#### Table 10: **gp120**

| Location             | WEAU   | Sequence   | Immunogen  | Species(HLA)  | References                  |
|----------------------|--|--|--|---|-----------------------------|
| gp120(39–51)         | gp120(31–43)                                     | EQLWVTVYYGVPV  | peptide  | $murine(H-2^{bxk})$                                   | [Sastry & Arlinghaus(1991)] |
|                      | <ul> <li>Peptides ind</li> </ul>                 | Peptides induced T-cell proliferative response to immunizing peptide and to gp160  | munizing peptide and to į                          | 3p160   |                             |
| gp120(45–55)         | gp120(37–47) <b>NOTES:</b>                       | VYYGVPVWKEA  | peptide  | $\operatorname{murine}(\operatorname{H-}2^{bxk,sxd})$ | [Sastry & Arlinghaus(1991)] |
|                      | • Fepudes ind                                    | Pepudes induced 1-cen proliferative response to immunizing pepude and to gprove  | munizing pepude and to                             |   | [N.L. at at (1002)]         |
| env(45–55)           | gp120(37–47)                                     | VYYGVPVWKEA  | Peptide immunization                               | rhesus monkey   | [Nehete et al.(1993)]       |
|                      | NOTES:  • Synthetic permise                      | <b>TES:</b> Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice.                                    | f the HIV-1 envelope tha                           | t stimulates a proliferativ                           | e response in               |
|                      | Proliferative                                    | Proliferative response to this peptide was observed in 3/3 immunized rhesus monkeys  | in 3/3 immunized rhesus                            | monkeys   |                             |
| gp120(48-61)         | gp120(40–53) <b>NOTES:</b>                       | GVPVWKEATTLFC  | peptide  | $murine(H-2^{sxd})$                                   | [Sastry & Arlinghaus(1991)] |
|                      | <ul> <li>Peptides ind</li> </ul>                 | Peptides induced T-cell proliferative response to immunizing peptide and to gp160  | munizing peptide and to <sub>{</sub>               | ;p160   |                             |
| env(48–60)           | gp120(40-53)                                     | GVPVWKEATTLFC  | Peptide<br>immunization                            | rhesus monkey   | [Nehete et al.(1993)]       |
|                      | NOTES: • Synthetic pe                            | TES:  Synthetic peptide derived from conserved region of the HIV-1 envelope that stimu mice  | f the HIV-1 envelope tha                           | t stimulates a proliferative response in              | e response in               |
|                      | Despite the:                                     | Despite the proliferative response to this peptide in mice, no response was observed   | mice, no response was ob                           | served in 3 rhesus monkeys                            | ys                          |
| gp120(72–82)         | gp120(64–74) <b>NOTES:</b>                       | AHKVWATHACV  | peptide  | $\operatorname{murine}(\operatorname{H-2}^{bxk,sxd})$ | [Sastry & Arlinghaus(1991)] |
|                      | <ul> <li>Peptides ind</li> </ul>                 | <ul> <li>Peptides induced T-cell proliferative response to immunizing peptide and to gp160</li> </ul>  | munizing peptide and to                            | 3p160   |                             |
| gp120(51-70<br>HXB2) | gp120(79–98)                                     | NPQEVVLVNTENFNMWKND  | <i>in vitro</i> stimulation                        | human   | [Li Pira et al.(1998)]      |
|                      | NOTES:  • Clonal heter antigens, do              | <b>FES:</b> Clonal heterogeneity was broad for a recall response to tetanus toxoid or PPD, antigens, dominated in this case by TCR V $\beta$ 13 usage                  | nse to tetanus toxoid or ge                        | PPD, but oligoclonal to primary HIV                   | primary HIV                 |
|                      | <ul><li>Donor of Ph</li><li>Documented</li></ul> | Donor of PBMC that recognized this epitope had HLA-DK alleles 2 and 7  Documented location of epitope in strain HXB2 does not match corresponding location in Database | EA-DK alleles 2 and 7 sees not match corresponding | ng location in Database                               |                             |

| Location               | WEAU                                  | Sequence  | Immunogen                  | Species(HLA)                                      | References                  |
|------------------------|---------------------------------------|---|----------------------------|---|-----------------------------|
| gp120(74–85 LAI)       | gp120(73–84) <b>NOTES:</b>            | CVPTDPNPQEVV?   | HIV infection              | human   | [Schrier et al.(1989)]      |
|                        | • Stimulates T-c                      | Stimulates T-cell proliferation in HIV-infected donors  |                            |   |                             |
| gp120(81–92)           | gp120(73–84) <b>NOTES:</b>            | CVPTNPVPQEVV  | peptide                    | $murine(H-2^{bxk,sxd})$                           | [Sastry & Arlinghaus(1991)] |
|                        | Peptides indu                         | • Peptides induced T-cell proliferative response to immunizing peptide and to gp160   | ınizing peptide and to gp  | 160   |                             |
| gp120(108–119          | gp120(107–118)                        | IISLWDQSLKPC?   | HIV infection              | human   | [Schrier et al.(1989)]      |
| <i>Li</i> , H)         | NOTES: • Stimulates T-c               | TES: Stimulates T-cell proliferation in HIV-infected donors   |                            |   |                             |
| gp120(101–126)         | gp120(100–125)                        | VEQMHEDIISLWDQSLK-<br>PCVKLTPLC   | glycosylated gp160         | $murine(H-2^k)$                                   | [Sjolander et al.(1996)]    |
|                        | NOTES: • Study showin,                | TES: Study showing that T cell determinants from glycoproteins can be dependent on the  | teins can be dependent c   | n the glycosylation of the protein                | e protein                   |
| gp120(109–121)         | gp120(101–113)<br><b>NOTES:</b>       | EQMHEDIISLWDQ   | peptide                    | $\operatorname{murine}(\operatorname{H-2}^{bxk})$ | [Sastry & Arlinghaus(1991)] |
|                        | <ul> <li>Peptides indu</li> </ul>     | Peptides induced T-cell proliferative response to immunizing peptide and to gp160   | mizing peptide and to gp   | 160   |                             |
| gp120(109–123<br>IIIB) | gp120(101–115)                        | EQMHEDIISLWDQSL   | IIIB gp160                 | $\mathrm{murine}(\mathrm{H-2}^{d,i5})$            | [Hale et al.(1989)]         |
|                        | NOTES: • Six multideter               | TES: Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types   | zed by mice of three or f  | our MHC types                                     |                             |
| gp120(112–130          | gp120(104–122)                        | HEDIISLWDQSLKPCVKLT   | HIV-1 exposure             | human   | [Furci et al.(1997)]        |
| IIII)                  | NOTES: • 9/11 exposed this previously | <b>TES:</b> 9/11 exposed uninfected individuals in this study had a proliferative response to a C5 peptide, but none reacted with this previously defined epitope | a proliferative response t | o a C5 peptide, but none                          | reacted with                |
| gp120(112–124          | gp120(104–116)                        | HEDIISLWDQSLK   | HIV infection              | human   | [Clerici et al.(1997)]      |
|                        | NOTES: • Epitope T2: u                | TES:  Epitope T2: used in a study of inluence of pentoxifyllines on HIV specific T cells  | ines on HIV specific T co  | ells  |                             |

| Location               | WEAU   | Sequence  | Immunogen                   | Species(HLA)                                      | References               |
|------------------------|--|---|-----------------------------|---|--------------------------|
| gp120(112–124          | gp120(104–116)                               | HEDIISLWDQSLK   | IIIB gp160                  | murine $(H-2^k)$                                  | [Hale et al.(1989)]      |
| 11110)                 | NOTES: • Epitope T2: S                       | TES: Epitope T2: Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types         | ions are recognized by n    | nice of three or four MHC                         | types                    |
| gp120(112–124          | gp120(104–116)                               | HEDIISLWDQSLK   | env fragment                | $\operatorname{murine}(\operatorname{H-2}^{k,s})$ | [Cease et al.(1987)]     |
| billo)                 | NOTES: • Epitope T2: 1                       | <b>TES:</b> Epitope T2: 1 of 2 functional epitopes identified using an amphipathic helix epitope prediction algorithm | sing an amphipathic heli:   | epitope prediction algori                         | hm                       |
| gp120(112–124<br>BH10) | gp120(104–116)                               | HEDIISLWDQSLK   | gp160 (IIIB)<br>vaccinia    | human   | [Berzofsky et al.(1988)] |
| DIRO)                  | NOTES: • Epitope T2: I                       | <b>TES:</b> Epitope T2: Proliferative response to T1 and T2 peptides in 14 immunized, uninfected humans               | ptides in 14 immunized,     | uninfected humans                                 |                          |
| gp120(112–124          | gp120(104–116)                               | HEDIISLWDQSLK   | HIV infection               | human   | [Clerici et al.(1989)]   |
| 11110)                 | NOTES: • Epitope T2: I                       | <b>TES:</b> Epitope T2: IL-2 production detection of T-helper lymphocytes from asymptomatic HIV-positive individuals  | lymphocytes from asymj      | งtomatic HIV-positive indi                        | viduals                  |
| gp120(112–124          | gp120(104–116)                               | HEDIISLWDQSLK   | HIV infection               | human   | [Clerici et al.(1991a)]  |
|                        | NOTES: • Epitope T2: H                       | <b>TES:</b> Epitope T2: Peptides stimulate Th cell function and CTL activity in similar patient                       | d CTL activity in similar   | patient populations                               |                          |
| gp120(112–124)         | gp120(104–116) <b>NOTES:</b> • Enitore T2: I | 20(104–116) HEDIISLWDQSLK rgp160 human [Clerici et<br>FES:  | rgp160                      | human   | [Clerici et al.(1991b)]  |
| gp120(112–124          | gp120(104–116)                               | HEDIISLWDQSLK   | HIV exposure                | human   | [Clerici et al.(1992)]   |
| ,                      | NOTES: • Epitope T2: (                       | <b>TES:</b> Epitope T2: Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed seronegative men             | [V-1 peptides in HIV-1 ex   | posed seronegative men                            |                          |
| gp120(112–124<br>IIIB) | gp120(104–116)                               | HEDIISLWDQSLK   | peptide priming gp160 boost | rhesus monkeys                                    | [Hosmalin et al.(1991)]  |
|                        | NOTES: • Epitope T2: I                       | <b>FES:</b> Epitope T2: Peptide priming to induce T-cell help enhances antibody response to gp160 immunization        | enhances antibody respo     | nse to gp160 immunizatio                          | n                        |

| Location       | WEAU  | Sequence   | Immunogen  | Species(HLA)   | References                     |
|----------------|---|--|--|--|--------------------------------|
| gp120(112–124  | gp120(104–116)  | HEDIISLWDQSLK  | HIV exposure   | human  | [Pinto et al.(1995)]           |
|                | NOTES: • Epitope T2: (  | <b>TES:</b><br>Epitope T2: CTL activity analyzed in parallel with T helper reactivity in exposed but uninfected health care workers  | helper reactivity in expo  | sed but uninfected health  | care workers                   |
| gp120(115–126  | gp120(114–125)  | SLKPCVKLTPLC?  | HIV infection  | human  | [Schrier et al.(1989)]         |
|                | NOTES: • Stimulates T-  | TES: Stimulates T-cell proliferation in HIV-infected donors  | 3  |  |                                |
| gp120(110–125) | gp120(109–124)<br><b>NOTES:</b>   | SLWDQSLKPCVKLTPL   | HIV-1 infection  | human  | [Caruso et al.(1997)]          |
|                | <ul> <li>T cells from I HIV antigen,</li> <li>The ability to</li> </ul>   | T cells from HIV-1 infected individuals as they progress to disease show reduced abil HIV antigen, but retain the ability to express the activation antigens CD25 and CD71 The ability to express activation markers in response to HIV is retained, but not in re | ass to disease show reducation antigens CD25 and to HIV is retained, but n | ed ability to proliferate in response to 1CD71 ot in response to tetanus toxoid recall | 1 response to<br>toxoid recall |
|                | <ul><li>antigen</li><li>This study inv</li><li>to in vitro stir</li></ul> | antigen  This study investigated CD25 and CD71 expression in PBMC from patients in various stages of progression, response to <i>in vitro</i> stimulation by peptide cocktail containing four antigenic Env peptides, or else p17 and p24                          | PBMC from patients in v<br>four antigenic Env pepti                        | arious stages of progressi<br>les, or else p17 and p24                                 | on, response                   |
| gp120(118–130) | gp120(110–122)  | LWDQSLKPCVKLT  | Peptide immunization   | rhesus monkey  | [Nehete et al.(1993)]          |
|                | NOTES: • Synthetic permice mice • Proliferative 1                         | <b>TES:</b> Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice Proliferative response to this peptide was observed in 3/3 immunized rhesus monkeys   | the HIV-1 envelope that 3/3 immunized rhesus n                             | stimulates a proliferative nonkeys   | response in                    |
| gp120(115–129  | gp120(114–128)  | SLKPCVKLTPLCVSL  | none   | human(HLA-DR)  | [Gaudebout et al.(1997)]       |
| LOI)           | NOTES:  • Peptide bound • Because of the were consider                    | Peptide bound to both HLA-DR*1101 and HLA-DR*0401 with high affinity Because of the distinctive binding pockets of HLA-DR*1101 and HLA-DR*0401, were considered candidates for promiscuous HLA-DR binding  | 0401 with high affinity<br>R*1101 and HLA-DR*C                             | 401, peptides that bound both affinity   | both affinity                  |

| Location                | WEAU   | Sequence  | Immunogen  | Species(HLA)  | References                  |
|-------------------------|--|---|--|---|-----------------------------|
| LAI)                    | NOTES:  • Peptide binds • Because of the were consider | <b>TES:</b> Peptide binds to both HLA-DR*1101 and HLA-DR*0401 with high affinity Because of the distinctive binding pockets of HLA-DR*1101 and HLA-DR*0401, were considered candidates for promiscuous HLA-DR binding                       | *0401 with high affinity<br>DR*1101 and HLA-DR*(<br>DR binding | 3401, peptides that bound both affinity   | both affinity               |
| gp120 (162–181<br>IIIB) | gp120 (166–185)  | STSIRGKVQKEYAFFYKLDI  | HIV-1 gp120 DNA<br>vaccine                                     | rhesus monkey   | [Lekutis et al.(1997)]      |
|                         | NOTES: • HIV-1 env DN                                  | IES: HIV-1 env DNA vaccine induced Th cell response to this epitope in a rhesus monkeys   | this epitope in a rhesus r                                     | nonkeys   |                             |
| gp120 (172–191<br>IIIB) | gp120 (176–195)  | EYAFFYKLDIIPIDNDTTSY  | HIV-1 gp120 DNA<br>vaccine                                     | rhesus monkey   | [Lekutis et al.(1997)]      |
|                         | NOTES: • HIV-1 env DN                                  | TES: HIV-1 env DNA vaccine induced Th cell response to this epitope in a rhesus monkey  | this epitope in a rhesus r                                     | nonkey  |                             |
| gp120(193–218)          | gp120(197–222)   | LTSCNSVITQACPKVSF-<br>EPIPIHYC  | glycosylated gp160   | murine(H- $2^{d,b}$ )   | [Sjolander et al.(1996)]    |
|                         | NOTES: • Study showing                                 | <b>TES:</b> Study showing that T cell determinants from glycoproteins can be dependent on the glycosylation of the protein  | roteins can be dependent                                       | on the glycosylation of the   | ne protein                  |
| gp120(204–216)          | gp120(203–215) <b>NOTES:</b> • Peptides indua          | 20(203–215) SVITQACSKVSFE peptide mu  TES: Peptides induced T-cell proliferative response in mice representing four haplotypes  | peptide<br>æ representing four haplo                           | $\begin{aligned} & \text{murine}(\text{H-}2^{bxk,sxd}) \\ & \text{types} \end{aligned}$ | [Sastry & Arlinghaus(1991)] |
| env(204–216)            | gp120(203–215)   | SVITQACSKVSFE   | Peptide<br>immunization  | rhesus monkey   | [Nehete et al.(1993)]       |
|                         | NOTES:  • Synthetic pep mice  • A weak or train        | <b>TES:</b> Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice  A weak or transient proliferative response to this pentide was observed in 3/3 immunized thesus monkeys | the HIV-1 envelope that  | stimulates a proliferativ   | e response in               |
|                         | <ul> <li>A weak or train</li> </ul>                    | A weak or transient proliferative response to this peptide was observed in 3/3 immunized rhesus monkeys   | otide was observed in 3/3                                      | immunized rhesus monk   | eys                         |

| Location               | WEAU   | Sequence  | Immunogen   | Species(HLA)                                       | References                         |
|------------------------|--|---|---|--|------------------------------------|
| gp120(205–219          | gp120(204–218)   | VITQACPKVSFEPIP   | none  | human(HLA-DR)                                      | [Gaudebout et al.(1997)]           |
|                        | NOTES:     Peptide binds     Because of the were consider      | Peptide binds to both HLA-DR*1101 and HLA-DR*0401 with high affinity Because of the distinctive binding pockets of HLA-DR*1101 and HLA-DR*0401, were considered candidates for promiscuous HLA-DR binding                         | 0401 with high affinity<br>R*1101 and HLA-DR*0<br>R binding | 401, peptides that bound both affinity             | both affinity                      |
| gp120(206–230)         | gp120(210–234)  NOTES:  • Study showin;                        | 20(210–234) PKVSFEPIPIHYCAPAG- glycosylated gp160 murine(H-2 <sup>d,b</sup> ) [Sjolan FAILKCNN] <b>TES:</b> Study showing that T cell determinants from glycoproteins can be dependent on the glycosylation of the protein        | glycosylated gp160  oteins can be dependent c               | murine(H- $2^{d,b}$ )  on the glycosylation of th  | [Sjolander et al.(1996)] e protein |
| gp120(215–228)         | gp120(214–227) NOTES: • Peptides indu                          | 5120(214–227) FEPIPIHYCAFPGF peptide mu OTES:  • Peptides induced T-cell proliferative response to immunizing peptide and to gp160  | peptide<br>unizing peptide and to gp                        | $murine(H-2^{bxk})$ o160                           | [Sastry & Arlinghaus(1991)]        |
| gp120(IIIB)            | gp120(224–239)   | PAGFAILKCNNKTFNY  | Peptide priming, in vitro                                   | human(DR2)   | [Manca et al.(1995b)]              |
|                        | NOTES:     Peptide stimul     Peptide primin     gp120 primin; | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein gp120 priming induced T-cells that recognize this peptide       | viduals <i>in vitro</i><br>ecognize whole protein<br>otide  |  |                                    |
| gp120(220–235<br>HXB2) | gp120(224–239) NOTES:  | PAGFAILKCNNKTFNY  | gp120 protein priming <i>in vitro</i>                       | human(DR2)   | [Guzman et al.(1998)]              |
|                        | Listeria mono phagosome to T-cells                             | Listeria monocytogenes, an intracellular pathogen which is ingested by macrophages and can escape from the phagosome to replicate in the cytoplasm, was used successfully as carrier to deliver this gp120 epitope to CD4+T-cells | which is ingested by ma<br>successfully as carrier to       | crophages and can esca<br>deliver this gp120 epito | pe from the pe to CD4+             |
| gp120(225–240<br>SF2)  | gp120(224–238)   | PAGFAILKCNNKTFN   | Peptide, in vitro   |  | [Manca et al.(1993)]               |
|                        | NOTES:  • T-cell line der  • Responds to A  • Human MAbs       | TES: T-cell line derived from un-primed, uninfected individual Responds to APC pulsed with either synthetic peptide or gp120 Human MAbs 448-D and 450-D enhance APC gp120 uptake and presentation                                 | dual<br>e or gp120<br>uptake and presentation               |  |                                    |

| Location               | WEAU   | Sequence  | Immunogen   | Species(HLA)  | References                    |
|------------------------|--|---|---|---|-------------------------------|
| gp120(194–202<br>HXB2) | gp120(227–235)   | FAILKCNNK   | gp120-APC protein priming in vitro  | human(DR2,6)  | [Manca et al.(1996)]          |
|                        | NOTES:  This epitope was the minim One Th line was stimulated Alanine substitutions at pofor a gp120 stimulated line Constructs combining GST cells but not at the N-term of   | This epitope was the minimal stimulatory sequence defined for two Th lines stimulated <i>in vitro</i> One Th line was stimulated by gp120, one by a Glutathione-S-transferase (GST)-peptide fusion  Alanine substitutions at position 914, 196, and 202 abrogated activity for the GST-peptide stimulated line, but not for a gp120 stimulated line  Constructs combining GST and the PAGFAILKCNNKTFNY gp120 peptide at the C-term end of GST stimulated Th cells but not at the N-term end | efined for two Th lines st<br>thione-S-transferase (GS<br>brogated activity for the<br>KTFNY gp120 peptide at | imulated <i>in vitro</i> T)-peptide fusion GST-peptide stimulated line, but not the C-term end of GST stimulated Th | line, but not<br>timulated Th |
| gp120(238–246<br>HXB2) | gp120(227–235)   | FAILKCNNK   | in vitro stimulation  | human   | [Li Pira et al.(1998)]        |
|                        | NOTES:  • Clonal heterory antigens, dornor of PBI • the only (determine)   | <b>TES:</b> Clonal heterogeneity was broad for a recall response to tetanus toxoid or PPD, but oligoclonal to antigens, dominated in this case by TCR V $\beta$ 22 usage Donor of PBMC that recognized this epitope had HLA-DR alleles 2 and 6 the only (detected) immunogenic variant of this epitope was derived from strain NOF (YAILKCNNK) Location of epitope in strain HXB2 noted in paper does not match corresponding location in Database  | e to tetanus toxoid or P  A-DR alleles 2 and 6  pe was derived from strai  es not match correspondi           | PD, but oligoclonal to primary HIV n NOF (YAILKCNNK)  | primary HIV                   |
| gp120(194–202<br>HXB2) | gp120(227–235)   | FAILKCNNK   | gp120-APC protein priming in vitro  | human(DR2,6)  | [Manca et al.(1996)]          |
|                        | NOTES:  This epitope in the value of the control of | TES:  This epitope was the minimal stimulatory sequence defined for two Th lines stimulated <i>in vitro</i> One Th line was stimulated by p66, one by a Glutathione-S-transferase (GST)-peptide fusion protein  Alanine substitutions at position 914, 196, and 202 abrogated activity for the GST-peptide stimulated line, but not   | efined for two Th lines st<br>one-S-transferase (GST)<br>brogated activity for the                            | imulated <i>in vitro</i><br>-peptide fusion protein<br>GST-peptide stimulated                                       | line, but not                 |
|                        | <ul> <li>Constructs linking GST to t constructs linking at the N-</li> <li>The C and N termini of GS SSTVNDIQKLV for contra</li> </ul>   | Constructs linking GST to the PAGFAILKCNNKTFNY gp120 peptide at the C-term end of GST stimulated Th cells, constructs linking at the N-term end did not The C and N termini of GST are not intrinsically permissive or non-permissive, presentation is epitope specific (see SSTVNDIQKLV for contrast)  | TY gp120 peptide at the C   | term end of GST stimul  | ated Th cells, specific (see  |
| gp120(IIIB)            | gp120(234–249)   | NKTFNGKGPCTNVSTY  | Peptide priming <i>in</i> vitro   | human   | [Manca et al.(1995b)]         |
|                        | NOTES:     Peptide stimu     Peptide primi   | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein   | viduals <i>in vitro</i><br>ecognize whole protein   |   |                               |

| Location                   | WEAU   | Sequence   | Immunogen  | Species(HLA)   | References                                      |
|----------------------------|--|--|--|--|---|
| gp120(240–252)             | gp120(239–251)   | GTGPCTNVSTVQC  | Peptide<br>immunization                            | rhesus monkey  | [Nehete et al.(1993)]                           |
|                            | <ul> <li>NOTES:</li> <li>Synthetic peptic mice</li> <li>Proliferative resin the other two</li> </ul> | TES: Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice Proliferative response to this peptide was observed in 1/3 immunized rhesus monkeys, with a weak transient response in the other two | the HIV-1 envelope that<br>1/3 immunized rhesus mo | stimulates a proliferative response in<br>onkeys, with a weak transient response | e response in<br>ient response                  |
| gp120(IIIB)                | gp120(244–258)   | TNVSTVQCTHGRPIY  | Peptide priming in vitro                           | human  | [Manca et al.(1995b)]                           |
|                            | NOTES: • Peptide stimu   | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>  | viduals <i>in vitro</i>                            |  |   |
| gp120(242–261<br>IIIB)     | gp120(246–265)   | VSTVQCTHGIRPVVSTQLLL   | SHIV-89.6 infection                                | Macaca mu-<br>latta(DRB1*0406)   | [Lekutis & Letvin(1997)]                        |
|                            | NOTES: • C2 region epii  | TES: C2 region epitope that has not been previously described  | bed  |  |   |
| gp120(IIIB)                | gp120(254–269)   | GIRPIVSTQLLLNGSC   | Peptide priming in vitro                           | human  | [Manca et al.(1995b)]                           |
|                            | NOTES: • Peptide stimu • Peptide primi   | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein  | viduals <i>in vitro</i><br>ecognize whole protein  |  |   |
| gp120(269–283<br>IIIB B10) | gp120(273-287)   | EVVIRSANFTDNAKT  | HIV infection                                      | human  | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
|                            | <b>NOTES:</b> • 12 gag and 18  | T <b>ES:</b><br>12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses  | ıld commonly evoke T-ce                            | ell responses  |   |
| gp120(IIIB)                | gp120(274–289)   | VVIRSDNFTNNAKTIC   | Peptide priming in vitro                           | human  | [Manca et al.(1995b)]                           |
|                            | NOTES:  • Peptide stimu  • Peptide primi   | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein  | viduals <i>in vitro</i><br>ecognize whole protein  |  |   |
|                            |  |  |  |  |   |

|  | gp120(303-321<br>IIIB) | gp120(MN)  |   | gp120(292–300<br>SF2)    |   | gp120(296–312<br>LAD   |   | gp120(IIIB)                     |   | gp120(274–288<br>IIIB B10)                      | Location     |
|--|------------------------|--|---|--------------------------|---|------------------------|---|---------------------------------|---|---|--------------|
| • Goats were im  | gp120(300-316)         | gp120(294–299) NOTES: • In a filamento   | NOTES: • Anon-glycosy form  | gp120(293–301)           | NOTES: • Stimulates T-c                                     | gp120(295–311)         | NOTES:     Peptide stimul     Peptide primir  | gp120(284–299)                  | NOTES: • 12 gag and 18  | gp120(278–292)                                  | WEAU         |
| <b>TES:</b> Goats were immunized with peptides containing V3 type-specific neutralizing determinants coupled to T1 | CTRPNNNTRKSIRIQRGPG(Y) | 20(294–299) ESVQIN immunization mu TES: In a filamentous bacteriophage coat protein background, stimulated Ab production | <b>TES:</b> A non-glycosylated form of gp120 was used as an immunogen – 20% of T-cell clones do not recognize the glycosylated form | NESVAINCT                | TES: Stimulates T-cell proliferation in HIV-infected donors | SVVEINCTRPNNNTRKS?     | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein | NAKTIIVQLNESVAIC                | <b>TES:</b> 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses | SANFTDNAKTIIVQL                                 | Sequence     |
| type-specific neutralizing   | polyvalent peptide     | immunization<br>und, stimulated Ab produ   | nunogen – 20% of T-cell c   | env 2–3, SF2 gp120       | ľS  | HIV infection          | ividuals <i>in vitro</i> recognize whole protein  | Peptide priming <i>in</i> vitro | ould commonly evoke T-c   | HIV infection                                   | Immunogen    |
| g determinants coupled to  | goat                   | murine ction to the V3 loop tip  | lones do not recognize the  | human                    |   | human                  |   | human                           | ell responses   | human   | Species(HLA) |
| <sub>2</sub> T1  | [Palker et al.(1989)]  | [Veronese et al.(1994)]  | glycosylated  | [Botarelli et al.(1991)] |   | [Schrier et al.(1989)] |   | [Manca et al.(1995b)]           |   | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] | References   |

| Location             | WEAU  | Sequence   | Immunogen   | Species(HLA)   | References                                    |
|----------------------|---|--|---|--|---|
| gp120(V3 IIIB)       | gp120(305–328)  | NNTRKSIRIQRGPGRAF-<br>VTIGKIGN   | DNA vaccine IIIB<br>env + rev   | murine   | [Sasaki et al.(1998)]                         |
|                      | NOTES:  • The env responsith DNA vaccytokines IFN foot pad swell    | <b>ΓES:</b> The env response is what is being sought, but co-expression of rev is required – intramuscular versus nasal vaccination with DNA vaccine with a QS-21 adjuvant was studied – QS-21 enhanced the IgG2a response mediated via Th1 cytokines IFNγ and IL-2 – delayed type hypersensitivity (DTH) in response to the V3 peptide was measured by a foot pad swelling test [Sasaki et al.(1998)] | ession of rev is required—lied—QS-21 enhanced t<br>tivity (DTH) in response                         | intramuscular versus nasa<br>he IgG2a response medi<br>to the V3 peptide was m                                     | I vaccination<br>ated via Th1<br>easured by a |
| gp120(307–322        | gp120(306–317)  | NTRKSIRIQRGPGR   | peptide   | murine   | [Goodman-Snitkoff                             |
| 11110)               | NOTES: • Identification   | <b>TES:</b> Identification of putative Th epitopes that can stimulate an antibody response in peptide-immunized mice   | ate an antibody response  | in peptide-immunized mi  | Ce (1779)]                                    |
| gp120(312–329)       | gp120(308–325)<br><b>NOTES:</b>                                     | (CG)KSIRIQRGPGRAFVTIG  | HIV-1 infection   | human  | [Adams et al.(1997)]                          |
|                      | • Used as positi  | • Used as positive control in study examining 1-cell response to four p24 Gag peptides   | sponse to rour p24 Gag p  | eptides  |   |
| gp120(V3 C subtype)  | gp120(310–321)  | (CKR)KIHIGPGQAFYT  | Peptide-ISCOM   | $\operatorname{murine}(\operatorname{H-2}^{b,d,k,s})$  | [Ahluwalia et al.(1997)]                      |
| subtype)             | NOTES:  • A V3 loop pep complexes) or presentation in               | <b>TES:</b> A V3 loop peptide modified to resemble an Indian form (GPGQ) was incorporated into ISCOMS (immune stimulating complexes) or liposomes, and used to immunize mice – the IgG2a/IgG2b antibody response was enhanced by the presentation in the ISCOM suggestive of a Th1 response  | m (GPGQ) was incorpora<br>ce – the IgG2a/IgG2b an<br>onse   | ted into ISCOMS (immun   | e stimulating<br>anced by the                 |
| gp120(306–325<br>MN) | gp120(310-329)  | RIHIGPGRAFYTTKNIIGIT   | HIV-1 infection   | human(DRB1*0101)   | [Hayball et al.(1997)]                        |
|                      | NOTES:  • Tandem repea proliferation  • Tandem peptic which can cou | Tandem repeated presentation of epitope enhances binding to class II molecule and therefore induction of T cell proliferation  Tandem peptides are thought to enhance proliferation through improved recruiting of CD4 to the activation complex, which can counter-balance gp120's sequestering of CD4 and consequential inhibition of a proliferative response                                       | binding to class II moleon through improved recruing through improved recruing the consequential in | cule and therefore induction of T cell ting of CD4 to the activation complex, hibition of a proliferative response | ion of T cell ion complex, response           |

| exposed uninfected individuals in this study had a fected individuals recognized this peptide unexposed uninfected controls could recognize thineously documented as IIIB sequence - most likely (0–324) RIQRGPGRAFVTIGK  [0–324) RIQRGPGRAFVTIGK  [0–324) RIQRGPGRAFVTIGK  [0–324) RIQRGPGRAFVTIGK  [0–324) RIQRGPGRAFVTIGK  [10–324) RIQRGPGRAFVTIGK  [10–324] RIQRGPGRAFVTIGK  [10–324] RIQRGPGRAFVTIGK  [10–324] RIQRGPGRAFVTIGK | Location<br>gp120(308–322<br>IIIB) | WEAU gp120(310–324)   | Sequence<br>RIHIGPGRAFYTTKN   | Immunogen HIV-1 exposure  | Species(HLA) human   |  |
|--|------------------------------------|---|---|---|----------------------|--|
| gp 1:  NO  Sp 1:  Sp 1:  NO  NO  NO  NO  NO  NO  NO  NO  NO  N   | <u>5</u>                           | NOTES:  • 9/11 exposed uninfected in  • 1/18 unexpos  • Erroneously | uninfected individuals in this study hadividuals recognized this peptide sed uninfected controls could recognized documented as IIIB sequence - most li | d a proliferative response<br>e this peptide<br>kely MN peptide                                   |                      | to a C5 peptide, but only 1/11 exposed   |
| 9p 1:<br>Sp 1:<br>NO:<br>NO:<br>NO:<br>NO:<br>NO:<br>NO:<br>NO:<br>NO  | gp120(315–329<br>IIIB)             | gp120(310–324)  | RIQRGPGRAFVTIGK   | vaccinia IIIB gp160   | 50                   | murine(H-2 $A^d$ )   |
| gp 1:<br>NO:<br>NO:<br>NO:<br>NO:  | , mb                               | NOTES: • Epitope P18:   | Induces both class II restricted CD4+   | Th cells, and class I:  | restri               | restricted CD8+ CTL  |
| 9p 1:  | gp120(315–329<br>IIIB)             | gp120(310-324)  | RIQRGPGRAFVTIGK   | J t. J.   |                      |  |
| gp12<br>NOI  |                                    | NOTES: • Synthetic per  |   | repude<br>immunization  |                      | =  |
| 9p12<br>NO7  |                                    | <ul><li>Despite the p</li></ul>                                     | ptide derived from conserved region c   | repude immunization f the HIV-1 envelo  | ope that             | rhesus monkey  |
| • • • • • • • • • • • • • • • • • • •  | gp120(315–329                      | gp120(310–324)  | ptide derived from conserved region croliferative response to this peptide in 1   | repude immunization immunization f the HIV-1 envelopment and humans, r                            | ope that             | rhesus monkey [Nehete et pe that stimulates a proliferative response in the oresponse was observed in 3 rhesus monkeys   |
| <ul> <li>IL-2 and \( \gamma \) IFN production from Th1 cells correlated with the CTLp free IL-4 production from Th 2 cells was inversely correlated with the CTL.</li> <li>The HIV-1+ children with strong CTL response had levels of anti-CD uninfected children.</li> </ul>  |                                    | NOTES:  | ptide derived from conserved region croliferative response to this peptide in RIQRGPGRAFVTIGK   | repude immunization f the HIV-1 envelo nice and humans, n   | pe that              | rhesus monkey pe that stimulates a proliferati o response was observed in 3 rl n human                                   |
| WITHIT COLOR CITIES CIT  |                                    | HIV-1+ infar  | ptide derived from conserved region croliferative response to this peptide in RIQRGPGRAFVTIGK and intensity of the CTL response and its                 | repude immunization f the HIV-1 envelonice and humans, n HIV-1 infection the type of Th response. | pe that<br>o respons | rhesus monkey  pe that stimulates a proliferati o response was observed in 3 rl n human nonse was studied in seven rapic |

| Location                              | WEAU                                 | Sequence   | Immunogen                  | Species(HLA)                           | References               |
|---------------------------------------|--------------------------------------|--|----------------------------|--|--------------------------|
| gp120(315–329                         | gp120(310–324)                       | RIQRGPGRAFVTIGK  |                            | murine(H-2 I-A $^d$ )                  | [Takeshita et al.(1995)] |
| , mb                                  | NOTES: • Epitope P18:                | <b>IES:</b> Epitope P18: Binds Class II H-2 I-A $^d$ requiring riqrgPgRaFvti, and Class I H-2 D $^d$                                       | PgRaFvti, and Class I H-   | $2\mathrm{D}^d$ , requiring iGPgRaFvtI | vtI                      |
| gp120(315–329                         | gp120(310–324)                       | RIQRGPGRAFVTIGK  | HIV infection              | human(DR)                              | [Baier et al.(1995)]     |
|                                       | NOTES: • Epitope P18: antigen presei | <b>TES:</b> Epitope P18: Linked HIV-1 T1 and P18 peptides to anti-HLA-DR and IgD Fab antigen presenting cells thus increase immunogenicity | anti-HLA-DR and IgD        | Fab fragments to enhance uptake by     | e uptake by              |
| gp120(315–329                         | gp120(310–324)                       | RIQRGPGRAFVTIGK  | HIV exposure               | human                                  | [Pinto et al.(1995)]     |
| , , , , , , , , , , , , , , , , , , , | NOTES: • Epitope P18:                | <b>TES:</b> Epitope P18: CTL activity analyzed in parallel with T helper reactivity in exposed but uninfected health care workers          | helper reactivity in expos | ed but uninfected health o             | are workers              |
| gp120(315–329                         | gp120(310–324)                       | RIHIGPGRAFYTTKN  | HIV exposure               | human                                  | [Pinto et al.(1995)]     |
|                                       | NOTES: • Epitope P18:                | TES:<br>Epitope P18: CTL activity analyzed in parallel with T helper reactivity in exposed but uninfected health care workers              | helper reactivity in expos | sed but uninfected health o            | are workers              |
| gp120(315–329                         | gp120(310–324)                       | RIQRGPGRAFVTIGK  | HIV infection              | human                                  | [Clerici et al.(1989)]   |
| , , , , , , , , , , , , , , , , , , , | NOTES: • Epitope P18:                | <b>TES:</b> Epitope P18: IL-2 production detection of T-helper lymphocytes from asymptomatic HIV-positive individuals                      | mphocytes from asympto     | omatic HIV-positive indiv              | viduals                  |
| gp120(315–329                         | gp120(310–324)                       | RIQRGPGRAFVTIGK  | HIV infection              | human                                  | [Clerici et al.(1991a)]  |
| , , , , , , , , , , , , , , , , , , , | NOTES: • Epitope P18:                | TES:<br>Epitope P18: Peptides stimulate Th cell function and CTL activity in similar patient   | CTL activity in similar p  | atient populations                     |                          |
| gp120(315–329                         | gp120(310-324)                       | RIQRGPGRAFVTIGK  | rgp160                     | human                                  | [Clerici et al.(1991b)]  |
| 11110)                                | NOTES: • Epitope P18: infection      | <b>TES:</b> Epitope P18: Immunizing uninfected individuals with rgp160 results in stronger infection                                       | ith rgp160 results in stro | onger Th response than does natural    | does natural             |
|                                       |                                      |  |                            |  |                          |

| Location                   | WEAU   | Sequence  | Immunogen   | Species(HLA)  | References                                      |
|----------------------------|--|---|---|---|---|
| gp120(315–329              | gp120(310-324)   | RIQRGPGRAFVTIGK   | HIV exposure  | human   | [Clerici et al.(1992)]                          |
| ,                          | NOTES: • Epitope P18:  | TES:  Epitope P18: Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed   | √-1 peptides in HIV-1 ex  | posed seronegative men  |   |
| gp120(315–329              | gp120(310–324)   | RIQRGPGRAFVTIGK   | HIV infection   | human   | [Clerici et al.(1997)]                          |
| ,                          | NOTES: • Epitope P18:  | <b>TES:</b> Epitope P18: used in a study of the influence of Pentoxifyllines on HIV specific T  | oxifyllines on HIV speci  | ífic T cells  |   |
| gp120(MN)                  | gp120(310–324) NOTES: • Epitope P18 N  | 20(310–324) RIHIGPGRAFYTTKN HIV exposure human [TES: Epitope P18 MN: Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed seronegative men  | HIV exposure HIV-1 peptides in HIV-                                       | human<br>l exposed seronegative m   | [Clerici et al.(1992)]<br>en                    |
| gp120(MN)                  | gp120(310–323)<br><b>NOTES:</b>  | RIHIGPGRAFYTTK  | peptide   | $murine(H-2^d)$   | [Klinman et al.(1995)]                          |
|                            | <ul> <li>Epitope SP10:</li> <li>10-mer from \(^{\mathbf{V}}\)</li> </ul>           | <ul> <li>Epitope SP10: Hybrid T1-V3 peptide activates IL-4 and IL-6 in a dose dependent manner</li> <li>10-mer from V3 contributes to this response</li> </ul>  | and IL-6 in a dose depen  | dent manner   |   |
| gp120(309–323<br>IIIB B10) | gp120(311-325)   | EQRGPGRAFVTIGKI   | HIV infection   | human   | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
|                            | NOTES: • 12 gag and 18   | TES: 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses  | uld commonly evoke T-c  | ell responses   |   |
| gp120(314–330)             | gp120(311–327) <b>NOTES:</b>   | IQRGPGRAFVTIGKIGN   | HIV-1 infection   | human   | [Caruso et al.(1997)]                           |
|                            | <ul> <li>T cells from H</li> <li>HIV antigen, I</li> <li>The ability to</li> </ul> | T cells from HIV-1 infected individuals as they progress to disease show reduced ability to proliferate in response to HIV antigen, but retain the ability to express the activation antigens CD25 and CD71  The ability to express activation markers in response to HIV is retained, but not in response to tetanus toxoid recall | ess to disease show reduvation antigens CD25 an to HIV is retained, but 1 | ced ability to proliferate in response to d CD71 not in response to tetanus toxoid recall | response to<br>oxoid recall                     |
|                            | <ul><li>antigen</li><li>This study invoto in vitro stin</li></ul>                  | antigen  This study investigated CD25 and CD71 expression in PBMC from patients in various stages of progression, response to <i>in vitro</i> stimulation by peptide cocktail containing four antigenic Env, peptides, or else p17 and p24  | PBMC from patients in four antigenic Env, pept                            | various stages of progressi<br>ides, or else p17 and p24                                  | on, response                                    |
| gp120(314–328<br>IIIB B10) | gp120(316–331)   | GRAFVTIGKIGNMRQ   | HIV infection   | human   | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
|                            | <b>NOTES:</b> • 12 gag and 18  | <b>TES:</b> 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses   | uld commonly evoke T-c  | ell responses   |   |
|                            |  |   |   |   |   |

| Location               | WEAU   | Sequence  | Immunogen   | Species(HLA)                                      | References              |
|------------------------|--|---|---|---|-------------------------|
| gp120(324–338<br>IIIB) | gp120(319–334)   | FVTIGKIGNMRQAHC   | IIIB gp160  | $\operatorname{murine}(\operatorname{H-2}^{k,d})$ | [Hale et al.(1989)]     |
|                        | NOTES: • Six multideter                                | TES: Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types   | ized by mice of three or t                        | our MHC types                                     |                         |
| gp120(IIIB)            | gp120(324–339)   | RIIGDIRKAHCNISRY  | Peptide priming in vitro                          | human   | [Manca et al.(1995b)]   |
|                        | NOTES:  • Peptide stimul  • Peptide primi              | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein | riduals <i>in vitro</i><br>ecognize whole protein |   |                         |
| gp120(327–341<br>HXB2) | gp120(330–344)   | RQAHCNISRAKWNNT   | rec HXB2 gp120                                    | $\operatorname{murine}(\operatorname{I-A}^d)$     | [Warren & Thomas(1992)] |
| ,                      | NOTES: • Murine T-cell                                 | TES:  Murine T-cell clone – MHC restriction determined, minimum epitope defined, N terminal flank of the V3 loop.   | inimum epitope defined,                           | N terminal flank of the V                         | <sup>7</sup> 3 loop.    |
| gp120(IIIB)            | gp120(334–348)   | CNISRAQWNNTLEQI   | Peptide priming in vitro                          | human   | [Manca et al.(1995b)]   |
|                        | NOTES:  • Peptide stimul  • Peptide primi              | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein | riduals <i>in vitro</i><br>ecognize whole protein |   |                         |
| gp120(342–356<br>IIIB) | gp120(338-352)   | RAKWNNTLKQICSKL   | IIIB gp160  | $\mathrm{murine}(\mathrm{H-}2^{k,t4,i5})$         | [Hale et al.(1989)]     |
|                        | NOTES: • Six multideter                                | <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types  | ized by mice of three or 1                        | our MHC types                                     |                         |
| gp120(IIIB)            | gp120(344–361)   | TLEQIVKKLREQFGNC  | Peptide priming <i>in</i> vitro                   | human   | [Manca et al.(1995b)]   |
|                        | <ul><li>Peptide stimul</li><li>Peptide primi</li></ul> | Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein             | viduals <i>in vitro</i><br>scognize whole protein |   |                         |
| gp120(346–359)         | gp120(347–360) NOTES: • Conjugation c                  | (20(347–360) QIVKKLREQFGNNK HIV infection human FES:  Conjugation of HIV peptides to liposomes and rIL-2 stimulation may enhance cell-mediated responses          | HIV infection stimulation may enhance             | human<br>cell-mediated responses                  | [Krowka et al.(1990)]   |
|                        |  |   |   |   |                         |

| gp120(367–376) QSSGGDPEIV? H                | NOTES:  • Stimulates T-cell proliferation in HIV-infected donors | gp120(373–387) PEIVTHSFNCGGEFF F  | NOTES: • 12 gag and 18 env T-cell sites were identified that could   | gp120(385–399) EFFYCNTTQLFNNTW P   | <ul> <li>NOTES:</li> <li>Peptide stimulation of PBMC from non-infected individu</li> <li>Peptide priming does not always induce T-cells that reco</li> </ul>  | gp120(395–410) FNNTWRLNHTEGTKGC P  |  | <ul> <li>NOTES:</li> <li>Peptide stimulation of PBMC from non-infected individu</li> <li>Peptide priming does not always induce T-cells that reco</li> </ul>  | <ul> <li>NOTES:         <ul> <li>Peptide stimulation of PBMC from non-infected individu</li> <li>Peptide priming does not always induce T-cells that recognized</li> </ul> </li> <li>gp120(398–412) TWFNSTWSTKGSNNT H</li> </ul>  |
|---|--|---|--|--|---|--|--|---|---|
| 20(367–376) QSSGGDPEIV? HIV infection human |  | n in HIV-infected donors  | n in HIV-infected donors  CGGEFF HIV infection human   | n in HIV-infected donors  CGGEFF HIV infection human h | n in HIV-infected donors  CGGEFF HIV infection human human were identified that could commonly evoke T-cell respons the priming in human vitro  | CGGEFF HIV infection human  CGGEFF HIV infection human  were identified that could commonly evoke T-cell respon  QLFNNTW Peptide priming in human  vitro  from non-infected individuals in vitro  ays induce T-cells that recognize whole protein  | CGGEFF HIV infection human  Were identified that could commonly evoke T-cell respon  QLFNNTW Peptide priming in human  "itro"  Trom non-infected individuals in vitro  ays induce T-cells that recognize whole protein  HTEGTKGC Peptide priming in human  vitro   | CGGEFF HIV infection human  CGGEFF HIV infection human  Were identified that could commonly evoke T-cell respon  QLFNNTW Peptide priming in human  vitro  Thom non-infected individuals in vitro  ays induce T-cells that recognize whole protein  HTEGTKGC Peptide priming in human  vitro  Thom non-infected individuals in vitro  ays induce T-cells that recognize whole protein  | CGGEFF  HIV infection  human  HIV infection  human  Were identified that could commonly evoke T-cell respon  QLENNTW  Peptide priming in  human  vitro  ays induce T-cells that recognize whole protein  The from non-infected individuals in vitro  ays induce T-cells that recognize whole protein  The from non-infected individuals in vitro  ays induce T-cells that recognize whole protein  HIV infection  human   |
| onses                                       | oonses   | oonses  | onses  | onses onses  | onses an   | oonses<br>an<br>an<br>an   | oonses an an an an   | onses onses an an an an   | oonses lan lan lan lan lan lan  |
|   | 376) QSSGGDPEIV? HIV infection human                             | 376) QSSGGDPEIV? HIV infection human ttes T-cell proliferation in HIV-infected donors | 376) QSSGGDPEIV? HIV infection human tes T-cell proliferation in HIV-infected donors  387) PEIVTHSFNCGGEFF HIV infection human | 20(367–376) QSSGGDPEIV? HIV infection human  TES: Stimulates T-cell proliferation in HIV-infected donors  20(373–387) PEIVTHSFNCGGEFF HIV infection human  TES: 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses  | 376) QSSGGDPEIV? HIV infection human  tes T-cell proliferation in HIV-infected donors  387) PEIVTHSFNCGGEFF HIV infection human  and 18 env T-cell sites were identified that could commonly evoke T-cell responses  PEFYCNTTQLFNNTW Peptide priming in human | 20(367–376) QSSGGDPEIV? HIV infection human  TES:  Stimulates T-cell proliferation in HIV-infected donors  20(373–387) PEIVTHSFNCGGEFF HIV infection human  TES:  12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses  20(385–399) EFFYCNTTQLFNNTW Peptide priming in human vitro  TES:  Peptide stimulation of PBMC from non-infected individuals in vitro  Peptide priming does not always induce T-cells that recognize whole protein | and 18 env T-cell sites were identified that could commonly evoke T-cell responses  387) PEIVTHSFNCGGEFF HIV infection human  387) PEIVTHSFNCGGEFF HIV infection human  399) EFFYCNTTQLFNNTW Peptide priming in human vitro  priming does not always induce T-cells that recognize whole protein  410) FNNTWRLNHTEGTKGC Peptide priming in human vitro | TES: Stimulates T-cell proliferation in HIV-infected donors  20(373–387) PEIVTHSFNCGGEFF HIV infection human  TES: 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses  20(385–399) EFFYCNTTQLFNNTW Peptide priming in human  TES: Peptide stimulation of PBMC from non-infected individuals in vitro  Peptide priming does not always induce T-cells that recognize whole protein  Peptide stimulation of PBMC from non-infected individuals in vitro  Peptide stimulation of PBMC from non-infected individuals in vitro  Peptide stimulation of PBMC from non-infected individuals in vitro  Peptide priming does not always induce T-cells that recognize whole protein | and 18 env T-cell sites were identified that could commonly evoke T-cell responses  387) PEIVTHSFNCGGEFF HIV infection human and 18 env T-cell sites were identified that could commonly evoke T-cell responses  399) EFFYCNTTQLFNNTW Peptide priming in human vitro  stimulation of PBMC from non-infected individuals in vitro priming does not always induce T-cells that recognize whole protein  410) FNNTWRLNHTEGTKGC Peptide priming in human vitro priming does not always induce T-cells that recognize whole protein priming does not always induce T-cells that recognize whole protein  Numan  Numan |

| Location                   | WEAU  | Sequence  | Immunogen   | Species(HLA)                             | References                                      |
|----------------------------|---|---|---|--|---|
| gp120(399-413<br>IIIB B10) | gp120(398-412)  | TWSTKGSNNTEGSDT   | HIV infection   | human                                    | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
|                            | <b>NOTES:</b> • 12 gag and 18                           | <b>TES:</b> 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses   | d commonly evoke T-ce   | ll responses                             |   |
| gp120(410–429<br>PV22)     | gp120(410–430)  | GSDTITLPCRIKQFINMWQE  | HIV infection   | human(DR4)                               | [Callahan et al.(1990)]                         |
| 1 7 22)                    | NOTES: • Synthetic pept                                 | TES: Synthetic peptides representing natural variants were used to test for recognition in t  | sed to test for recognitic  | n in the context DR4                     |   |
| gp120(410–429              | gp120(410-430)  | GSDTITLPCRIKQFINMWQE  | HIV infection   | human(DR4(Dw10))                         | [Polydefkis et al.(1990)]                       |
|                            | NOTES: • Human CD4+                                     | <b>TES:</b> Human CD4+ T-cell clones lyse recombinant vaccinia virus-infected cells that synthesize envelope gp160  | virus-infected cells that   | synthesize envelope gp1                  | 50  |
| gp120(IIIB)                | gp120(417–432)  | LPCRIKQIINMWQEVY  | Peptide priming <i>in</i> vitro   | human                                    | [Manca et al.(1995b)]                           |
|                            | NOTES:  • Peptide stimul  • Peptide primir              | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein   | iduals <i>in vitro</i><br>cognize whole protein   |  |   |
| gp120(424-438<br>IIIB B10) | gp120(425–439)  | INMWQEVGKAMYAPP   | HIV infection   | human                                    | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
|                            | <b>NOTES:</b> • 12 gag and 18                           | TES: 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses  | d commonly evoke T-ce   | ll responses                             |   |
| gp120(426–441              | gp120(422–437)  | KQFINMWQEWGKAMYA  | HIV-1 exposure  | human                                    | [Furci et al.(1997)]                            |
| шь)                        | NOTES: • 9/11 exposed this previously • IIIB position 4 | TES: 9/11 exposed uninfected individuals in this study had a proliferative response to a C5 this previously defined epitope IIIB position 435 listed as "W" in this epitope as opposed to "V" in the sequence | duals in this study had a proliferative response to a in this epitope as opposed to "V" in the sequence | o a C5 peptide, but none reacted with ce | eacted with                                     |
| gp120(428–443              | gp120(422–437)  | KQIINMWQEVGKAMYA  | env fragment  | $murine(H-2^{k,d,s})$                    | [Cease et al.(1987)]                            |
| шь вто)                    | NOTES: • Epitope T1: 1                                  | <b>TES:</b> Epitope T1: 1 of 2 functional epitopes identified using an amphipathic helix epitope  | an amphipathic helix ep   | itope prediction algorithm               | n   |
|                            |   |   |   |  |   |

| Location               | WEAU  | Sequence   | Immunogen   | Species(HLA)  | References  |
|------------------------|---|--|---|---|---|
| gp120(428–443<br>IIIB) | gp120(422–437) KQIINM:  NOTES:  Epitope T1: C3H H2 <sup>k</sup> m responders – T1 can be p was thoroughly explored  | 0120(422–437) KQIINMWQEVGKAMYA peptide murine(H- $2E\alpha E\beta^k$ ) [Boehncke OTES:  • Epitope T1: C3H H2 <sup>k</sup> mice were used for immunization in the study because H-2 <sup>k</sup> mice are particularly good T1 responders – T1 can be presented by $E\alpha E\beta^k$ but not $E\alpha E\beta^b$ – the nature of the T1 class II molecular interaction was thoroughly explored  | peptide zation in the study becaus of $E\alpha E\beta^b$ – the nature o   | murine(H- $2E\alpha E\beta^k$ ) [Boehncke e H- $2^k$ mice are particularly good T1 f the T1 class II molecular interaction  | [Boehncke et al.(1993)] rly good T1 interaction             |
|                        | <ul> <li>Alanine substance</li> <li>except at threa</li> <li>activity – only</li> <li>specificity</li> <li>A gain in pote</li> <li>interfere with</li> </ul>  | Alanine substitutions across peptide did not negatively affect MHC binding or effective presentation of epitope, except at three critical residues (432N, 435Q, 439K), however substitutions with larger side chains often diminished activity – only a few amino acids were found to be critical for class II interaction and for maintaining T cell receptor specificity  A gain in potency was observed when 436E was replaced with A – this suggests that substitutions in positions that interfere with binding might allow the design of a more potent vaccine | ively affect MHC binding ), however substitutions writical for class II interaction placed with A – this suggetore potent vaccine | or effective presentation ith larger side chains often on and for maintaining T oests that substitutions in posts   | of epitope, diminished sell receptor sitions that           |
| gp120(428–443<br>IIIB) | gp120(422–437)  | KQIINMWQEVGKAMYA   | subcutaneous peptide immunization   | $murine(H-2^k)$   | [Ahlers et al.(1997)]                                       |
|                        | NOTES:  • T1 peptide: first ider • Alanine at position orders of magnitude • Vaccines with a CT1 to the wildtype helpe • T1 peptide linked MWQEVGKAMYA KQIINMWQAVGK GRAFVTI   | T1 peptide: first identified helper epitope in HIV Alanine at position 436 (instead of E in wild-type) enhances MHC binding and antigenicity of peptide by several orders of magnitude Vaccines with a CTL epitope linked to a more potent helper epitope yielded greatly enhanced CTL response relative to the wildtype helper epitope T1 peptide linked to CTL epitope in four vaccine constructs were used to immunize mice: KQIIN-MWQEVGKAMYAPPISGQIRRIQRGPGRAFVTIGK, KQIINMWQEVGKAMYAPPISGQIRRIQRGPGRAFVTIGK, KQIINMWQAVGKAMYAPPISGQIRRIQRGPGRAFVTIGK, GRAFVTI  | enhances MHC binding and a thelper epitope yielded greatly accine constructs were used GK, KQIINMWQEVGKA AFVTIGK, KQIINMWQA       | s MHC binding and antigenicity of peptide by several pitope yielded greatly enhanced CTL response relative onstructs were used to immunize mice: KQIIN-KQIINMWQEVGKAMYAPPISGQIRRIQRGPGRAFVTI, KQIINMWQAVGKAMYAPPISGQIRRIQRGP- | e by several onse relative : KQIIN- pRGPGRAFVTI, pIRRIQRGP- |
| gp120(428–433<br>IIIB) | gp120(422–437)  | KQIINMWQEVGKAMYA   | HIV-1 infection   | human   | [Wasik et al.(1997)]  |
|                        | <ul> <li>NOTES:</li> <li>Epitope T1: The breadth an progressing HIV-1+ infants</li> <li>IL-2 and γ IFN production 1</li> <li>IL-4 production from Th2 c</li> <li>The HIV-1+ children with ε to those of uninfected child</li> </ul> | <b>TES:</b> Epitope T1: The breadth and intensity of the CTL response and the type of Th response was studied in seven rapidly progressing HIV-1+ infants IL-2 and $\gamma$ IFN production from Th1 cells correlated with the CTLp frequency against HIV-1 Gag, Env, Nef and Pol IL-4 production from Th2 cells was inversely correlated with the CTLp frequency The HIV-1+ children with a strong CTL responses had levels of anti-CD3 MAb induction of Th1 cells comparable to those of uninfected children  | esponse and the type of Th<br>d with the CTLp frequency<br>lated with the CTLp frequency<br>had levels of anti-CD3 M              | response was studied in so<br>/ against HIV-1 Gag, Env,<br>ency<br>Ab induction of Th1 cells  | even rapidly  Nef and Pol  comparable                       |

| Location               | WEAU                    | Sequence   | Immunogen                  | Species(HLA)                             | References               |
|------------------------|-------------------------|--|----------------------------|--|--------------------------|
| gp120(428–443<br>IIIB) | gp120(422–437)          | KQIINMWQEVGKAMYA   | gp160 (IIIB)<br>vaccinia   | human                                    | [Berzofsky et al.(1988)] |
|                        | NOTES: • Epitope T1: P  | <b>TES:</b> Epitope T1: Proliferative response to T1 and T2 peptides in 14 immunized, uninfected humans                    | ides in 14 immunized, ur   | infected humans                          |                          |
| gp120(428–443          | gp120(422–437)          | KQIINMWQEVGKAMYA   | polyvalent peptide         | goat                                     | [Palker et al.(1989)]    |
| 11110)                 | NOTES: • Epitope T1: C  | <b>TES:</b> Epitope T1: Goats immunized with peptides containing V3 type-specific neutralizing determinants coupled to T1  | ng V3 type-specific neut   | ralizing determinants cou                | pled to T1               |
| gp120(428–443          | gp120(422–437)          | KQIINMWQEVGKAMYA   | HIV infection              | human                                    | [Clerici et al.(1989)]   |
| ,                      | NOTES: • Epitope T1: I  | TES: Epitope T1: IL-2 production detection of T-helper lymphocytes from asymptomatic                                       | mphocytes from asympto     | matic HIV-positive individuals           | iduals                   |
| gp120(428–443          | gp120(422–437)          | KQIINMWQEVGKAMYA   | IIIB gp160                 | $\mathrm{murine}(\mathrm{H-}2^{k,d,t4})$ | [Hale et al.(1989)]      |
| , , ,                  | NOTES: • Epitope T1: S  | TES:  Epitope T1: Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types             | ns are recognized by mic   | e of three or four MHC t                 | /pes                     |
| gp120(428–443          | gp120(422–437)          | KQIINMWQEVGKAMYA   | HIV infection              | human                                    | [Clerici et al.(1991a)]  |
| ,                      | NOTES: • Epitope T1: P  | TES: Epitope T1: Peptides stimulate Th cell function and CTL activity in similar patient                                   | CTL activity in similar pa | itient populations                       |                          |
| gp120(428–443          | gp120(422–437)          | KQIINMWQEVGKAMYA   | rgp160                     | human                                    | [Clerici et al.(1991b)]  |
| 11110)                 | NOTES: • Epitope T1: Ir | TES: Epitope T1: Immunizing uninfected individuals with rgp160 results in stronger Th response than does natural infection | gp160 results in stronger  | Th response than does nati               | ıral infection           |
| gp120(428–443          | gp120(422–437)          | KQIINMWQEVGKAMYA   | HIV exposure               | human                                    | [Clerici et al.(1992)]   |
| 11111)                 | NOTES: • Epitope T1: C  | TES:  Epitope T1: Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed seronegative men                        | 1 peptides in HIV-1 expo   | sed seronegative men                     |                          |
|                        |                         |  |                            |  |                          |

|  | gp120(428–443<br>IIIB) |  | gp120(428–443        |  | gp120(428–451<br>IIIB)        |   | gp120(428–443<br>IIIB) |   | gp120(428–443<br>IIIB) | ,  | gp120(428–443<br>IIIB) |  | gp120(428–443<br>IIIB)  | Location     |
|--|------------------------|--|----------------------|--|-------------------------------|---|------------------------|---|------------------------|--|------------------------|--|-------------------------|--------------|
| NOTES:  • Linked HIV presenting or   | gp120(422-437)         | NOTES: • Epitope T1:   | gp120(422–437)       | NOTES:  • Linked to a  | gp120(422-445)                | NOTES: • Epitope T1:  | gp120(422-437)         | NOTES: • Epitope T1:  | gp120(422-437)         | NOTES: • Epitope T1:   | gp120(422–437)         | NOTES: • Epitope T1:   | gp120(422–437)          | WEAU         |
| <b>IES:</b> Linked HIV-1 T1 and P18 peptides to anti-HLA-DR and anti-IgD Fab fragmen presenting cells and thus increase immunogenicity | KQIINMWQEVGKAMYA       | <b>TES:</b> Epitope T1: CTL activity analyzed in parallel with T helper reactivity in exposed but uninfected health care workers | KQIINMWQEVGKAMYA     | TES:  Linked to a CTL epitope from hepatitis C virus, induced CD4+ helper cells producing IL-2 | KQIIMNWQEVGKAMYAP-<br>PISGQIR | <b>TES:</b> Epitope T1: used in a study of the influence of Pentoxifyllines on HIV specific T cells | KQIINMWQEVGKAMYA       | <b>TES:</b> Epitope T1: Hybrid T1-V3 peptide activates IL-4 and IL-6 in a dose dependent manner | KQIINMWQEVGKAMYA       | <b>TES:</b> Epitope T1: Hybrid T1-V3 peptide immunogenicity reduced when the fusogenic | KQIINMWQEVGKAMYA       | <b>TES:</b> Epitope T1: Engineered into a filamentous bacteriophage coat protein, stimulated | KQIINMWQEVGKAMYA        | Sequence     |
| A-DR and anti-IgD Fab  | HIV infection          | h T helper reactivity in ε   | HIV exposure         | nduced CD4+ helper ce  | peptide                       | entoxifyllines on HIV sp  | HIV infection          | and IL-6 in a dose depo   | peptide                | ity reduced when the fu  | peptide                | iophage coat protein, sti  | immunization            | Immunogen    |
| fragments to enhance u   | human(DR)              | xposed but uninfected he   | human                | ls producing IL-2  | $murine(H2^d)$                | ecific T cells  | human                  | ndent manner  | $murine(H-2^d)$        | sogenic domain of gp41 was added   | chimpanzee             |  | murine                  | Species(HLA) |
| ts to enhance uptake by antigen  | [Baier et al.(1995)]   | alth care workers  | [Pinto et al.(1995)] |  | [Shirai et al.(1996)]         |   | [Clerici et al.(1997)] |   | [Klinman et al.(1995)] | vas added  | [Haynes et al.(1993)]  | for Ab production to the V3 loop   | [Veronese et al.(1994)] | References   |

| Location               | WEAU   | Sequence   | Immunogen  | Species(HLA)   | References  |
|------------------------|--|--|--|--|---|
| gp120(428-445)         | gp120(424–441) NOTES:  T cells from F HIV antigen, The ability to antigen This study inv | TES:  Tells from HIV-1 infected individuals as they progress to disease show reduced ability to proliferate in response to HIV antigen, but retain the ability to express the activation antigens CD25 and CD71  The ability to express activation markers in response to HIV is retained, but not in response to tetanus toxoid recall antigen  This study investigated CD25 and CD71 expression in PBMC from patients in various stages of progression, response to in vitro stimulation by peptide cocktail containing four antigenic Env peptides, or else p17 and p24 | HIV-1 infection ress to disease show reduvation antigens CD25 and to HIV is retained, but 1 n PBMC from patients in four antigenic Env pepti | human [Caruso et ced ability to proliferate in response to d CD71 to in response to tetanus toxoid recall various stages of progression, response des, or else p17 and p24 | [Caruso et al.(1997)] n response to toxoid recall ion, response |
| gp120(432–446          | gp120(426–440)   | NMWQEVGKAMYAPPI  | IIIB gp160   | $murine(H-2^{t4})$   | [Hale et al.(1989)]   |
| 11110)                 | NOTES: • Six multideter  | TES: Six multideterminant helper T-cell regions are recognized by mice of three or four  | nized by mice of three or  | four MHC types   |   |
| gp120(IIIB)            | gp120(427–442)   | MWQEVGKAMYAPPIGC   | Peptide priming <i>in</i> vitro  | human  | [Manca et al.(1995b)]   |
|                        | NOTES: • Peptide stimu • Peptide primi   | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein  | ividuals <i>in vitro</i><br>recognize whole protein  |  |   |
| gp120(437–451<br>IIIB) | gp120(431–445)   | VGKAMYAPPISGQIR  | IIIB gp160   | $\mathrm{murine}(\mathrm{H-}2^{k,d,i5,t4})$  | [Hale et al.(1989)]   |
| , , , ,                | NOTES: • Six multideter  | <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four   | nized by mice of three or  | four MHC types   |   |
| gp120(430–453)         | gp120(431–454)   | VGKAMYAPPISGQIRCS-<br>SNITGLL  | glycosylated gp160   | murine(H-2 <sup>b</sup> )  | [Sjolander et al.(1996)]  |
|                        | NOTES:     Study showin     Peptide stimu     Local glycosy                              | TES:  Study showing that T cell determinants from glycoproteins can be dependent on the glycosylation of the protein Peptide stimulation of an <i>in vitro</i> proliferative response required <i>in vivo</i> priming with glycosylated protein Local glycosylation sites not thought to be part of the epitope, rather thought to be important for epitope process  | roteins can be dependent<br>nse required <i>in vivo</i> primi<br>e epitope, rather thought   | on the glycosylation of the protein<br>ng with glycosylated protein<br>to be important for epitope processing  | ein<br>e processing   |

| NOTES:  • Six m  | gp120(483–497 gp120(478–492)<br>IIIB) | NOTES: • 12 ga   | gp120(474–488 gp120(476–490)<br>IIIB B10)       | • Conju  | gp120(466-481) gp120(470-485)<br>NOTES: | NOTES: • 12 ga   | gp120(459–473 gp120(460–475)<br>IIIB B10)       | NOTES:  | gp120(IIIB) gp120(457–472)      | NOTES:   | gp120(IIIB) gp120(447–462) | NOTES:  | gp120(IIIB) gp120(437–452) | Location WEAU |
|--|---------------------------------------|--|---|--|---|--|---|---|---------------------------------|--|----------------------------|---|----------------------------|---------------|
| ıultidetern  | 3–492)                                | g and 18 e   | 5–490)  | ıgation of   | )_485)                                  | g and 18 e   | )–475)  | de stimula<br>de primin   | 7–472)                          | de stimula<br>de primin  | 7–462)                     | de stimula<br>de primin   | 7–452)                     |               |
| <b>TES:</b> Six multideterminant helper T-cell regions are recognized by mice of three or four | RDNWRSELYKYKVVK                       | TES: 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses | DMRDNWRSELYKYKV                                 | Conjugation of HIV peptides to liposomes and rIL-2 stimulation may enhance cell-mediated responses | FRPGGGDMRDNWRSEL                        | TES: 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses | GNSNNESEIFRPGGG                                 | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein | RDGGTNVTNDTEVFRC                | <b>Preprise Stimulation of PBMC from non-infected individuals</b> <i>in vitro</i> <b>Peptide priming does not always induce T-cells that recognize whole protein</b> | SSNITGLLLTRDGGTC           | <b>TES:</b> Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein | APPIGGQISCSSNITY           | Sequence      |
| nized by mice of three or 1  | IIIB gp160                            | ould commonly evoke T-ce   | HIV infection                                   | stimulation may enhance  | HIV infection                           | ould commonly evoke T-ce   | HIV infection                                   | ividuals <i>in vitro</i> recognize whole protein  | Peptide priming <i>in</i> vitro | ividuals <i>in vitro</i> recognize whole protein   | Peptide priming in vitro   | ividuals <i>in vitro</i><br>recognize whole protein   | Peptide priming in vitro   | Immunogen     |
| cour MHC types   | $murine(H-2^{d,t4})$                  | ll responses   | human   | cell-mediated responses  | human                                   | ll responses   | human   |   | human                           |  | human                      |   | human                      | Species(HLA)  |
|  | [Hale et al.(1989)]                   |  | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |  | [Krowka et al.(1990)]                   |  | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |   | [Manca et al.(1995b)]           |  | [Manca et al.(1995b)]      |   | [Manca et al.(1995b)]      | References    |

| Location                   | WEAU  | Sequence  | Immunogen  | Species(HLA)  | References                                      |
|----------------------------|---|---|--|---|---|
| gp120(482–501<br>IIIB)     | gp120(484–503)  | ELYKYKVVKIEPLGVAPTKA  | HIV-1 gp120 DNA<br>vaccine                           | rhesus monkey                                       | [Lekutis et al.(1997)]                          |
|                            | <ul><li>HIV-1 env DN</li><li>This epitope v</li></ul> | HIV-1 env DNA vaccine induced Th cell response to this epitope in a rhesus monkey. This epitope was recognized by both monkeys used in this study   | this epitope in a rhesus m<br>this study             | onkey   |   |
| gp120(484–498<br>IIIB B10) | gp120(486–500) NOTES:                                 | 20(486–500) YKYKVVKIEPLGVAP HIV infection hun   | HIV infection  | human   | [Wahren et al.(1989b),<br>Wahren et al.(1989a)] |
| gp120(492–506              | gp120(486-501)  | CKYKVVKIEPLGVAPT  | IIIB gp160   | $\mathrm{murine}(\mathrm{H-2}^{d,k,t4,i5})$         | [Hale et al.(1989)]                             |
| IIIB)                      | NOTES: • Six multideter                               | <b>TES:</b><br>Six multideterminant helper T-cell regions are recognized by mice of three or four N   | ized by mice of three or 1                           | four MHC types                                      |   |
| gp120(484–496<br>HXB2)     | gp120(486–498)  | YKYKVVKIEPLGV   | HIV-1 env DNA vaccination                            | Macaca mu-<br>latta(DR*W201)                        | [Lekutis & Letvin(1998)]                        |
|                            | NOTES: • Variants of thinduce prolife wildtype pept   | TES: Variants of this epitope with substitutions at position 490(K) retained ability to bind to MHC class II, but failed to induce proliferation/cytokine secretion in HIV-1 env-specific CD4+ Th cells, the modified peptide antagonized the wildtype peptide-induced proliferative response | 490(K) retained ability t<br>specific CD4+ Th cells, | o bind to MHC class II,<br>the modified peptide ant | but failed to<br>agonized the                   |
| gp120(IIIB)                | gp120(487–502)  | KYKVIKIEPLGIAPTC  | Peptide priming in                                   | human   | [Manca et al.(1995b)]                           |
|                            | NOTES:  • Peptide stimu  • Peptide primi              | Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> Peptide priming does not always induce T-cells that recognize whole protein   | viduals <i>in vitro</i><br>scognize whole protein    |   |   |
| gp120(486-494<br>IIIB)     | gp120(488-496)  | YKVVKIEPL   | SHIV-HXBc2 infection                                 | Macaca mu-<br>latta(DRB*W201)                       | [Lekutis & Letvin(1997)]                        |
|                            | NOTES: • C5 region mir                                | <b>TES:</b> C5 region minimal epitope determined through fine epitope mapping   | pitope mapping                                       |   |   |
| gp120(494–518<br>IIIB)     | gp120(489–514)  | KVVKIEPLGVAPTKAKR-<br>RVVQREKRC   | peptide  | murine  | [Goodman-Snitkoff et al.(1990)]                 |
|                            | • Identification                                      | Identification of putative Th epitopes that can stimulate an antibody response in peptide immunized mice  | te an antibody response i                            | n peptide immunized mid                             | 3e  |

| Location     | WEAU  | Sequence  | Immunogen   | Species(HLA)   | References                                       |
|--------------|---|---|---|--|--|
| gp120(IIIB)  | gp120(501–513) NOTES:  Thought to be Response to t Presentation ( Suppression ( was observed  | 20(501–513) TKAKRRVVEREKR in vitro stimulation human(DR) [Wilson et TTES: Thought to be a mimic of a HLA class II DR $\beta$ chain variable region Response to this epitope may cause a breakdown of self-tolerance Presentation of epitope induced autoreactive T-cell lines in PBMC from uninfected donors Suppression of proliferation to soluble antigens by the CD8+ fraction of TKAKRRVVEREKR stimulated T cells was observed   | in vitro stimulation ain variable region of self-tolerance I lines in PBMC from unity the CD8+ fraction of T        | human(DR)  ifected donors  KAKRRVVEREKR sti  | [Wilson et al.(1997)] mulated T cells            |
| gp120(IIIB)  | gp120   |   | gp120 or gp160<br>DNA vaccine   | murine   | [Shiver et al.(1997)]                            |
|              | NOTES:  • DNA vaccinations of with Th1-like secretic with Th1-like secretic e An intramuscular rour A proliferative responsinguinal lymph nodes | <b>TES:</b> DNA vaccinations of BALBc mice with a gp120 or gp160 DNA vaccine elicited a strong T cell proliferative response with Th1-like secretion of $\gamma$ interferon and IL-2, with little or no IL-4, as well as antigen specific gp120 Abs An intramuscular route of inoculation gave a stronger proliferative response than intradermal A proliferative response could be detected in all lymph tissues tested: spleen, PBMC, and mesenteric, iliac, and inguinal lymph nodes | gp160 DNA vaccine elici<br>vith little or no IL-4, as we<br>ger proliferative response<br>lymph tissues tested: spl | ted a strong T cell prolificed a strong T cell prolification antigen specific gp than intradermal sen, PBMC, and mesen | erative response<br>120 Abs<br>teric, iliac, and |
| gp120        | gp120   |   | DNA gag/pol, or env vaccine   | murine   | [Kim et al.(1997b)]                              |
|              | NOTES:  • A gp160 DN gives an inc:  | <b>TES:</b> A gp160 DNA vaccine, when delivered in conjuction with the plasmid encoding the co-stimulatory molecule CD86, gives an increase in the proliferative responses to gp120 in mice   | on with the plasmid encoc   | ling the co-stimulatory r  | nolecule CD86,                                   |
| gp120        | gp120 NOTES:  | 20 TES:  Someones flanking belief T cell immunogenic demains can be important for immunogenicity.   | moins can be important for  | human  | [De Berardinis et al.(1997)]                     |
| gp120(gp160) | gp120<br>NOTES:   | 20 polyclonal HIV-1 infection hu  | HIV-1 infection   | human  | [Rosenberg et al.(1997)]                         |

| Location              | WEAU   | Sequence  | Immunogen  | Species(HLA)   | References                          |
|-----------------------|--|---|--|--|-------------------------------------|
| gp120(gp160)          | gp120<br>NOTES:                              | polyclonal  | HIV-1 infection  | Macaca nemestrina  | [Kent et al.(1997)]                 |
|                       | <ul><li>Macac their in A stroweeks</li></ul> | Macaca nemestrina can be infecte their initial immune response A strong proliferative response a weeks of infection | Macaca nemestrina can be infected with HIV, and clear the infection within 6 months, so it is of interest to examine their initial immune response  A strong proliferative response against gp160 with IL-4 production, indicating a Th2 response, was found with 4 weeks of infection | thin 6 months, so it is of interest to examine dicating a Th2 response, was found with 4 | erest to examine<br>as found with 4 |
|                       | • The gp16 responses                         | o160 proliferative response<br>ses  | The gp160 proliferative response by 8 weeks produces both IL-4 and $\gamma$ interferon, indicating both Th1 and Th2 responses  | $\gamma$ interferon, indicating bo   | th Th1 and Th2                      |
| gp120(gp160<br>HXBc2) | gp120  | polyclonal  | gp160 DNA vaccine, env protein boost   | Macaca mulatta   | [Letvin et al.(1997)]               |
|                       | NOTES:  • Vaccin  T-cell • Vaccin            | ation of Macaca mulatta ()<br>proliferative response, a C7<br>ated animals challenged wi                            | IES: Vaccination of Macaca mulatta (Rhesus monkeys) with an HXBc2 env DNA prime and a protein boost elicited a T-cell proliferative response, a CTL response, and type-specific neutralizing antibodies Vaccinated animals challenged with SHIV-HXB2 were protected from infection     | DNA prime and a protein zing antibodies  | boost elicited a                    |
| gp120(MN)             | gp120  | polyclonal  | env + rev MN DNA<br>vaccine  | human  | [MacGregor et al.(1998)]            |
|                       | NOTES:                                       | TES: An HIV DNA env and rev vaccine 300 μg, was safe All three groups showed an increa                              | <b>TES:</b> An HIV DNA env and rev vaccine given to 15 asymptomatic HIV+ individuals at 300 $\mu$ g, was safe All three groups showed an increased proliferative response after vaccination  | viduals at three different dosages, 30, 100 or ation                                     | ages, 30, 100 or                    |