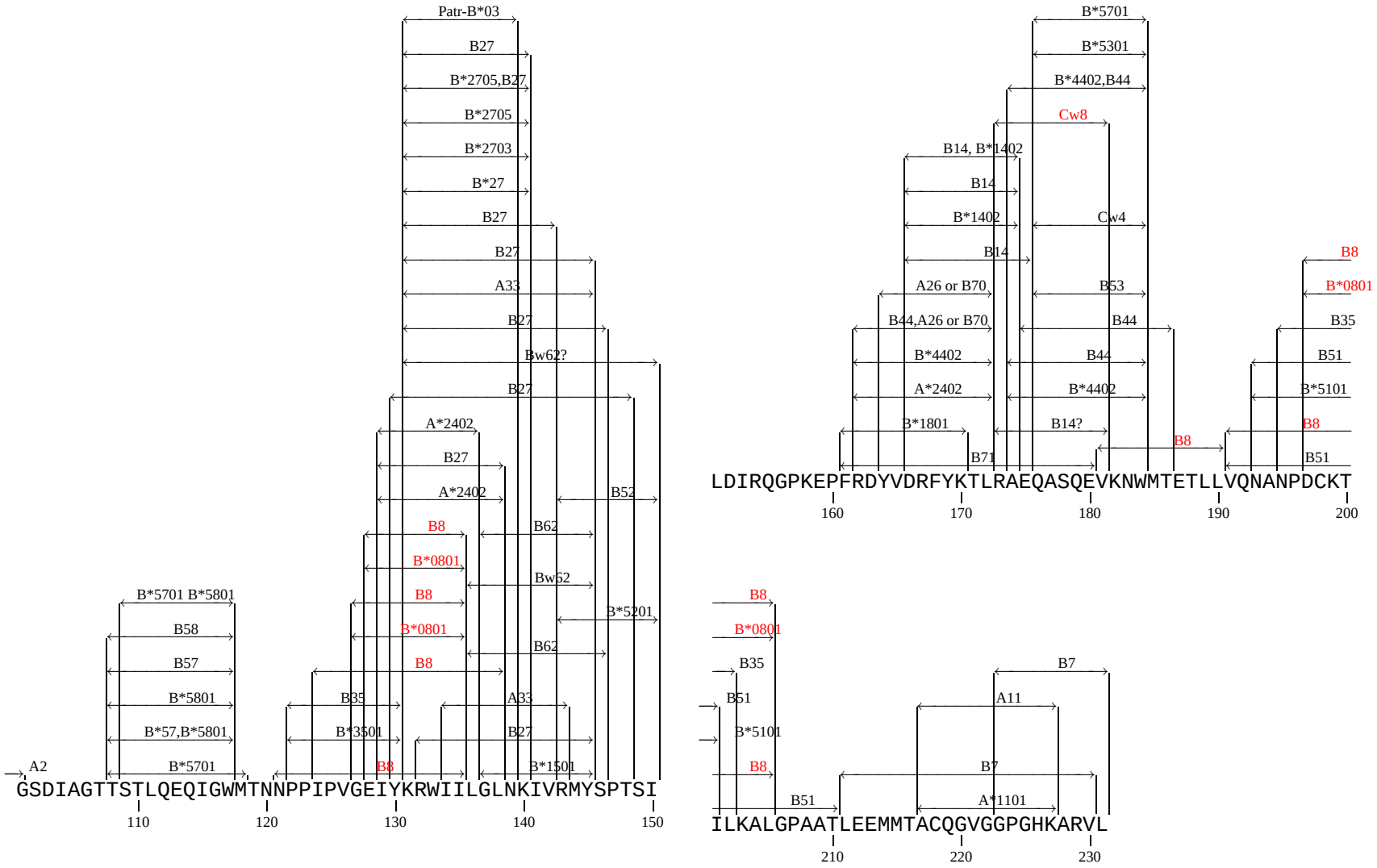
HXB2 Location	Author Location	Sequence	Immunogen	Species(HLA)	References
Nef(102–115)	Nef(102–115 LAI)	HSQRRQDILDLWIY	HIV-1 infection	human(B7)	[Goulder (1997b), Goulder (1997a)]
	• Identical twin hemophiliac brothers were both infected with the same batch of factor VIII • One had a strong response to this peptide, the other did not • [Goulder (1997a)] is a review of immune escape that summarizes this study				
Nef(102–121)	Nef(101–120 SF2)	HSQRRQDILDLQIYHTQGYF	HIV-1 infection	human()	[Lieberman (1997)]
	• Of 25 patients, most had CTL speci£c for more than 1 HIV-1 protein • Eleven subjects had CTL that could recognize vaccinia-expressed LAI Nef • Two of these 11 had CTL response to this peptide • The responding subjects were HLA-A2, A3, B8, B62 and HLA-A2, B21				
Nef(105–114)	Nef(105–114 LAI)	RRQDILDLWI	HIV-1 infection	human(B*2705)	[Goulder (1997c)]
	• De£ned as optimal epitope from within reactive peptide HSQRRQDILDLWIYHTQGYF [Nef(102-121 LAI)] • HLA-B*2705 is associated with slow HIV disease progression • The HLA-B*2705 binding motif includes R at position 2, and L in the C-term position				
Nef(105–114)	Nef(105–114 LAI)	RRQDILDLWI	HIV-1 infection	human(B*2705)	[Brander & Goulder(2001)]
	• C. Brander notes this is a B*2705 epitope				
Nef(106–115)	()	RQDILDLWIY		(B7)	[Brander & Goulder(2001), Goulder(1999)]

p17 CTL Map


B8
B8
B*0801
B8
B7
not B8
B8
A3
Cw4
A3
A*0301
A*03
Bw62
B62
B42
A30,A3.1
A3.1
A3
A*0301
B27
B*0301
A3
A*0301
B27
B62
A3
A24
A23
A*2402
B35
B*3501
MGARASVLSGGELDRWEKIRLRPGGKKKYKLKHIVWASRELERFAVNPGL
10
20
30
40
50
B62
B*0201
A2, A*0202
A2
A*0214,A*0201
A*0205
A*0202
A*0201
A*02
A*3002
B8
B*0801
A1
A11
A11
A*1101
B8,B60
B60
B*4001
B8
LETSEGCRQILGQLQPSLQTGSEELRSLYNTVATLYCVHQRIEIKDTKEA
60
70
80
90
100
A*2402
B8, B60
A*6802
B8
B35
B60
B*3501
B*4001
A33
LDKIEEEQNKSKKKAQQAAADTGHSNQVSQNY (continues in p24)
110
120
130

p24 CTL Map


(from p17)
A*6802
A*2402(from p17)
B14
B57
Cw3
Pair-B*02
A5
A*2501
B57,B58
B57,B*5801
B57
B*5701 B*5801
B*5701
B7,B*8101
B7
B*0702
A2, A*0202
A2
A*02
B57
B*5703
B57
B*5703
B57
B*5701
B*57
B27
B12(B44)
B12
Cw01,Cw02
Cw*0102,Cw1
C*0102(Cw1)
A26
A*2601
C*0802(Cw8)
B14, Cw8
B53
B42
B*8101
B*5301
B*4201
B*0702
B53
B58
B*8101
B*4001
B7
PIVQNIQGQMVHQAISPRTLNAWVKVVEEKAFSPEVIPMFSALSEGATPQ
10
20
30
40
50
Cw8, B*1402
Cw8
C*0802
B14, Cw8
B14
B14, Cw8
C*0802(Cw8)
B7
B53
B42
B*8101
B*5301
B*4201
B*0702
B53
B58
B*4001
B*8101
B12(B44)
B12
B52
B39
B*3901
A2
A25
A*2501
A2
B55
DLNTMLNTVGGHQAAMQMLKETINEEAAEWDRVHPVHAGPIAPGQMREPR
60
70
80
90
100


Patr-B*03
B27
B*2705,B27
B*2705
B*2703
B*27
B27
B27
A33
B27
Bw62?
B27
A*2402
B27
A*2402
B52
B8
B62
B*0801
Bw62
B*5701 B*5801
B8
B*5201
B58
B*0801
B62
B57
B8
B*5801
B35
A33
B*57,B*5801
B*3501
B27
A2
B*5701
B8
B*1501
GSDIAGTTSTLQEQIGWMTNNPPIPVGEIYKRWIILGLNKIVRMYSPTSI
110
120
130
140
150
B*5701
B*5301
B*4402,B44
Cw8
B14, B*1402
B14
B*1402
Cw4
B14
B8
A26 or B70
B53
B*0801
B44,A26 or B70
B44
B35
B*4402
B44
B51
A*2402
B*4402
B*5101
B*1801
B14?
B8
B8
B71
B51
LDIRQGPKEPFRDYVDRFYKTLRAEQASQEVKNWMTETLLVQNANPDCKT
160
170
180
190
200
B8
B*0801
B35
B7
B51
A11
B*5101
B8
B7
B51
A*1101
ILKALGPAATLEEMMTACQGVGGPGHKARVL
210
220
230

p2p7p1p6 CTL Map

```
    AEAMSQVTNSATIMMQRGNFRNQRKIVKCFNCGKEGHTARNCRAPRKKGC
              |         |         |         |         |
             10        20        30        40        50

 p2 <-            <>
start      p2 end  p7 start

          A2                          A2
    WKCGKEGHQMKDCTERQANFLGKIWPSYKGRPGNFLQSRPEPTAPPEESF
              |         |         |         |         |
             60        70        80        90       100

                  <>                    <>
             p7 end  p1 start     p1   p6 start
                                 end

                          B7
    RSGVETTTPPQKQEPIDKELYPLTSLRSLFGNDPSSQ
              |         |         |
            110       120       130

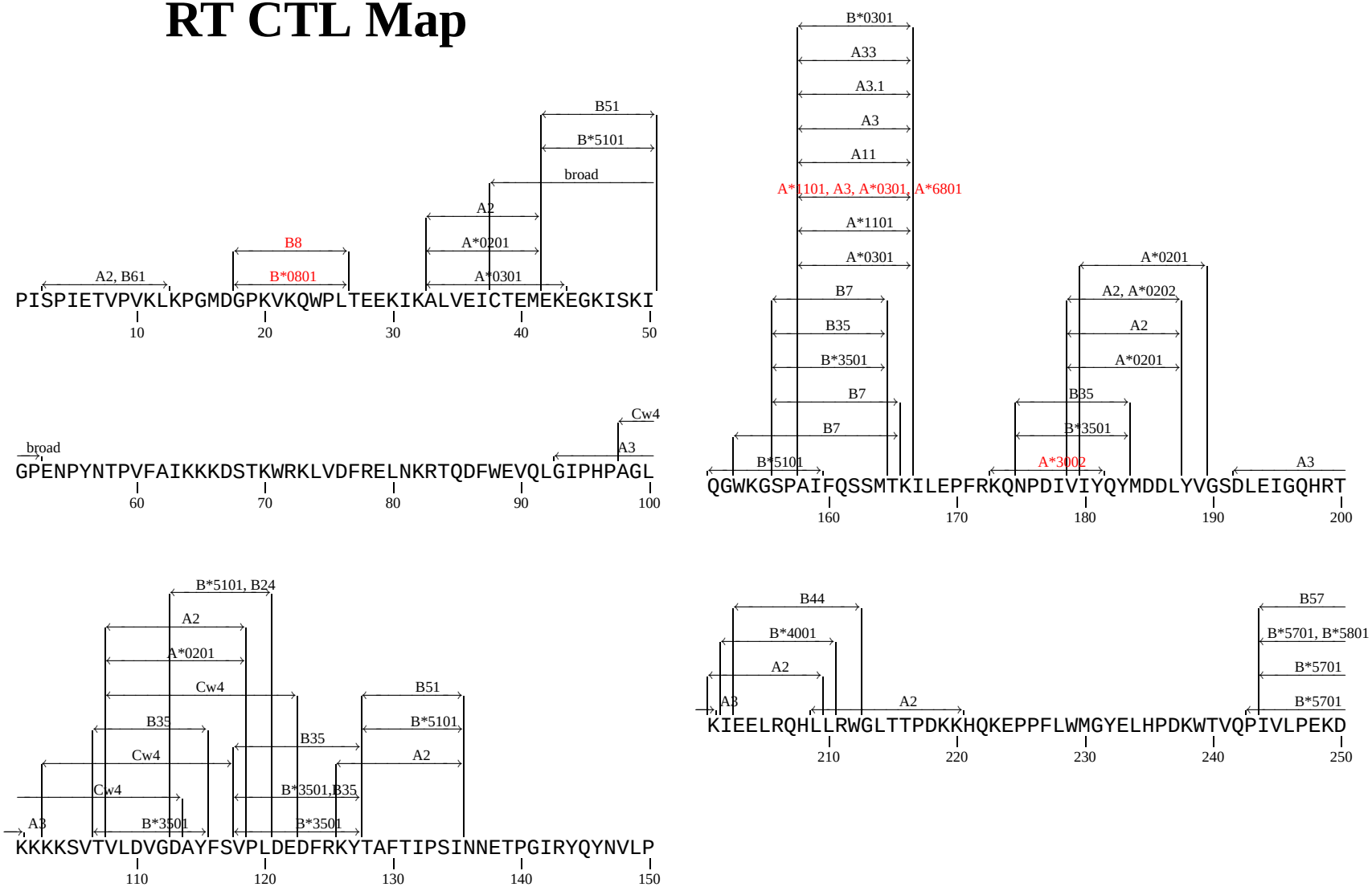
                                p6 end ->
```

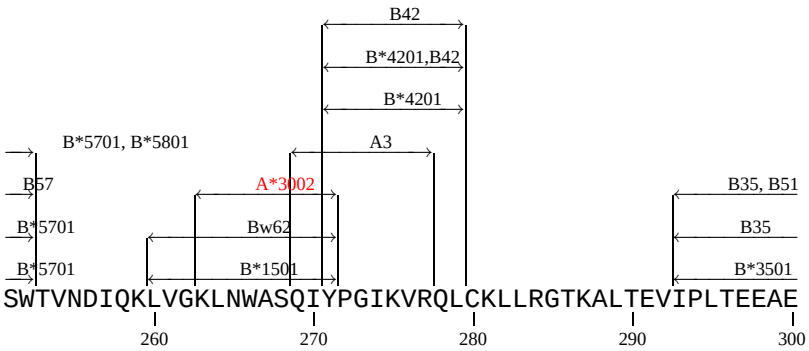
Protease CTL Map

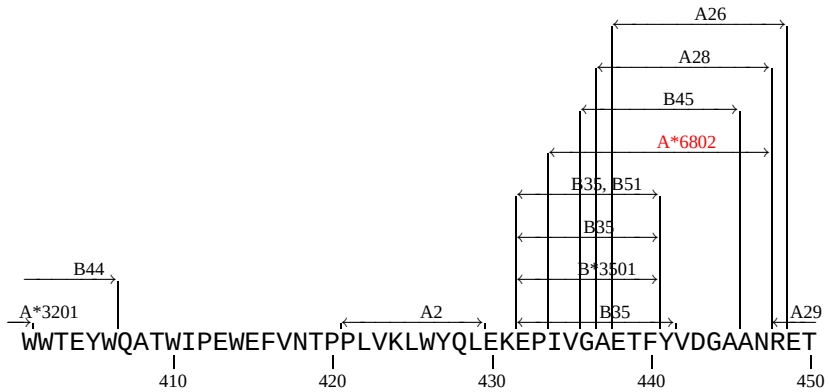
```
A*7401
A*6802,A*7401,A19
A*6802                                  A*6802
PQVTLWQRPLVTIKIGGQLKEALLDTGADDTVLEEMSLPGRWKPKMIGGI
          |         |         |         |         |
         10        20        30        40        50

                                  A*0201
GGFIKVRQYDQILIEICGHKAIGTVLVGPTPVNIIGRNLLTQIGCTLNF
          |         |         |         |
         60        70        80        90
```

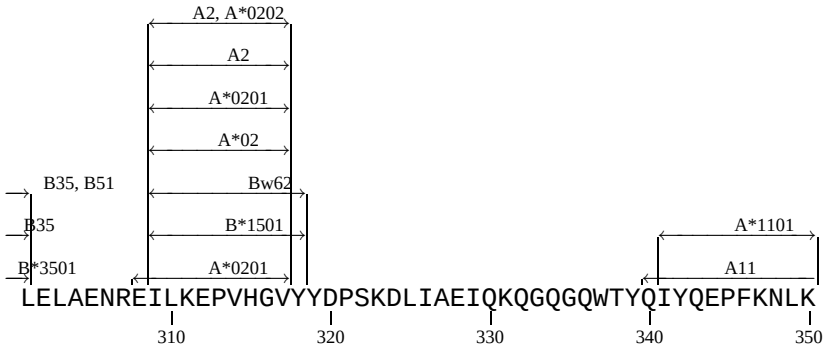
RT CTL Map

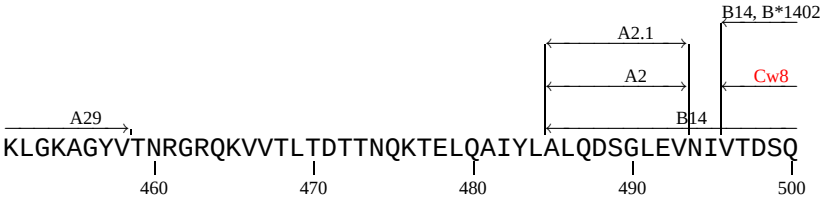

B51
B*5101
broad
A2
B8
A*0201
A2, B61
B*0801
A*0301
PISPIETVPVKLKPGMDGPKVKQWPLTEEKIKALVEICTEMEKEGKISKI
10
20
30
40
50
Cw4
broad
A3
GPENPYNTPVFAIKKKDSTKWRKLVDFRELNKRTQDFWEVQLGIPHPAGL
60
70
80
90
100
B*0301
A33
A3.1
A3
A11
A*1101, A3, A*0301, A*6801
A*1101
A*0301
B7
B35
B*3501
B7
B7
B*5101
A*0201
A2, A*0202
A2
A*0201
B35
B*3501
A*3002
A3
QGWKGSPAIFQSSMTKILEPFRKQNPDIVIYQYMDDLYVGSDLEIGQHRT
160
170
180
190
200
B*5101, B24
A2
A*0201
Cw4
B51
B35
B*5101
B35
Cw4
A2
Cw4
B*3501,B35
A3
B*3501
B*3501
KKKKSVTVLDVGDAYFSVPLDEDFRKYTAFTIPSINNETPGIRYQYNVLP
110
120
130
140
150
B44
B*4001
A2
A3
A2
B57
B*5701, B*5801
B*5701
B*5701
KIEELRQHLLRWGLTTPDKKHQKEPPFLWMGYELHPDKWTVQPIVLPEKD
210
220
230
240
250

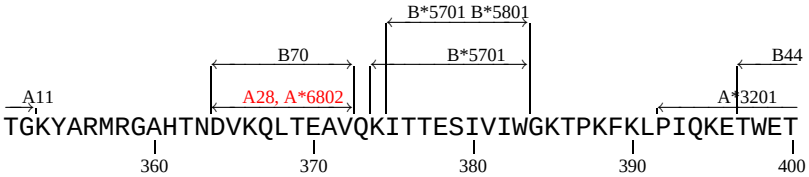


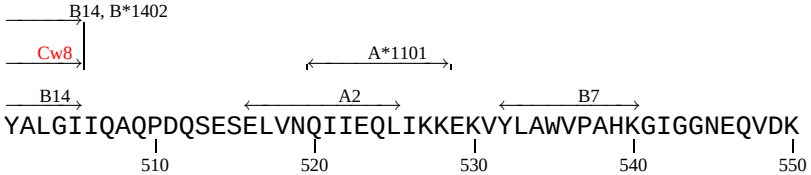


p15 RNase start <-









LVSAGIRKVL

-> p15 RNase end

Integrase CTL Map

B*5101

FLDGIDKAQDEHEKYHSNWRAMASDFNLPPVVAKEIVASCDKCQLKGEAM

10 20 30 40 50

A*2402 A*6802

HGQVDCSPGIWQLDCTHLEGKVILVAVHVASGYIEAEVIPAETGQETAYF

60 70 80 90 100

A*6802

LLKLAGRWPVKTIHTDNGSNFTGATVRAACWWAGIKQEFGIPYNPQSQGV

110 120 130 140 150

A*1101

B57

B*5701

VESMNKELKKIIGQVRDQAEHLKTAVQMAVFIHNFKRKGGIGGYSAGERI

160 170 180 190 200

A2

A*0201

VDIIATDIQTKELQKQITKIQNFRVYYRDSRNPLWKGPAKLLWKGEGAVV

210 220 230 240 250

IQDNSDIKVVPRRKAKIIRDYGKQMAGDDCVASRQDED

260 270 280

Rev CTL Map

B*5801

B*5701

MAGRSGDSDEELIRTVRLIKLLYQSNPPPNPEGTRQARRNRRRRWRERQR

10 20 30 40 50

Cw5

B14, Cw8

A1

B14

QIHSISERILGTYLGRSAEPVPLQLPPLERLTLDCNEDCGTSGTQGVGSP

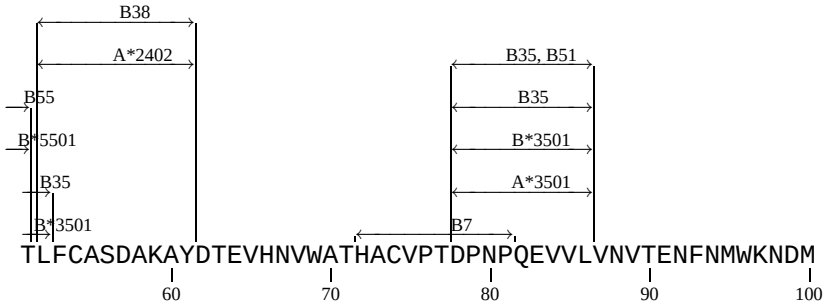
60 70 80 90 100

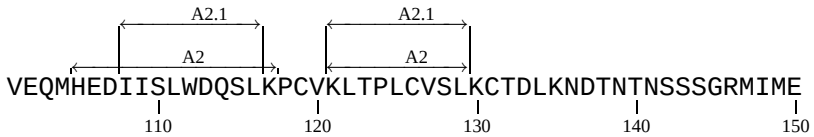
QILVESPTVLESGTKE

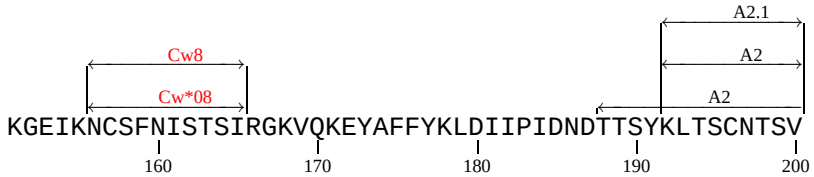
110

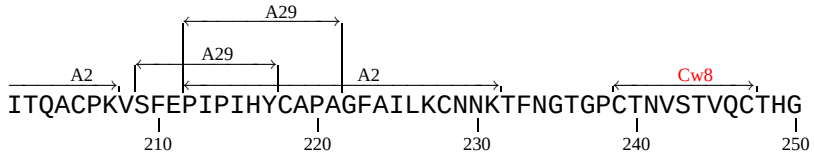
gp160 CTL Map

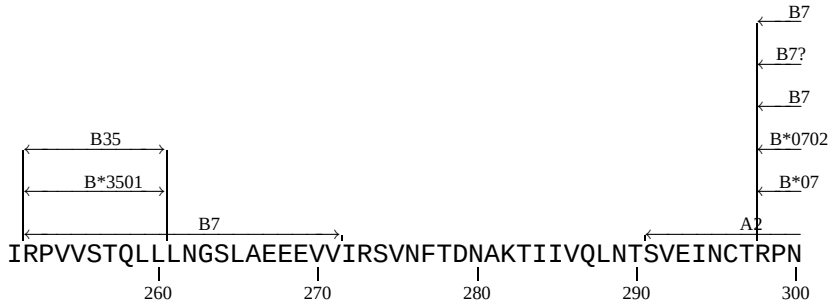
<- gp120 start

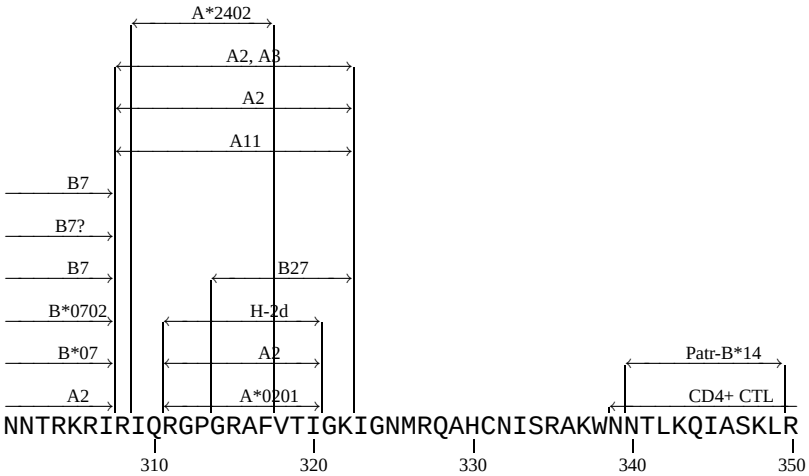


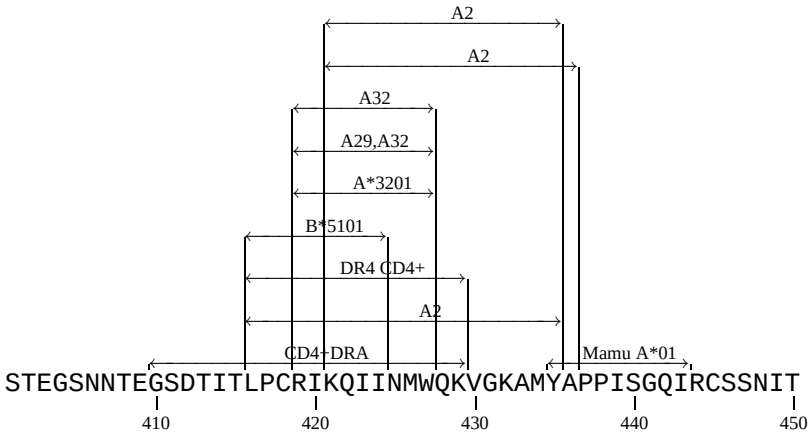


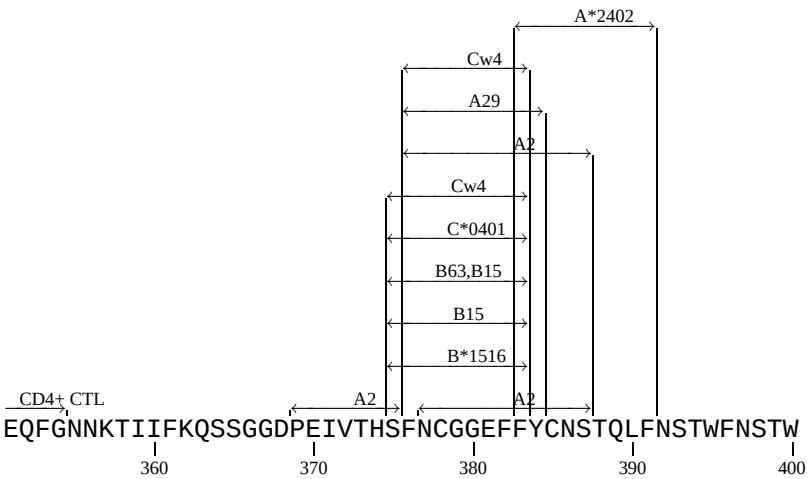


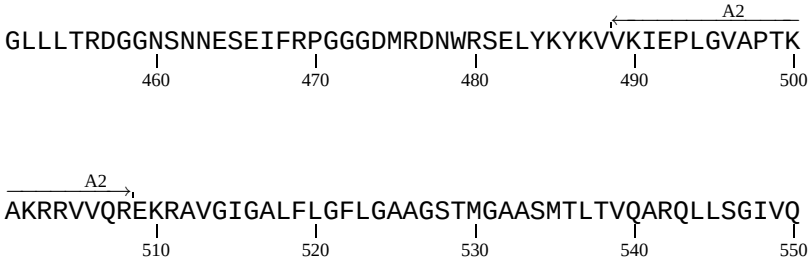




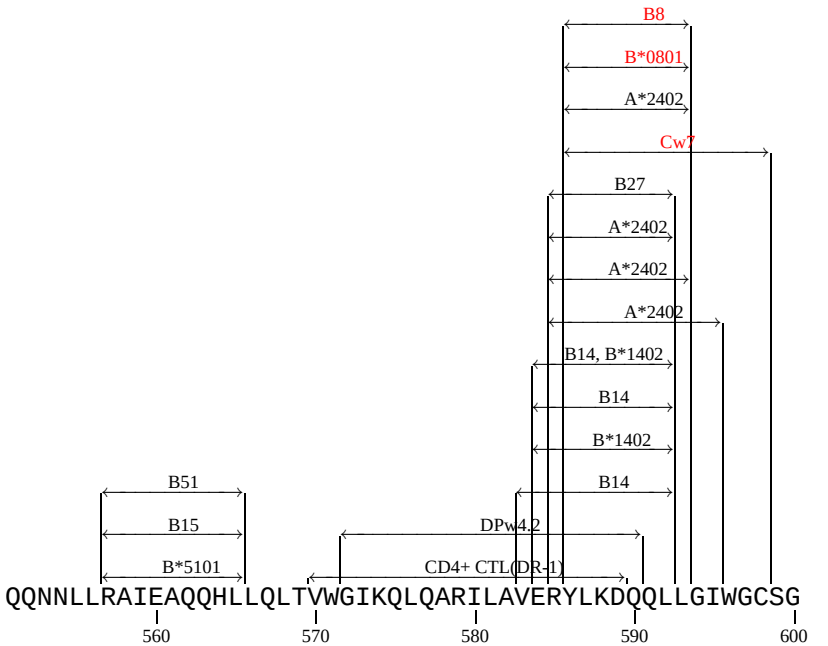


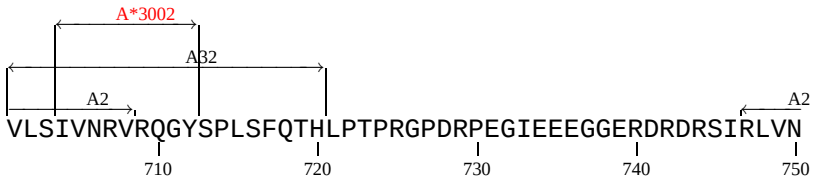


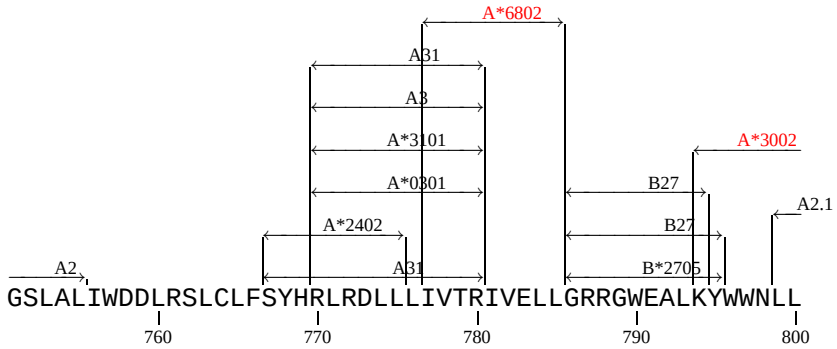




gp120 end <> gp41 start

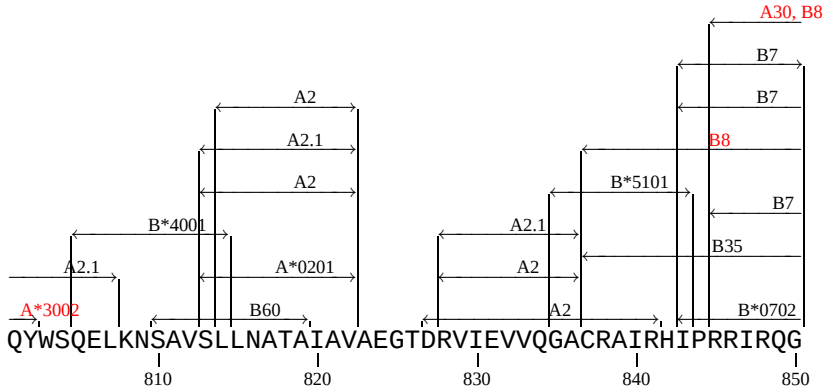

B8
B*0801
A*2402
Cw7
B27
A*2402
A*2402
A*2402
B14, B*1402
B14
B*1402
B14
B51
B15
B*5101
DPw4.2
CD4+ CTL(DR-1)
QQNNLLRAIEAQQHLLQLTVWGIKQLQARILAVERYLKDQQLLGIWGCSG
560
570
580
590
600

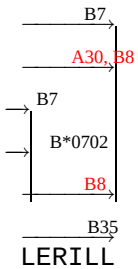

A*3002
A32
A2
A2
VLSIVNRVRQGYSPLSFQTHLPTPRGPDRPEGIEEEGGERDRDRSIRLVN
710
720
730
740
750


A*6802
A31
A3
A*3101
A*0301
A*2402
A31
A*3002
B27
B27
B*2705
A2.1
A2
GSLALIWDDLRSLCLFSYHRLRDLLLIVTRIVELLGRRGWEALKYWWNLL
760
770
780
790
800

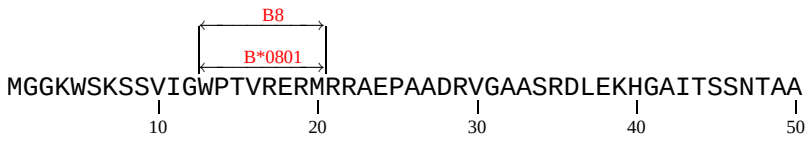
B35
B*3501
KLICTTAVPWNASWSNKSLEQIWNHTTWMEWDREINNYTSLIHSLIEESQ
610
620
630
640
650

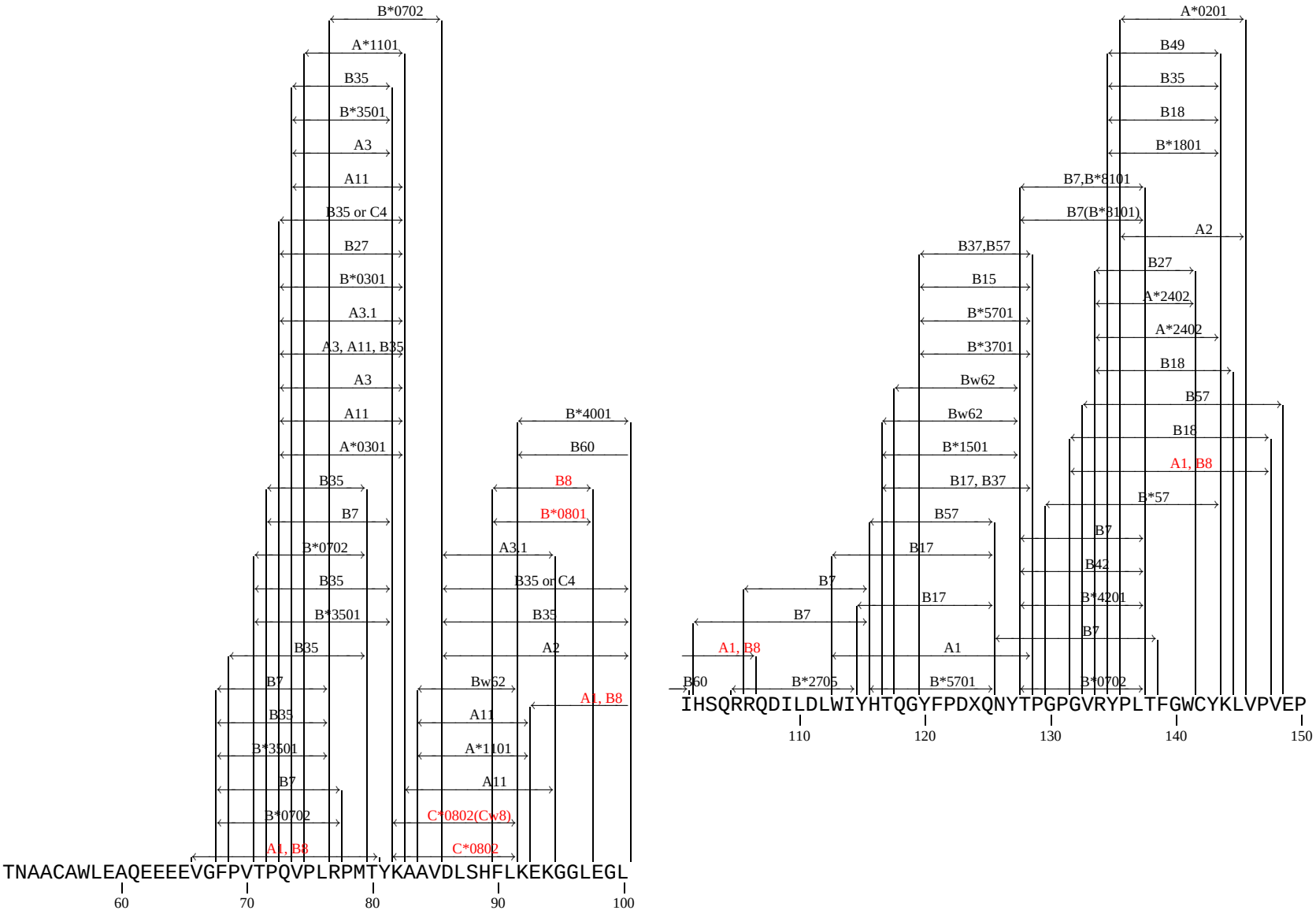
A2.1
A*2402
A2.1
A2
NQQEKNEQELLELDKWASLWNWFNITNWLWYIKLFIMIVGGLVGLRIVFA
660
670
680
690
700

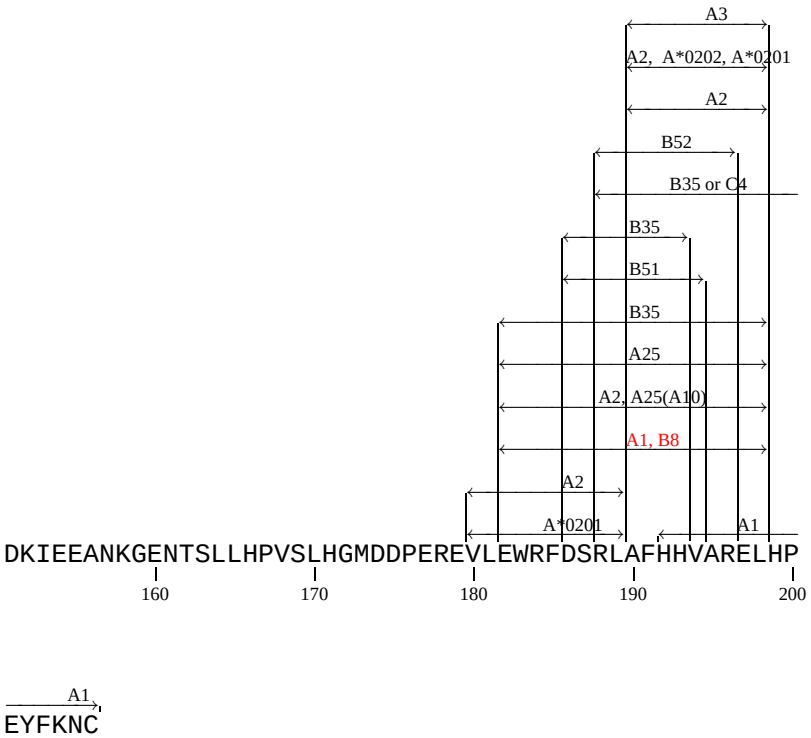

A30, B8
B7
B7
A2
A2.1
B8
A2
B*5101
B7
B*4001
A2.1
B35
A2.1
A*0201
A2
A*3002
B60
A2
B*0702
QYWSQELKNSAVSLLNATAIAVAEGTDRVIEVVQGACRAIRHIPRRIRQG
810
820
830
840
850


B7
A30, B8
B7
B*0702
B8
B35
LERILL
-> gp41 end

Nef CTL Map


B8
B*0801
MGGKWSKSSVIGWPTVRERMRRAEPAADRVGAASRDLEKHGAITSSNTAA
10
20
30
40
50


B*0702
A*1101
B35
B*3501
A3
A11
B35 or C4
B27
B*0301
A3.1
A3, A11, B35
A3
A11
A*0301
B35
B7
B*0702
B35
B*3501
B35
B7
B35
B*3501
B7
B*0702
A1, B8
B*4001
B60
B8
B*0801
A3.1
B35 or C4
B35
A2
Bw62
A1, B8
A11
A*1101
A11
C*0802(Cw8)
C*0802
TNAACAWLEAQEEEEVGFPVTPQVPLRPMTYKAAVDLSHFLKEKGGLEGL
60
70
80
90
100
A*0201
B49
B35
B18
B*1801
B7,B*8101
B7(B*8101)
A2
B37,B57
B27
B15
A*2402
B*5701
A*2402
B*3701
B18
Bw62
B57
Bw62
B18
B*1501
A1, B8
B17, B37
B*57
B57
B7
B17
B42
B7
B17
B*4201
B7
B7
A1, B8
A1
B60
B*2705
B*5701
B*0702
IHSQRRQDILDLWIYHTQGYFPDXQNYTPGPGVRYPLTFGWCYKLVPVEP
110
120
130
140
150



[Brander & Goulder(2001)] C. Brander & P. Goulder. The evolving £eld of HIV CTL epitope mapping: New approaches to the identi£cation of novel epitopes. *HIV Molecular Immunology Database* pages IV–1, 2001. Notes: This review article in the annual HIV Molecular Immunology Compendium presents the table of Optimal CTL Epitopes that has been curated by Brander and others for several years.

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to two HLA-A*0201-restricted epitopes, in Gag (SLYNTVATL) and Pol (ILKEPVHGV) in 22 other HIV-infected donors with HLA-A*0201. The majority (71%) generated responses to the Gag epitope. In the 29% of donors failing to respond to the Gag epitope in standard assays, there was evidence of low frequency memory CTL responses using peptide stimulation of PBMC, and most of these donors also showed mutations in or around the Gag epitope.

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[Sipsas (1997)] N. V. Sipsas, S. A. Kalams, A. Trocha, S. He, W. A. Blattner, B. D. Walker, & R. P. Johnson. Identi£cation of type-speci£c cytotoxic T lymphocyte responses to homologous viral proteins in laboratory workers accidentally infected with HIV-1. *J Clin Invest* **99**:752–62, 1997. (Medline: 97197584) Notes: To examine a situation where the autologous strain and the reference reagents would be the same, the CTL response of three lab workers accidentally infected with HIV IIIB was studied. Both group speci£c and type speci£c epitopes were targets for CTL clones. One subject had a broadening of CTL response over time, using a broad range of restricting HLA class I alleles. Characterization of the cytotoxic T lymphocyte (CTL) response against HIV-1 has been limited by the use of target cells expressing viral proteins from laboratory isolates of HIV-1. This approach has favored identi£cation of group-speci£c CTL responses and precluded assessment of the extent of type-speci£c CTL responses directed against HIV-1. Using cells expressing viral proteins from the HIV-1 IIIB strain, we performed a detailed characterization of HIV-1-speci£c CTL response in three laboratory workers accidentally infected with HIV-1 IIIB. Eight of the epitopes identi£ed were group speci£c, lying in relatively conserved regions of Gag, reverse transcriptase, and envelope. Three type-speci£c epitopes were identi£ed, two of them in highly variable regions of envelope. In longitudinal studies in one subject, seven different epitopes and £ve different restricting HLA class I alleles were identi£ed, with a progressive increase in the number of CTL epitopes recognized by this subject over time. Our data demonstrate that type-speci£c CTL responses make up a signi£cant proportion of the host cellular immune response against HIV-1 and that a broadening of epitope speci£city may occur.