[Abacioglu (1994)] Y. H. Abacioglu, T. R. Fouts, J. D. Laman, E. Claassen, S. H. Pincus, J. P. Moore, C. A. Roby, R. Kamin-Lewis, & G. K. Lewis. Epitope Mapping and Topology of Baculovirus-Expressed HIV-1 gp160 Determined with a Panel of Murine Monoclonal Antibodies. *AIDS Res Hum Retroviruses* **10**:371–381, 1994. (Medline: 94347461) Notes: Thirty MAbs were obtained from BALB/c mice immunized with rgp160 LAI expressed in baculovirus. These antibodies map to 4 domains: gp120 C1, C2, C3/V4, and the cytoplasmic tail of gp41. All epitopes were exposed on rgp160 without denaturing the protein, but 6/8 epitopes mapped in gp120 are not exposed unless the protein is denatured, showing rgp160 and rgp120 fold differently.

[Acel (1998)] A. Acel, B. E. Udashkin, M. A. Wainberg, & E. A. Faust. Efficient gap repair catalyzed in vitro by an intrinsic DNA polymerase activity of human immunodeficiency virus type 1 Integrase. *J Virol* **72**:2062–71, 1998. (Medline: 98139101) Notes: Intrinsic polymerase activity that can catalyze gap repair was described for HIV Integrase. This activity was inhibited by the MAb 35, that binds to KAKIIRDYGK at the C-term end of Integrase.

[Ahluwalia (1997)] A. Ahluwalia, K. Gokulan, I. Nath, & D. N. Rao. Modification of delivery system enhances MHC nonrestricted immunogenicity of V3 loop region of HIV-1 gp120. *Microbiol Immunol* **41**:779–84, 1997. (Medline: 98065759).

[Akerblom (1990)] L. Akerblom, J. Hinkula, P.-A. Broliden, B. Makitalo, T. Fridberger, J. Rosen, M. Villacres-Eriksson, B. Morein, & B. Wahren. Neutralizing cross-reactive and non-neutralizing monoclonal antibodies to HIV-1 gp120. *AIDS* **4**:953–960, 1990. (Medline: 91083889).

[Allaway (1993)] G. P. Allaway, A. M. Ryder, G. A. Beaudry, & P. J. Madden. Synergistic inhibition of HIV-1 envelope-mediated cell fusion by CD4-based molecules in combination with antibodies to gp120 or gp41. *AIDS Res Hum Retroviruses* **9**:581–587, 1993. (Medline: 93378778).

[Alsmadi (1997)] O. Alsmadi, R. Herz, E. Murphy, A. Pinter, & S. A. Tilley. A novel antibody-dependent cellular cytotoxicity epitope in gp120 is identified by two monoclonal antibodies isolated from a long-term survivor of human immunodeficiency virus type 1 infection. *J Virol* **71**:925–33, 1997. (Medline: 97151073).

[Alsmadi & Tilley(1998)] O. Alsmadi & S. A. Tilley. Antibody-dependent cellular cytotoxicity directed against cells expressing human immunodeficiency virus type 1 Envelope of primary or laboratory-adapted strains by human and chimpanzee monoclonal antibodies of different epitope specificities. *J Virol* **72**:286–93, 1998. (Medline: 98080415).

[Altmeyer (1999)] R. Altmeyer, E. Mordelet, M. Girard, & C. Vidal. Expression and detection of macrophage tropic HIV-1 gp120 in the brain using conformation-dependent antibodies. *Virology* **259**:314–21, 1999. (Medline: 99319000).

[Andersson (1997)] A. Z. E. Andersson, E. Krambovitis, & C. A. Borrebaeck. Induction of antigen-specific isotype switching by in vitro immunization of human naive B lymphocytes. *Immunol Methods* **200**:181–190, 1997. (Medline: 97158597) Notes: A two-step *in vitro* immunization protocol is described, which yields an isotype switch.

[Andris (1992)] J. S. Andris, S. Johnson, S. Zolla-Pazner, & J. D. Capra. Molecular characterization of five anti-human immunodeficiency virus type 1 antibody heavy chains reveals extensive somatic mutation typical of an antigen-driven immune response. *Proc Natl Acad Sci USA* **88**:7783–7788, 1992. (Medline: 91352074).

[Andrus (1998)] L. Andrus, A. M. Prince, I. Bernal, P. McCormack, D. H. Lee, M. K. Gorny, & S. Zolla-Pazner. Passive immunization with a human immunodeficiency virus type 1- neutralizing monoclonal antibody in Hu-PBL-SCID mice: isolation of a neutralization escape variant. *J Infect Dis* **177**:889–97, 1998. (Medline: 98194583).

[Arendrup (1995)] M. Arendrup, L. Akerblom, P. M. Heegaard, J. O. Nielsen, & J. E. Hansen. The HIV-1 V3 domain on field isolates: participation in generation of escape virus in vivo and accessibility to neutralizing antibodies. *Arch Virol* **140**:655–670, 1995. (Medline: 95314457) Notes: The anti-V3 Ab titre in patient serum was generally low against autologous virus isolated later than the serum sample, in contrast to a higher titre against peptides corresponding to virus isolated earlier than the serum sample. The authors conclude that the V3 domain is subject to immunoselection *in vivo*, and that V3 on early field virus is less accessible to NAbs than the V3 loop on laboratory strains.

[Arendrup (1993)] M. Arendrup, A. Sonnerborg, B. Svennerholm, L. Akerblom, C. Nielsen, H. Clausen, S. Olofsson, J. O. Nielsen, & J. E. S. Hensen. Neutralizing antibody response during human immunodeficiency virus type 1 infection: type and group specificity and viral escape. *J Gen Virol* **74**:855–863, 1993. (Medline: 93260399).

[Armstrong & Dimmock(1996)] S. J. Armstrong & N. J. Dimmock. Varying temperature-dependence of post-attachment neutralization of human immunodeficiency virus type 1 by monoclonal antibodies to gp120: identification of a very early fusion-independent event as a neutralization target. *J Gen Virol* **77**:1397–1402, 1996. (Medline: 8757979).

[Armstrong (1996)] S. J. Armstrong, T. L. McInerney, L. McLain, B. Wahren, J. Hinkula, M. Levi, & N. J. Dimmock. Two neutralization anti-V3 monoclonal antibodies act by affecting different functions of human immunodeficiency virus type 1. *J Gen Virol* **77**:2931–2941, 1996. (Medline: 97152500).

[Baba (2000)] T. W. Baba, V. Liska, R. Hofmann-Lehmann, J. Vlasak, W. Xu, S. Ayehunie, L. A. Cavacini, M. R. Posner, H. Katinger, G. Stiegler, B. J. Bernacky, T. A. Rizvi, R. Schmidt, L. R. Hill, M. E. Keeling, Y. Lu, J. E. Wright, T. C. Chou, & R. M. Ruprecht. Human neutralizing monoclonal antibodies of the IgG1 subtype protect. *Nat Med* **6**:200–6, 2000. (Medline: 20124178).

[Back (1993)] N. K. T. Back, L. Smit, M. Schutten, P. L. Nara, M. Tersmette, & J. Goudsmit. Mutations in Human Immunodeficiency Virus Type 1 gp41 Affect Sensitivity to Neutralization by gp120 Antibodies. *J Virol* **67**:6897–6902, 1993. (Medline: 94016886) Notes: Three closely related clones were derived from a neutralization resistant IIIB isolate that had been passaged in a chimpanzee. gp41 mutations were shown to profoundly alter the ability of V3 loop MAbs 5023 and 178.1 to neutralize. Critical substitutions in gp41 were 668 and 675, close to the immunogenic domain 662-668, or ELDKWAS. Less profound inhibition was observed for the anti-CD4 binding site MAb GP13.

[Bagley (1994)] J. Bagley, P. J. Dillon, C. Rosen, J. Robinson, J. Sodroski, & W. A. Marasco. Structural Characterization of Broadly Neutralizing Human Monoclonal Antibodies Against the CD4 Binding Site of HIV-1 gp120. *Mol Immunol* **31(15)**:1149–1160, 1994. (Medline: 95021325) Notes: This paper is a detailed study of the V-D-J heavy chain usage and V-J light chain usage for the three monoclonals that bind to the HIV-1 envelope CD4 binding site: F105, 15e and 21h. Different germline genes were used, and there was evidence for antigen-drive clonal selection of somatic mutations. Eight positions in the heavy chain and two in the light chain complementarity determining positions were identical in the three Mabs.

[Bai (2000)] Y. Bai, Y. Zhao, T. Yu, M. P. Dierich, & Y. H. Chen. Antibodies to HIV-1 gp41 recognize synthetic peptides of human IFN-alpha and IFN-beta. *Int Arch Allergy Immunol* **121**:170–2, 2000. (Medline: 20171160).

[Banapour (1987)] B. Banapour, K. Rosenthal, L. Rabin, V. Sharma, L. Young, J. Fernandez, E. Engleman, M. McGrath, G. Reyes, & J. Lifson. Characterization and Epitope Mapping of a Human Monoclonal Antibody Reactive with the Envelope Glycoprotein of Human Immunodeficiency Virus. *J Immunol* **139**:4027–4033, 1987. (Medline: 88088754).

[Bandres (1998)] J. C. Bandres, Q. F. Wang QF, J.O'Leary, F. Baleaux, A. Amara, J. A. Hoxie, & S.-P. M. K. Gorny. Human immunodeficiency virus (HIV) envelope binds to CXCR4 independently of CD4, and binding can be enhanced by interaction with soluble CD4 or by HIV envelope deglycosylation. *J Virol* **72**:2500–2504, 1998. (Medline: 98139153).

[Barbas III (1992)] C. F. Barbas III, E. Bjorling, F. Chiodi, N. Dunlop, D. Cababa, T. M. Jones, S. L. Zebedee, M. A. Persson, P. A. Nara, E. Norrby, & et al. Recombinant human Fab fragments neutralize human type 1 immunodeficiency virus in vitro. *Proc Natl Acad Sci USA* **89**:9339–9343, 1992. (Medline: 93028460).

[Barbas III (1993)] C. F. Barbas III, T. A. Collet, P. Roben, J. Binley, W. Amberg, D. Hoekstra, D. Cabana, T. M. Jones, R. A. Williamson, G. R. Pilkington, N. L. Haigwood, A. C. Satterthwait, I. Sanz, & D. R. Burton. Molecular profile of an antibody response to HIV-1 as probed by combinatorial libraries. *J Mol Biol* **230**:812–823, 1993. (Medline: 93240535).

[Barsov (1996)] E. V. Barsov, W. E. Huber, J. Marcotrigiano, P. K. Clark, A. D. Clark, E. Arnold, & S. H. Hughes. Inhibition of Human Immunodeficiency Virus Type 1 Integrase by the Fab Fragment of a Specific Monoclonal Antibody Suggests that Different Multimerization States Are Required for Different Enzymatic Functions. *J Virol* **70**:4484–4494, 1996. (Medline: 96256759) Notes: MAb 35 does not inhibit HIV-1 IN, but Fab 35 inhibits 3'-end processing, strand transfer and disintegration. This appears to be through interfering with multimerization, and suggests that the C-terminal region is important for IN function.

[Bartlett (1998)] J. A. Bartlett, S. S. Wasserman, C. B. Hicks, R. T. Dodge, K. J. Weinhold, C. O. Tacket, N. Ketter, A. E. Wittek, T. J. Palker, & B. F. Haynes. Safety and immunogenicity of an HLA-based HIV envelope polyvalent synthetic peptide immunogen. *AIDS* **12**:1291–300, 1998. (Medline: 98372113).

[Beddows (1999)] S. Beddows, S. Lister, R. Cheingsong, C. Bruck, & J. Weber. Comparison of the antibody repertoire generated in healthy volunteers following immunization with a monomeric recombinant gp120 construct derived from a CCR5/CXCR4-using human immunodeficiency virus type 1 isolate with sera from naturally infected individuals. *J Virol* **73**:1740–5, 1999. (Medline: 99099077).

[Belshe (1998)] R. B. Belshe, G. J. Gorse, M. Mulligan, T. Evans, M. Keefer, J. Excler, A. Duliege, J. Tartaglia, W. Cox, J. McNamara, K. Hwang, A. Bradney, D. Montifiori, K. Weinhold, & N. A. V. E. Group. Induction of immune responses to HIV-1 canarypox virus ALVAC HIV-1 and gp120 SF-2 recombinant vaccines in uninfected volunteers. *AIDS* **12**:2407–2415, 1998. (Medline: 99090756).

[Benjouad (1993)] A. Benjouad, J.-C. Gluckman, L. Montagnier, & E. Bahraoui. Specificity of antibodies produced against native or desialylated human immunodeficiency virus type 1 recombinant gp160. *J Virol* **67**:1693–1697, 1993. (Medline: 93172394) Notes: MAbs raised against desialylated HIV-1 gp160 cross-react with HIV-2 gp140 due to the immunodominant epitope in gp41.

[Beretta & Dalgleish(1994)] A. Beretta & A. Dalgleish. B-cell epitopes. *AIDS* **8 (suppl 1)**:S133–S145, 1994.

[Beretta (1987)] A. Beretta, F. Grassi, M. Pelagi, A. Clivio, C. Parravicini, G. Giovinazzo, F. Andronico, L. Lopalco, P. Verani, S. Butto, F. Titti, G. B. Rossi, G. Viale, E. Ginelli, & A. G. Siccardi. HIV env Glycoprotein Shares a Cross-Reacting Epitope with a Surface Protein Present on Activated Human Monocytes and Involved in Antigen Presentation. *Eur J Immunol* **17**:1793–1798, 1987. (Medline: 88083077) Notes: The MAb M38 binds to gp120 and also to a human protein of 80 kd that is expressed on a small fraction of mononuclear cells in the lymph nodes. M38 inhibits proliferation in autologous tetanus toxoid presentation, so is involved in antigen presentation. Suggested molecular mimicry.

[Berman (1997)] P. W. Berman, A. M. Gray, T. Wrin, J. C. Vennari, D. J. Eastman, G. R. Nakamura, D. P. Francis, G. Gorse, & D. H. Schwartz. Genetic and immunologic characterization of viruses infecting MN-rgp120-vaccinated volunteers. *J Infect Dis* **176**:384–397, 1997. (Medline: 97379381).

[Berman (1991)] P. W. Berman, K. Rosenthal, G. Nakamura, L. Riddle, J. P. Porter, D. Dowbenko, M. Hobbes, R. Byrn, J. Groopman, T. Gregory, & B. Fendly. Monoclonal antibodies to gp160 of HIV-1 that neutralize HIV-1 infectivity, block the binding of gp120 to CD4, and react with diverse isolates. *J AIDS* **4**:306, 1991.

[Berthet-Colominas (1999)] C. Berthet-Colominas, S. Monaco, A. Novelli, G. Sibai, F. Mallet, & S. Cusack. Head-to-tail dimers and interdomain flexibility revealed by the crystal structure of HIV-1 capsid protein p24 complexed with a monoclonal Fab. *EMBO* **18**:1124–36, 1999. (Medline: 99164080).

[Binley (1999)] J. Binley, R. Sanders, B. Clas, N. Schuelke, A. Master, Y. Guo, F. Kajumo, D. Anselma, P. Maddon, W. Olson, & J. Moore. A Recombinant Human Immunodeficiency virus type 1 envelope glycoprotein complex stabilized by an intramolecular disulfide bond between the gp120 and gp41 subunits is an antigenic mimic of the trimeric virion associated structure. *J Virol* **74**:627–43, 1999. (Medline: 20091317).

[Binley (1997a)] J. M. Binley, H. Arshad, T. R. Fouts, & J. P. Moore. An investigation of the high avidity antibody response to gp120 of human immunodeficiency virus type 1. *AIDS Res and Human Retro* **13**:1007–1015, 1997a. (Medline: 97407538).

[Binley (1996)] J. M. Binley, H. J. Ditzel, C. F. Barbas III, N. Sullivan, J. Sodroski, P. W. H. I. Parren, & D. R. Burton. Human antibody responses to HIV type 1 glycoprotein 41 cloned in phage display libraries suggest three major epitopes are recognized and give evidence for conserved antibody motifs in antigen binding. *AIDS Res Hum Retroviruses* **12**:911–924, 1996. (Medline: 96392164) Notes: A panel of anti-gp41 human Fab fragments were generated by panning phage display antibody libraries prepared from HIV-1 positive donors with rgp41. Fabs tended to be directed against three epitopes, designated clusters I-III. None were neutralizing. A common CDR3 motif was found in several of the heavy chain sequences.

[Binley (1997b)] J. M. Binley, P. J. Klasse, Y. Cao, I. Jones, M. Markowitz, D. D. Ho, & J. P. Moore. Differential regulation of the antibody responses to Gag and Env proteins of human immunodeficiency virus type 1. *J Virol* **71**:2799–809, 1997b. (Medline: 97213946) Notes: Retention of anti-Env antibodies and loss of anti-Gag antibodies during progression was studied, and suggested to be the result of the loss of T-cell help and the ability of Env to stimulate B cells even with declining CD4 cells, because of Env‘s unique ability to bind to the CD4 molecule.

[Binley (1998)] J. M. Binley, R. Wyatt, E. Desjardins, P. D. Kwong, W. Hendrickson, J. P. Moore, & J. Sodroski. Analysis of the interaction of antibodies

with a conserved enzymatically deglycosylated core of the HIV type 1 Envelope glycoprotein 120. *AIDS Res Hum Retroviruses* **14**:191–8, 1998. (Medline: 98150872) Notes: This paper helped showed the biological relevance of a deglycosylated variable loop deleted form of the core gp120.

[Bizub-Bender (1994)] D. Bizub-Bender, J. Kulkosky, & A. M. Skalka. Monoclonal antibodies against HIV type 1 Integrase: clues to molecular structure. *AIDS Res Hum Retroviruses* **10**:1105–1115, 1994. (Medline: 95127293).

[Bjorling (1992)] E. Bjorling, L. Goobar-Larson, G. Utter, E. Norby, & F. Chiodi. Four distinct antigenic regions are present in the primary structure of HIV-1 and HIV-2 proteinases. *AIDS* **6**:157–163, 1992. (Medline: 92215472).

[Boe (1998)] S. O. Boe, B. Bjorndal, B. Rosok, A. M. Szilvay, & K. H. Kalland. Subcellular localization of human immunodeficiency virus type 1 RNAs, Rev, and the splicing factor SC-35. *Virology* **244**:473–82, 1998. (Medline: 98263821).

[Bolmstedt (1990)] A. Bolmstedt, S. Olofsson, E. Sjogren-Jansson, I. Sjoblom, L. Akerblom, J.-E. S. Hansen, & S.-L. Hu. Carbohydrate determinant NeuAc-Galβ(1-4) of N-linked glycans modulates the antigenic activity of human immunodeficiency virus type 1 glycoprotein gp120. *J Gen Virol* **73**:3009–3105, 1990. (Medline: 93107843).

[Bolmstedt (1996)] A. Bolmstedt, S. Sjolander, J. E. Hansen, L. Akerblom, A. Hemming, S. L. Hu, B. Morein, & S. Olofsson. Influence of N-linked glycans in V4-V5 region of human immunodeficiency virus type 1 glycoprotein gp160 on induction of a virus-neutralizing humoral response. *J AIDS Hum Retrovirol* **12**:213–220, 1996. (Medline: 96275629) Notes: Because N-linked glycans on viral glycoproteins can protect otherwise accessible neutralization epitopes of the viral envelope from neutralizing antibodies, the aim of this study was to explore the possibility of achieving a more broadly neutralizing immune response with a gp160 depleted of three N-linked glycans in the CD4-binding domain. Mutant and wild type gp160 were formulated into immunostimulating complexes (iscoms), and guinea pigs were vaccinated. Both preparations induced high serum antibody response to native gp120 and V3 peptides. The sera from animals immunized with the mutated glycoprotein lacking CD4 glycosylation sites did not neutralize nonrelated HIV strains better than did sera from animals immunized with wild type glycoprotein, but animals immunized with mutant gp160 neutralized mutant virus better than wild type virus, and vice versa.

[Boots (1997)] L. J. Boots, P. M. McKenna, B. A. Arnold, P. M. Keller, M. K. Gorny, S. Zolla-Pazner, J. E. Robinson, & A. J. Conley. Anti-human immunodeficiency virus type 1 human monoclonal antibodies that bind discontinuous epitopes in the viral glycoproteins can identify mimotopes from recombinant phage peptide display libraries. *AIDS Res Hum Retroviruses* **13**:1549–59, 1997. (Medline: 98090112).

[Bou-Habib (1994)] D. C. Bou-Habib, G. Roderiquez, T. Oravecz, P. W. Berman, P. Lusso, & M. A. Norcross. Cryptic nature of envelope V3 region epitopes protects primary monocytotropic human immunodeficiency virus type 1 from antibody neutralization. *J Virol* **68**:6006–6013, 1994. (Medline: 94335117) Notes: This paper shows that antibodies to the tip of the V3 loop fail to neutralize primary isolate JR-CSF, and that the V3 loop is far more accessible on the JR-CSF derived T-cell tropic strain T-CSF. Anti-V3 antibodies successfully neutralize T-CSF. Weak binding of anti-V3 antibodies to the primary isolate JR-CSF suggests the V3 loop is accessible only in a minor fraction of proteins.

[Boudet (1995)] F. Boudet, H. Keller, M. P. Kieny, & J. Theze. Single peptide and anti-idiotype based immunizations can broaden the antibody response against the variable V3 domain of HIV-1 in mice. *Mol Immunol* **32**:449–457, 1995. (Medline: 95303114) Notes: Given the high degree of sequence variability of the V3 loop, the humoral response to this region tends to be type specific. An anti-idiotypic antibody could broaden the anti-V3 antibody polyclonal response in BALB/c mice, relative to the original Ab used to generate the anti-idiotype response. A synthetic peptide derived from the V3 determinant of HIV-1 MN induced an antibody response to multiple HIV-1 strains, but the extent of this cross-reactivity was inversely correlated with the binding affinity to V3 MN peptide.

[Boudet (1991)] F. Boudet, J. Theze, & M. Zouali. UV-treated polystyrene microtitre plates for use in an ELISA to measure antibodies against synthetic peptides. *J Immunol Methods* **142**:73–82, 1991. (Medline: 1717595).

[Boudet (1994)] F. Boudet, J. Theze, & M. Zouali. Anti-Idiotypic Antibodies to the Third Variable Domain of gp120 Induce an Anti-HIV-1 Antibody Response in Mice. *Virology* **200**:176–188, 1994. (Medline: 94174715).

[Boyer (1991)] V. Boyer, H. Broly, S. Souche, P. Madaule, J. Rossier, D. Zagury, & C. Desgranges. Characterization and large production of human monoclonal antibodies against the HIV-1 envelope. *Clin Exp Immunol* **83**:452–459, 1991. (Medline: 91168433).

[Bradney (1999)] A. Bradney, S. Scheer, J. Crawford, S. Buchbinder, & D. Montifiori. Neutralization escape in human immunodeficiency virus type 1-infected long term non-progressors. *J Inf Dis* **179**:1264–7, 1999. (Medline: 99208712).

[Brand (1998)] D. Brand, F. Lemiale, I. Turbica, L. Buzelay, S. Brunet, & F. Barin. Comparative analysis of humoral immune responses to HIV type 1 envelope glycoproteins in mice immunized with a DNA vaccine, recombinant Semliki Forest virus RNA, or recombinant Semliki Forest virus particles. *AIDS Res Hum Retroviruses* **14**:1369–77, 1998. (Medline: 99002727).

[Bristow (1994)] R. G. W. Bristow, A. R. Douglas, J. J. Skehel, & R. S Daniels. Analysis of murine antibody responses to baculovirus-expressed human immunodeficiency virus type 1 envelope glycoproteins. *J Gen Virol* **75**:2089–2095, 1994. (Medline: 94322004) Notes: BALB/c mice were immunized with baculovirus expressed gp160 or gp120, and 15 MAbs were generated. No MAbs generated in this study neutralized reference strains, using a tetrazolium-based cytotoxicity assay to test for neutralization. Ten of the Mabs were mapped by peptide ELISA, and seven reacted with the C1 region, one with V2, one with V4, and one with the C-terminal end.

[Broder (1994)] C. Broder, P. Earl, D. Long, S. Abedon, B. Moss, & R. Doms. Antigenic implications of human immunodeficiency virus type 1 envelope quaternary structure: Oligomer-specific and -sensitive monoclonal antibodies. *Proc Natl Acad Sci USA* **91**:11699–11703, 1994. (Medline: 95062336) Notes: 35 anti-gp41 and 27 anti-gp120 murine MAbs generated by immunization with oligomeric HIV-1 IIIB envelope were studied. These MAbs tended to react with conformational epitopes. 21 of the anti-gp41 MAbs reacted preferentially with oligomeric env, while only 1 of the anti-gp120 MAbs reacted more strongly with the oligomer, and 14 of the anti-gp120 preferentially recognized monomeric env.

[Broliden (1990)] P. A. Broliden, K. Ljunggren, J. Hinkula, E. Norrby, L. Akerblom, & B. Wahren. A monoclonal antibody to human immunodeficiency virus type 1 which mediates cellular cytotoxicity and neutralization. *J Virol* **64**:936–940, 1990. (Medline: 90112670).

[Broliden (1991)] P. A. Broliden, B. Makitalo, L. Akerblom, J. Rosen, K. Broliden, G. Utter, M. Jondal, E. Norrby, & B. Wahren. Identification of amino acids in the V3 region of gp120 critical for virus neutralization by human HIV-1 specific antibodies. *Immunology* **73**:371–376, 1991. (Medline: 92010009).

[Broliden (1989)] P. A. Broliden, V. Moschese, K. Ljunggren, J. Rosen, C. Fundaro, A. Plebani, M. Jondal, & P. Rossi. Diagnostic implication of specific immunoglobulin G patterns of children born to HIV-1 infected mothers. *AIDS* **3**:577, 1989. (Medline: 90000745).

[Buchacher (1994)] A. Buchacher, R. Predl, K. Strutzenberger, W. Steinfellner, A. Trkola, M. Purtscher, G. Gruber, C. Tauer, F. Steindl, A. Jungbauer, & H. Katinger. Generation of human monoclonal antibodies against HIV-1 proteins; electrofusion and Epstein-Barr virus transformation for peripheral blood lymphocyte immortalization. *AIDS Res Hum Retroviruses* **10**:359–369, 1994. (Medline: 94347460) Notes: A panel of 33 human monoclonal antibodies were produced. Linear epitopes for some of this set of MAbs were mapped using peptide ELISA. Linear epitopes were mapped in gp41, and a single epitope was mapped in p24. While multiple gp120 specific MAbs were generated, all seemed to be conformational or carbohydrate dependent, or both.

[Buchacher (1992)] A. Buchacher, R. Predl, C. Tauer, M. Purtscher, G. Gruber, R. Heider, F. Steindl, A. Trkola, A. Jungbauer, & H. Katinger. Human monoclonal antibodies against gp41 and gp120 as potential agents for passive immunization. *Vaccines* **92**:191–195, 1992.

[Buchbinder (1992)] A. Buchbinder, S. Karwowska, M. K. Gorny, S. T. Burda, & S. Zolla-Pazner. Synergy Between Human Monoclonal Antibodies to HIV Extends Their Effective Biologic Activity Against Homologous and Divergent Strains. *AIDS Res Hum Retroviruses* **8**:425–427, 1992. (Medline: 93103824) Notes: The anti-gp120 V3 MAb 447-D and the anti- gp120 CD4 BS MAb 588-D showed synergistic neutralization.

[Bugge (1990)] T. H. Bugge, B. O. Lindhardt, L. L. Hansen, P. Kusk, E. Hulgaard, K. Holmback, P. J. Klasse, J. Zeuthen, & K. Ulrich. Analysis of a Highly Immunodominant Epitope in the Human Immunodeficiency Virus Type 1 Transmembrane Glycoprotein, gp41, Defined by a Human Monoclonal Antibody. *J Virol* **64**:4123–4129, 1990. (Medline: 90347803).

[Bukawa (1995)] H. Bukawa, K.-I. Sekigawa, K. Hamajima, J. Fukushima, Y. Yamada, H. Kiyono, & K. Okuda. Neutralization of HIV-1 by secretory IgA induced by oral immunization with a new macromolecular multicomponent peptide vaccine candidate. *Nature Med* **1**:681–685, 1995. (Medline: 96071531) Notes: This paper studies the anti-HIV-1 antibodies raised in response to a multicomponent peptide vaccine, given orally. It consisted of: V3 loop peptides based on sequences from cyclized B consensus sequence;

a PND common in Japan; IIIB PND; Thai B strains PND; a CD4 binding site peptide; and a Gag peptide, HPG30. BALB/c mice were immunized. Serum IgA and IgG and fecal IgA were detected. IgA from fecal samples was capable of neutralizing lab strains.

[Buratti (1997)] E. Buratti, S. G. Tisminetzky, P. D'Agaro, & F. E. Baralle. A neutralizing monoclonal antibody previously mapped exclusively on human immunodeficiency virus type 1 gp41 recognizes an epitope in p17 sharing the core sequence. *J Virol* **71**:2457–62, 1997. (Medline: 97184581).

[Burton (1991)] D. Burton, C. Barbas, M. Persson, S. Koenig, R. M. Chanock, & R. A. Lerner. A large array of human monoclonal antibodies to type 1 human immunodeficiency virus from combinatorial libraries of asymptomatic seropositive individuals. *Proc Natl Acad Sci USA* **88**:10134–10137, 1991. (Medline: 92052225) Notes: A panel of human monoclonal antibody Fab fragments was generated against the surface of the gp120 glycoprotein of HIV-1 by antigen selection from a random combinatorial library prepared from 5 ml of bone marrow from an asymptomatic individual who had been HIV-positive for 6 years. These Fab variable regions were sequenced and were found to be diverse. Binding constants were measured and the Fabs generally bound gp120 with high affinity. The methods used to obtain this panel could be used to obtain antibodies to test passive immunization as a therapy for AIDS.

[Burton & Montefiori(1997)] D. R. Burton & D. C. Montefiori. The antibody response in HIV-1 infection. *AIDS* **11 Suppl A**:S87–S98, 1997. (Medline: 98112351) Notes: An excellent review of Ab epitopes and the implications for Envelope structure, neutralization of HIV, the distinction between primary and TCLA strains, ADCC and its role in clearance, and the Ab response during the course of infection.

[Burton (1994)] D. R. Burton, J. Pyati, R. Koduri, S. J. Sharp, G. B. Thornton, P. W. Parren, L. S. Sawyer, R. M. Hendry, N. Dunlop, & P. L. Nara. Efficient neutralization of primary isolates of HIV-1 by a recombinant human monoclonal antibody. *Science* **266**:1024–1027, 1994. (Medline: 95063934) Notes: The MAb IgG1b12 showed very potent neutralization of a range of primary B subtype isolates. Binding with a variety of international isolates was tested; bound to most B isolates, 20% of A, C and Ds, but hardly reacted with E clade.

[Calarota (1996)] S. Calarota, M. Jansson, M. Levi, K. Broliden, O. Libonatti, H. Wigzell, & B. Wahren. Immunodominant glycoprotein 41 epitope identified by seroreactivity in HIV type 1-infected individuals. *AIDS Res Hum Retroviruses* **12**:705–713, 1996. (Medline: 96303589).

[Cao (1997)] J. Cao, N. Sullivan, E. Desjardin, C. Parolin, J. Robinson, R. Wyatt, & J. Sodroski. Replication and neutralization of human immunodeficiency virus type 1 lacking the V1 and V2 variable loops of the gp120 Envelope glycoprotein. *J Virol* pages 9808–12, 1997. (Medline: 98037702) Notes: An HIV-1 mutant lacking the V1-V2 loops can replicate in Jurkat cells and revertants that replicate with wild-type efficiency rapidly evolve in culture. These viruses exhibited increased neutralization susceptibility to V3 loop or CD4i MAbs, but not to sCD4 or anti-CD4BS MAbs. Thus the gp120 V1 and V2 loops protect HIV-1 from some subsets of neutralizing antibodies.

[Capon (89)] D. J. Capon, S. M. Chamow, J. Mordenti, S. A. Marsters, T. Gregory, H. Mitsuya, R. A. Byrn, C. Lucas, F. M. Wurm, J. E. Groopman, & et al. Designing CD4 immunoadhesins for AIDS therapy. *Nature* **337**:525–31, 89. (Medline: 89127515).

[Carlos (1999)] M. P. Carlos, Y. Yamamura, F. Diaz-Mitoma, & J. V. Torres. Antibodies from HIV-positive and AIDS patients bind to an HIV envelope multivalent vaccine. *J Acquir Immune Defic Syndr* **22**:317–24, 1999. (Medline: 20097658).

[Cavacini (1993a)] L. A. Cavacini, C. L. Emes, J. Power, A. Buchbinder, S. Zolla-Pazner, & M. R. Posner. Human monoclonal antibodies to the V3 loop of HIV-1 gp120 mediate variable and distinct effects on binding and viral neutralization by a human monoclonal antibody to the CD4 binding site. *J AIDS* **6**:353–358, 1993a. (Medline: 93204013).

[Cavacini (1995)] L. A. Cavacini, C. L. Emes, J. Power, F. D. Desharnais, M. Duval, D. Montefiori, & M. R. Posner. Influence of heavy chain constant regions on antigen binding and HIV-1 neutralization by a human monoclonal antibody. *J Immunol* **155**:3638–3644, 1995. (Medline: 96016013) Notes: By changing the IgG1 constant region of MAb F105 from $IgG_1\kappa$ to $IgG_3\kappa$, dramatic strain specific increases in neutralization efficiency were obtained.

[Cavacini (1994a)] L. A. Cavacini, C. L. Emes, J. Power, M. Duval, & M. R. Posner. Effect of antibody valency on interaction with cell-surface expressed HIV-1 and viral neutralization. *J Immunol* **152**:2538–2545, 1994a. (Medline: 94179837).

[Cavacini (1993b)] L. A. Cavacini, C. L. Emes, J. Power, J. Underdalh, R. Goldstein, K. Mayer, & M. R. Posner. Loss of serum antibodies to a conformational epitope of HIV-1/gp120 identified by a human monoclonal antibody is associated with disease progression. *J AIDS* **6**:1093–1102, 1993b. (Medline: 94015913) Notes: Serum from 100% of asymptomatic HIV-positive people blocked F105 binding, while serum samples from 27% of ARC/AIDS patients blocked F105 binding.

[Cavacini (1998a)] L. A. Cavacini, C. L. Emes, A. V. Wisnewski, J. Power, G. Lewis, D. Montefiori, & M. R. Posner. Functional and molecular characterization of human monoclonal antibody. *AIDS Res Hum Retroviruses* **14**:1271–80, 1998a. (Medline: 98435940).

[Cavacini (1994b)] L. A. Cavacini, J. Power, C. L. Emes, K. Mace, G. Treacy, & M. R. Posner. Plasma pharmacokinetics and biological activity of a human immunodeficiency virus type 1 neutralizing human monoclonal antibody, F105, in cynomolgus monkeys. *Tumor Immunol* **15**:251–256, 1994b. (Medline: 94340180) Notes: MAb F105 was administered intravenously to four cynomolgus monkeys. At 15 days post-dose, total serum F105 was 230 +/- 79 μg/ml and F105 was immunoreactive with cells infected with the MN and IIIB strains of HIV-1 as determined by flow cytometry.

[Cavacini (1998b)] L. A. Cavacini, M. H. Samore, J. Gambertoglio, B. Jackson, M. Duval, A. Wisnewski, S. Hammer, C. Koziel, C. Trapnell, & M. R. Posner. Phase I study of a human monoclonal antibody directed against the CD4-. *AIDS Res Hum Retroviruses* **14**:545–50, 1998b. (Medline: 98252382) Notes: In an immunotherapeutic study, administration of a single dose of F105 was non-toxic and the Ab persisted, yet no benefit was observed in 4 individuals. The authors suggest it may be more helpful in other settings, for example, patients with no pre-existing anti-CD4 BS Abs, or in combination with other MAbs.

[Cavacini (1999)] L. A. Cavacini, A. Wisnewski, J. E. Peterson, D. Montefiori, C. Emes, M. Duval, G. Kingsbury, A. Wang, D. Scadden, & M. R. Posner. A human anti-HIV autoantibody enhances EBV transformation and HIV. *Clin Immunol* **93**:263–73, 1999. (Medline: 20071224).

[Chang (1998)] A. H. Chang, J. A. Hoxie, S. Cassol, M. O'Shaughnessy, & F. Jirik. Construction of single-chain antibodies that bind an overlapping epitope of HIV-1 Nef. *FEBS Lett* **441**:307–12, 1998. (Medline: 99098374).

[Chanh (1987)] T. C. Chanh, G. R. Dreesman, & R. C. Kennedy. Monoclonal anti-idiotypic antibody mimics the CD4 receptor and binds human immunodeficiency virus. *Proc Natl Acad Sci USA* **84**:3891–3895, 1987. (Medline: 87231923).

[Chanh (1986)] T. C. Chanh, R. C. Kennedy, B. E. Alderete, P. Kanda, J. W. Eichberg, & G. R. Dreesman. Human immunodeficiency virus gp120 glycoprotein detected by a monoclonal antibody to a synthetic peptide. *Eur J Immunol* **16**:1465–1468, 1986. (Medline: 87054226).

[Chen (1995)] C. H. Chen, T. J. Matthews, C. B. McDanal, D. P. Bolognesi, & M. L. Greenberg. A molecular clasp in the human immunodeficiency virus (HIV) type 1 TM protein determines the anti-HIV activity of gp41 derivatives: implication for viral fusion. *J Virol* **69**:3771–3777, 1995. (Medline: 95264470).

[Chen (1996)] J. D. Chen, Q. Yang, W. A. Marasco, & S. Y. Chen. Intra- and extra-cellular immunization against HIV-1 infection with lymphocytes transduced with an AAV vector expressing a human anti-gp120 antibody. *Hum Gene Ther* **7**:1515–1525, 1996. (Medline: 97018136).

[Chen (1994a)] S. Y. Chen, Y. Khouri, J. Bagley, & W. A. Marasco. Combined intra- and extracellular immunization against human immunodeficiency virus type 1 infection with a human anti-gp120 antibody. *Proc Natl Acad Sci USA* **91**:5932–5936, 1994a. (Medline: 94286552).

[Chen (1994b)] Y.-H. Chen, A. Susanna, G. Bock, F. Steindl, H. Katinger, & M. P. Dierich. HIV-1 gp41 shares a common immunologic determinant with human T, B and monocyte cell lines. *Immunol Letters* **39**:219–222, 1994b. (Medline: 94307758) Notes: The MAb 3D6 binds to HIV gp41, and to a 43 kd protein found in human T, B and monocyte cell lines. The authors suggest the possibility of molecular mimicry.

[Chesebro & Wehrly(1988)] B. Chesebro & K. Wehrly. Development of a Sensitive Quantitative Focal Assay for Human Immunodeficiency Virus Infectivity. *J Virol* **62**:3779–3788, 1988. (Medline: 88333153).

[Chesebro (1992)] B. Chesebro, K. Wehrly, J. Nishio, & S. Perryman. Macrophage-tropic human immunodeficiency virus isolates from different patients exhibit unusual V3 envelope sequence homogeneity in comparison with T-cell-tropic isolates: definition of critical amino acids involved in cell tropism. *J Virol* **66**:6547–54, 1992. (Medline: 93021382).

[Chiba (1997)] J. Chiba, M. Nakano, Y. Suzuki, K. Aoyama, H. Ohba, T. Kobayashi, A. Yasuda, A. Kojima, & T. Kurata. Generation of neutralizing

antibody to the reverse transcriptase of human immunodeficiency virus type 1 by immunizing of mice with an infectious vaccinia virus recombinant. *J Immunol Methods* **207**:53–60, 1997. (Medline: 97469114).

[Chin (1995)] L.-T. Chin, A.-C. Malmborg, K. Kristensson, J. Hinkula, B. Wahren, & C. A. K. Borrebaeck. Mimicking the humoral immune response in vitro results in antigen-specific isotype switching supported by specific autologous T helper cells: generation of human HIV-1-neutralizing IgG monoclonal antibodies from naive donors. *Eur J Immunol* **25**:657–663, 1995. (Medline: 95220411).

[Cleveland (2000a)] S. M. Cleveland, E. Buratti, T. D. Jones, P. North, F. Baralle, L. McLain, T. McInerney, Z. Durrani, & N. J. Dimmock. Immunogenic and antigenic dominance of a nonneutralizing epitope over a highly conserved neutralizing epitope in the gp41 envelope glycoprotein of human immunodeficiency virus type 1: its deletion leads to a strong neutralizing response. *Virology* **266**:66–78, 2000a. (Medline: 20080974).

[Cleveland (2000b)] S. M. Cleveland, T. D. Jones, & N. J. Dimmock. Properties of a neutralizing antibody that recognizes a conformational form of epitope ERDRD in the gp41 C-terminal tail of human immunodeficiency virus type 1. *J Gen Virol* **81 Pt 5**:1251–60, 2000b. (Medline: 20231935).

[Collado (2000)] M. Collado, D. Rodriguez, J. R. Rodriguez, I. Vazquez, R. M. Gonzalo, & M. Esteban. Chimeras between the human immunodeficiency virus (HIV-1) Env and vaccinia virus immunogenic proteins p14 and p39 generate in mice broadly reactive antibodies and specific activation of CD8+ T cell responses to Env. *Vaccine* **18**:3123–33, 2000. (Medline: 20316327).

[Conley (1994a)] A. J. Conley, M. K. Gorny, J. A. Kessler II, L. J. Boots, M. Ossorio-Castro, S. Koenig, D. W. Lineberger, E. A. Emini, C. Williams, & S. Zolla-Pazner. Neutralization of primary human immunodeficiency virus type 1 isolates by the broadly reactive anti-V3 monoclonal antibody 447-52D. *J Virol* **68**:6994–7000, 1994a. (Medline: 95018607).

[Conley (1996)] A. J. Conley, J. A. Kessler II, L. J. Boots, P. M. McKenna, W. A. Schleif, E. A. Emini, G. E. Mark III, H. Katinger, E. K. Cobb, S. M. Lunceford, S. R. Rouse, & K. K. Murthy. The consequence of passive administration of an anti-human immunodeficiency virus type 1 neutralizing monoclonal antibody before challenge of chimpanzees with a primary virus isolate. *J Virol* **70**:6751–6758, 1996. (Medline: 96386562) Notes: The MAb 2F5 was infused into two chimpanzees which were then given an intravenous challenge with a primary HIV-1 isolate – both became infected, but with delayed detection and prolonged decrease in viral load relative to controls, indicating that preexisting, neutralizing antibodies (passively administered or actively elicited) affect the course of acute-phase virus replication and can be influential after the Ab can no longer be detected in the peripheral circulation.

[Conley (1994b)] A. J. Conley, J. A. Kessler II, L. J. Boots, J.-S. Tung, B. A. Arnold, P. M. Keller, A. R. Shaw, & E. A. Emini. Neutralization of divergent human immunodeficiency virus type 1 variants and primary isolates by IAM-41-2F5, and anti-gp41 human monoclonal antibody. *Proc Natl Acad Sci USA* **91**:3348–3352, 1994b. (Medline: 94211861) Notes: 2F5 is capable of neutralizing a broad range of primary isolates and lab strains. Susceptibility to neutralization was dependent on presence of a conserved antibody binding site. Kinetic studies were done, and 2F5 has a very long $t_1/2$ of dissociation, 156 minutes for gp41. The authors point out that LDKW core is present in highly diverged international isolates.

[Connelly (1994)] R. J. Connelly, M. Kahn, J. Blake, O. K. Haffar, & E. K. Thomas. Dual specificity of a monoclonal anti-idiotypic antibody for HIV-1 neutralizing monoclonals 110.3 and 110.4 as well as the V3 loop of gp120. *Virology* **205**:554–557, 1994. (Medline: 95065703).

[Connor (1998)] R. I. Connor, B. T. Korber, B. S. Graham, B. H. Hahn, D. D. Ho, B. D. Walker, A. U. Neumann, S. H. Vermund, J. Mestecky, S. Jackson, E. Fenamore, Y. Cao, F. Gao, S. Kalams, K. J. Kunstman, D. McDonald, N. McWilliams, A. Trkola, J. P. Moore, & S. M. Wolinsky. Immunological and virological analyses of persons infected by human immunodeficiency virus type 1 while participating in trials of recombinant gp120 subunit vaccines. *J Virol* **72**:1552–76, 1998. (Medline: 98105804) Notes: No gp120-vaccine induced antibodies in a human trial of gp120 MN and SF2 could neutralize the primary viruses that infected the vaccinees. The primary isolates from the infected vaccinees were shown not to be particularly refractive to neutralization by their susceptibility to a panel of neutralizing MAbs.

[Cook (1994)] D. G. Cook, J. Fantini, S. L. Spitalnik, & F. Gonzalez-Scarano. Binding of human immunodeficiency virus type 1 HIV-1 gp120 to Galactosylceramide (GalCer): relationship to the V3 loop. *Virol* **201**:206–214, 1994. (Medline: 94240806) Notes: Antibodies against GalCer can block infection of CD4-negative cells from the brain and colon that are susceptible to HIV infection. This paper explores the ability of a panel of MAbs to inhibit

binding of gp120 to GalCer, and also of the binding of GalCer to inhibit MAb-gp120 interaction. MAbs to the V3 loop and GalCer showed mutual inhibition of binding to gp120, and anti-CD4 binding site MAbs showed reduced inhibition. N- and C-terminal MAbs didn't influence GalCer binding.

[Cordell (1991)] J. Cordell, J. P. Moore, C. J. Dean, P. J. Klasse, R. A. Weiss, & J. A. McKeating. Rat monoclonal antibodies to nonoverlapping epitopes of human immunodeficiency virus type I gp120 block CD4 binding in vitro. *Virology* **185**:72–79, 1991. (Medline: 92024127).

[Cotropia (1996)] J. Cotropia, K. E. Ugen, S. Kliks, K. Broliden, P.-A. Broliden, J. A. Hoxie, V. Srikantan, W. V. Williams, & D. B. Weiner. A Human Monoclonal Antibody to HIV-1 gp41 with Neutralizing Activity Against Diverse Laboratory Isolates. *J AIDS* **12**:221–232, 1996. (Medline: 96275630).

[Cotropia (1992)] J. Cotropia, K. E. Ugen, D. Lambert, K. Ljunggren-Broliden, S. Kliks, J. Hoxie, & D. B. Weiner. Characterization of Human Monoclonal Antibodies to the HIV-1 Transmembrane gp41 Protein. *Vaccines 92* pages 157–163, 1992. Notes: Editors: F. Brown, H. S. Ginsberg and R. Lerner, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY.

[Croix (1993)] D. A. Croix, H. Y. Yeh, J. Sedlacek, R. B. Luftig, & P. D. Gottlieb. A dominant epitope of HIV-1 protease recognized by hamster monoclonal antibodies. *J AIDS* **6**:558–566, 1993. (Medline: 93267390).

[Cruikshank (1997)] W. W. Cruikshank, S. R. Doctrow, M. S. Falvo, K. Huffman, J. Maciaszek, G. Viglianti, J. Raina, H. Kornfeld, & B. Malfroy. A lipidated anti-Tat antibody enters living cells and blocks HIV-1 viral replication. *J Acquir Immune Defic Syndr Hum Retrovirol* **14**:193–203, 1997. (Medline: 97232374) Notes: A technique was developed to lipidate antibodies and allow intracellular delivery; lipidated anti-Tat inhibited viral replication of several HIV-1 isolates by approximately 85% as shown by increased viability of infected cells and decreased reverse transcriptase activity.

[Dalgleish (1988)] A. G. Dalgleish, T. C. Chanh, R. C. Kennedy, P. Kanda, P. R. Clapham, & R. A. Weiss. Neutralization of Diverse HIV-1 Strains by Monoclonal Antibodies Raised against a gp41 Synthetic Peptide. *Virology* **165**:209–215, 1988. (Medline: 88265860).

[De Santis (1991)] R. De Santis, A. Anastasi, S. Marcolini, G. Valesini, M. Pezzella, N. Vonesch, E. Sturchio, & A. Mele. Production of a Nef-specific monoclonal antibody by the use of a synthetic peptide. *AIDS Res and Human Retroviruses* **7(3)**:315–21, 1991. (Medline: 91291502).

[del Real (1999)] G. del Real, M. Llorente, P. Lucas, L. Kremer, J. L. Toran, & M.-A. C. Antibody repertoire against HIV-1 gp120 triggered in nude and normal mice by GM-CSF/gp120 immunization. *Mol Immunol* **36**:721–31, 1999. (Medline: 20059084).

[Denisova (1996)] G. Denisova, B. Stern, D. Raviv, J. Zwickel, N. I. Smorodinsky, & J. M. Gershoni. Humoral immune response to immunocomplexed HIV envelope glycoprotein 120. *AIDS Res Hum Retroviruses* **12**:901–909, 1996. (Medline: 96392163) Notes: Mice were injected with the gp120 in different configurations: free, complexed with CD4, and as an immunocomplex bound to a V3 loop MAb (M77) of the protein. Polyclonal sera, as well as monoclonal antibodies produced in each case, were analyzed. The free gp120 and gp120-CD4 complex immunogens stimulated responses were directed mainly toward conformational epitopes, but gp120 immunocomplexed with MAb M77 also produced numerous and varied MAbs directed toward linear epitopes that were presumably inaccessible on the gp120, gp120-CD4 proteins.

[Denisova (1995)] G. Denisova, J. Zwickel, & J. M. Gershoni. Binding of HIV-1 gp120 to an anti-V3 loop antibody reveals novel antigen-induced epitopes. *FASEB J* **9**:127–132, 1995. (Medline: 95121798) Notes: This paper describes the characterization of five antibodies that bind M77-epitopes that are only revealed upon M77-gp120 interaction.

[Denisova (2000)] G. F. Denisova, M. Zerwanitzer, D. A. Denisov, E. Spectorman, I. Mondor, Q. Sattentau, & J. M. Gershoni. Expansion of epitope cross-reactivity by anti-idiotype modulation of the primary humoral response. *Mol Immunol* **37**:53–8, 2000. (Medline: 20245598).

[DeSantis (1994)] C. DeSantis, L. Lopalco, P. Robbioni, R. Longhi, G. Rappocciolo, A. G. Siccardi, & A. Beretta. Human Antibodies to Immunodominant C5 Region of HIV-1 gp120 Cross-React with HLA Class I on Activated Cells. *AIDS Res Hum Retroviruses* **10**:157–162, 1994. (Medline: 94257320).

[DeVico (1991)] A. L. DeVico, T. D. Copeland, S. Oroszlan, R. C. Gallo, & M. G. Sarngadharan. Interaction of C-terminal sequences of human immunodeficiency virus reverse transcriptase with template primer. *J Biol Chem* **266**:6774–6779, 1991. (Medline: 91201318).

[Devico (1995)] A. L. Devico, R. Rahman, J. Welch, R. Crowley, P. Lusso, M. G. Sarngadharan, & R. Pal. Monoclonal antibodies raised against covalently crosslinked complexes of human immunodeficiency virus type 1

gp120 and CD4 receptor identify a novel complex-dependent epitope on gp120. *Virology* **211**:583–588, 1995. (Medline: 95373192) Notes: To explore the immunogenicity of regions of gp120 that are exposed due to conformational changes in gp120 upon CD4 binding, CD4 was covalently linked to gp120 and this complex was used as an immunogen for BALB/c mice. Two MAbs were produced, both of which bind preferentially to the gp120-CD4 complex, and are conformational. Competition assays indicate these MAbs bind to epitopes that are recognized by sera from HIV-1 infected humans.

[di Marzo Veronese (1986)] F. di Marzo Veronese, T. D. Copeland, A. L. DeVico, R. Rahman, S. Oroszlan, R. C. Gallo, & M. G. Sarngadharan. Characterization of highly immunogenic p66/p51 as the reverse transcriptase of HTLV-III/LAV. *Science* **231**:1289–1291, 1986. (Medline: 86122937) Notes: This study identified the 66 and 51 kilodaltons bands in western blots as RT. Enzymatic activity was shown, and the protein was defined by Edmund N-terminal degradation and comparison to HIV-1 pol nucleotide translation. A mouse hybridoma was generated that inhibited enzyme activity.

[di Marzo Veronese (1992)] F. di Marzo Veronese, R. Rahman, R. Pal, C. Boyer, J. Romano, V. S. Kalyanaraman, B. C. Nair, R. C. Gallo, & M. G. Sarngadharan. Delineation of immunoreactive, conserved regions in the external envelope glycoprotein of the human immunodeficiency virus type 1. *AIDS Res Hum Retroviruses* **8**:1125–1132, 1992. (Medline: 92368730).

[di Marzo Veronese (1993)] F. di Marzo Veronese, M. S. Reitz and, G. Gupta, M. Robert-Guroff, C. Boyer-Thompson, A. Louie, R. C. Gallo, & P. Lusso. Loss of a neutralizing epitope by a spontaneous point mutation in the V3 loop of HIV-1 isolated from an infected laboratory worker. *J Biol Chem* **268**:25894–25901, 1993. (Medline: 94064668) Notes: The MAb M77 cannot neutralize a virus isolated from a IIIB infected lab-worker that has a single point mutation in the defined linear epitope. M77 cannot bind to the mutant native gp120, but can bind to a peptide that carries the substitution.

[di Marzo Veronese (1985)] F. di Marzo Veronese, M. G. Sarngadharan, R. Rahman, P. D. Markham, M. Popovic, A. J. Bodner, & R. C. Gallo. Monoclonal antibodies specific for p24, the major core protein of human T-cell leukemia virus type III. *Proc Natl Acad Sci USA* **82**:5199–5202, 1985. (Medline: 85270492).

[Dickey (2000)] C. Dickey, U. Ziegner, M. G. Agadjanyan, V. Srikantan, Y. Refaeli, A. Prabhu, A. Sato, W. V. Williams, D. B. Weiner, & K. E. Ugen. Murine monoclonal antibodies biologically active against the amino region of HIV-1 gp120: isolation and characterization. *DNA Cell Biol* **19**:243–52, 2000. (Medline: 20256306).

[Dingwall (1989)] C. Dingwall, I. Ernberg, M. J. Gait, S. M. Green, S. Heaphy, J. Karn, A. D. Lowe, M. Singh, M. A. Skinner, & R. Valerio. Human immunodeficiency virus 1 tat protein binds trans-activation-responsive region (TAR) RNA in vitro. *Proc Natl Acad Sci USA* **86**:6925–6929, 1989. (Medline: 89386652).

[Ditzel (1995)] H. J. Ditzel, J. M. Binley, J. P. Moore, J. Sodroski, N. Sullivan, L. S. W. Sawyer, R. M. Hendry, W.-P. Yang, C. F. Barbas III, & D. R. Burton. Neutralizing recombinant human antibodies to a conformational V2- and CD4-binding site-sensitive epitope of HIV-1 gp120 isolated by using an epitope-masking procedure. *J Immunol* **154**:893–906, 1995. (Medline: 95114416) Notes: A panel of Fabs was obtained from a library prepared from the bone marrow of a long-term asymptomatic HIV-1 seropositive male donor. Four Fabs recognize the CD4BS. An additional four Fabs were retrieved after epitope masking gp120 with the CD4BS Fabs at the screening stage. 3/4 of these Fabs bind to a V2 dependent conformational epitope.

[Ditzel (1997)] H. J. Ditzel, P. W. Parren, J. M. Binley, J. Sodroski, J. P. Moore, C. F. B. 3rd, & D. R. Burton. Mapping the protein surface of human immunodeficiency virus type 1 gp120 using human monoclonal antibodies from phage display libraries. *J Mol Biol* **267**:684–95, 1997. (Medline: 97272001) Notes: (Genbank: U82767 U82768 U82769 U82770 U82771 U82772 U82942 U82943 U82944 U82945 U82946 U82947 U82948 U82949 U82950 U82951 U82952 U82961 U82962) Recombinant monoclonal antibodies from phage display libraries provide a method for Env surface epitope mapping. Diverse epitopes are accessed by presenting gp120 to the library in different forms, such as sequential masking of epitopes with existing MAbs or sCD4 prior to selection or by selection on peptides. Fabs identified by these methods have specificities associated with epitopes presented poorly on native multimeric envelope.

[Dowbenko (1988)] D. Dowbenko, G. Nakamura, C. Fennie, C. Shimasaki, L. Riddle, R. Harris, T. Gregory, & L. Lasky. Epitope mapping of the immunodeficiency virus type 1 gp120 with monoclonal antibodies. *J Virol* **62**:4703–4711, 1988. (Medline: 89037359).

[D'Souza (1991)] M. P. D'Souza, P. Durda, C. V. Hanson, G. Milman, & C. Investigators. Evaluation of monoclonal antibodies to HIV-1 by neutralization

and serological assays: an international collaboration. *AIDS* **5**:1061–1070, 1991. (Medline: 92029721).

[D'Souza (1994)] M. P. D'Souza, S. J. Geyer, C. V. Hanson, R. M. Hendry, G. Milman, & C. Investigators. Evaluation of monoclonal antibodies to HIV-1 envelope by neutralization and binding assays: an international collaboration. *AIDS* **8**:169–181, 1994. (Medline: 94318200).

[D'Souza (1995)] M. P. D'Souza, G. Milman, J. A. Bradac, D. McPhee, C. V. Hanson, & R. M. Hendry. Neutralization of primary HIV-1 isolates by anti-envelope monoclonal antibodies. *AIDS* **9**:867–874, 1995. (Medline: 96014959) Notes: Eleven labs tested the 6 human MAbs 1125H, TH9, 4.8D, 257-D-IV, TH1, 2F5, and also HIVIG for neutralization of MN, JRCSF, the two B clade primary isolates 301657 and THA/92/026, and the D clade isolate UG/92/21. 2F5 was the most broadly neutralizing, better than HIVIG. The other MAbs showed limited neutralization of only MN (anti-CD4BS MAbs 1125H, TH9, and 4.8D), or MN and JRCSF (anti-V3 MAbs 257-D-IV and TH1).

[D'Souza (1997)] P. D'Souza, D. Livnat, J. A. Bradac, S. H. Bridges and the AIDS Clinical Trials Group Antibody Selection Working Group, & C. Investigators. Evaluation of monoclonal antibodies to human immunodeficiency virus type 1 primary isolates by neutralization assays: performance criteria for selecting candidate antibodies for clinical trials. *J Infect Dis* **175**:1056–1062, 1997. (Medline: 97275172) Notes: Five laboratories evaluated neutralization of nine primary B clade isolates by a coded panel of seven human MAbs to HIV-1 subtype B envelope. IgG1b12, 2G12, 2F5 showed potent and broadly cross-reactive neutralizing ability; F105, 447/52-D, 729-D, 19b did not neutralize the primary isolates.

[Duarte (1994)] C. A. Duarte, M. Montero, A. Seralena, R. Valdes, V. Jimenez, J. Benitez, E. Narciandi, J. Madrazo, G. Padron, G. Sanchez, G. Gilljam, K. Persson, S. Ojeda, A. Caballero, A. Miranda, M. C. Dominguez, B. Wahren, & A. Menendez. Multiepitope polypeptide of the HIV-1 envelope induces neutralizing monoclonal antibodies against V3 loop. *AIDS Res Hum Retroviruses* **10**:235–243, 1994. (Medline: 94289061).

[Durda (1990)] P. J. Durda, L. Bacheler, P. Clapham, A. M. Jenoski, B. Leece, T. J. Matthews, A. McKnight, R. Pomerantz, M. Rayner, & K. J. Weinhold. HIV-1 neutralizing monoclonal antibodies induced by a synthetic peptide. *AIDS Res Hum Retroviruses* **6**:1115, 1990. (Medline: 91090986).

[Durda (1988)] P. J. Durda, B. Leece, A. M. Jenoski, H. Rabin, A. Fisher, R. Gallo, & F. Wong-Staal. Characterization of murine monoclonal antibodies to HIV-1 induced by synthetic peptides. *AIDS Res Hum Retroviruses* **4**:331–342, 1988. (Medline: 89062029).

[Durrani (1998)] Z. Durrani, T. L. McInerney, L. McLain, T. Jones, T. Bellaby, F. R. Brennan, & N. J. Dimmock. Intranasal immunization with a plant virus expressing a peptide from HIV-1 gp41 stimulates better mucosal and systemic HIV-1-specific IgA and IgG than oral immunization. *J Immunol Methods* **220**:93–103, 1998. (Medline: 99053665).

[Earl (1997)] P. L. Earl, C. C. Broder, R. W. Doms, & B. Moss. Epitope map of human immunodeficiency virus type 1 gp41 derived from 47 monoclonal antibodies produced by immunization with oligomeric envelope protein. *J Virol* **71**:2674–84, 1997. (Medline: 97213931).

[Earl (1994)] P. L. Earl, C. C. Broder, D. Long, S. A. Lee, J. Peterson, S. Chakrabarti, R. W. Doms, & B. Moss. Native oligomeric human immunodeficiency virus type 1 Envelope glycoprotein elicits diverse monoclonal antibody reactivities. *J Virol* **68**:3015–3026, 1994. (Medline: 94202289) Notes: In a study of the repertoire of response to oligomeric versus monomeric Env protein, 138 murine MAbs were generated in response to an immunogen that was a gp120/bp41 oligomeric molecule that was not cleaved due to a mutation in the cleavage site. The oligomeric molecule was found to elicit a response that was very different than the monomer. Most MAbs were conformational, many were to gp41 or if in gp120, to the CD4 BS. Few MAbs to linear V3 epitopes were produced in response to oligomeric protein, though this was a common specificity in response to immunization with gp120 monomeric protein.

[Eaton (1994)] A. M. Eaton, K. E. Ugen, D. B. Weiner, T. Wildes, & J. A. Levy. An Anti-gp41 Human Monoclonal Antibody That Enhances HIV-1 Infection in the Absence of Complement. *AIDS Res Hum Retroviruses* **10**:13–18, 1994. (Medline: 94235368).

[Eddleston (1993)] M. Eddleston, J. C. de la Torre, J.-Y. Xu, N. Dorfman, A. Notkins, S. Zolla-Pazner, & M. B. A. Oldstone. Molecular Mimicry Accompanying HIV-1 Infection: Human Monoclonal Antibodies That Bind to gp41 and to Astrocytes. *AIDS Res Hum Retroviruses* **10**:939–944, 1993. (Medline: 94107594) Notes: In this paper, three anti-HIV-1 gp41 specific MAbs were found to react with astrocytes: 98-6, 167-7 and 15G1. Reactive astrocytes in the hippocampus were most prominently involved, and the

antibodies stained no other cell type in the brain, kidney or liver. All three mapped to a conformationally dependent epitope between aa 644-663.

[Ehrhard (1996)] B. Ehrhard, R. Misselwitz, K. Welfle, G. Hausdorf, R. W. Glaser, J. Schneider-Mergener, & H. Welfle. Chemical modification of recombinant HIV-1 capsid protein p24 leads to the release of a hidden epitope prior to changes of the overall folding of the protein. *Biochemistry* **35**:9097–9105, 1996. (Medline: 96291251).

[Emini (1992)] E. A. Emini, W. A. Schleif, J. H. Nunberg, A. J. Conley, Y. Eda, S. Tokiyoshi, S. D. Putney, S. Matsushita, K. E. Cobb, C. M. Jett, J. W. Eichberg, & K. K. Murthy. Prevention of HIV-1 infection in chimpanzees by gp120 V3 domain-specific monoclonal antibody. *Nature* **355**:728–730, 1992. (Medline: 92158079).

[Ernst (1998)] W. Ernst, R. Grabherr, D. Wegner, N. Borth, A. Grassauer, & H. Katinger. Baculovirus surface display: construction and screening of a eukaryotic epitope library. *Nucleic Acids Res* **26**:1718–23, 1998. (Medline: 98181076).

[Evans (1989)] D. J. Evans, J. McKeating, J. M. Meredith, K. L. Burke, K. Katrak, A. John, M. Ferguson, P. D. Minor, R. A. Weiss, & J. W. Almond. An engineered poliovirus chimera elicits broadly reactive HIV-1 neutralizing antibodies. *Nature* **339**:385–388, 1989. (Medline: 89262052).

[Faiman & Horovitz(1997)] G. A. Faiman & A. Horovitz. Thermodynamic analysis of the interaction between the 0.5beta Fv fragment and the RP135 peptide antigen derived from the V3 loop of HIV- 1 gp120. *J Biol Chem* **272**:31407–11, 1997. (Medline: 98058925).

[Felgenhauer (1990)] M. Felgenhauer, J. Kohl, & F. Ruker. Nucleotide sequence of the cDNA encoding the V-regions of the H- and L-chains of a human monoclonal antibody specific to HIV-1 gp41. *Nucl Acids Res* **18**:4927, 1990. (Medline: 90370490).

[Ferns (1989)] R. B. Ferns, J. C. Partridge, R. P. Spence, N. Hunt, & R. S. Tedder. Epitope location of 13 anti-gag HIV-1 monoclonal antibodies using oligopeptides and their cross-reactivity with HIV-2. *AIDS* **3**:829–834, 1989. (Medline: 90211679).

[Ferns (1991)] R. B. Ferns, J. C. Partridge, M. Tisdale, N. Hunt, & R. S. Tedder. Monoclonal antibodies define linear and conformational epitopes of HIV-1 pol gene products. *AIDS Res Hum Retroviruses* **7**:307–313, 1991. (Medline: 91291501) Notes: 21 anti-RT MAbs were raised and characterized – three narrowly defined linear epitopes were mapped. The three linear and selected conformational MAbs are included in the database.

[Ferns (1987)] R. B. Ferns, R. S. Tedder, & R. A. Weiss. Characterization of monoclonal antibodies against the human immunodeficiency virus gag products and their use in monitoring HIV isolate variation. *J Gen Virol* **68**:1543–1551, 1987. (Medline: 87224802).

[Fevrier (1995)] M. Fevrier, F. Boudet, A. Deslandres, & J. Theze. Two new human monoclonal antibodies against HIV type 1 glycoprotein 120: characterization and neutralizing activities against HIV type 1 strains. *AIDS Res Hum Retroviruses* **11**:491–500, 1995. (Medline: 95358909).

[Fontenot (1995)] J. D. Fontenot, T. C. VanCott, B. S. Parekh, C. P. Pau, J. R. George, D. L. Birx, S. Zolla-Pazner, M. K. Gorny, & J. M. Gatewood. Presentation of HIV V3 loop epitopes for enhanced antigenicity, immunogenicity and diagnostic potential. *AIDS* **9**:1121–1129, 1995. (Medline: 96098127).

[Forthal (1995)] D. N. Forthal, G. Landucci, M. K. Gorny, S. Zolla-Pazner, & W. E. Robinson. Functional activities of 20 human immunodeficiency virus type 1 (HIV-1)-specific human monoclonal antibodies. *AIDS Res Hum Retroviruses* **11**:1095–1099, 1995. (Medline: 96089216) Notes: A series of tests were performed on 20 human monoclonal antibodies to assess their potential therapeutic utility. Antibodies were tested for potentially harmful complement-mediated antibody enhancing activity (C-ADE), and for potentially beneficial neutralizing activity and antibody dependent cellular cytotoxicity ADCC.

[Fortin (2000)] J. F. Fortin, R. Cantin, M. G. Bergeron, & M. J. Tremblay. Interaction between virion-bound host intercellular adhesion molecule-1 and the high-affinity state of lymphocyte function-associated antigen-1 on target cells renders R5 and X4 isolates of human immunodeficiency virus type 1 more refractory to neutralization. *Virology* **268**:493–503, 2000. (Medline: 20171850).

[Fouts (1997)] T. R. Fouts, J. M. Binley, A. Trkola, J. E. Robinson, & J. P. Moore. Neutralization of the human immunodeficiency virus type 1 primary isolate JR-FL by human monoclonal antibodies correlates with antibody binding to the oligomeric form of the envelope glycoprotein complex. *J Virol* **71**:2779–2785, 1997. (Medline: 97213943) Notes: To test whether antibody neutralization of HIV-1 primary isolates is correlated with the affinities

for the oligomeric envelope glycoproteins, JRFL was used as a model primary virus and a panel of 13 human MAbs were evaluated for: half-maximal binding to rec monomeric JRFL gp120; half-maximal binding to oligomeric - JRFL Env expressed on the surface of transfected 293 cells; and neutralization of JRFL in a PBMC-based neutralization assay. Antibody affinity for oligomeric JRFL Env but not monomeric JRFL gp120 correlated with JRFL neutralization.

[Fouts (1998)] T. R. Fouts, A. Trkola, M. S. Fung, & J. P. Moore. Interactions of polyclonal and monoclonal anti-glycoprotein 120 antibodies with oligomeric glycoprotein 120-glycoprotein 41 complexes of a primary HIV type 1 isolate: relationship to neutralization. *AIDS Res Hum Retroviruses* **14**:591–7, 1998. (Medline: 98252387) Notes: Ab reactivity to oligomeric forms of gp120 were compared to neutralization of the macrophage tropic primary virus JRFL, and did not always correlate. This builds upon studies which have shown that oligomer binding while required for neutralization, is not always sufficient. MAb 205-46-9 and 2G6 bind oligomer with high affinity, comparable to IgG1b12, but unlike IgG1b12, cannot neutralize JRFL. Furthermore, neutralizing and non-neutralizing sera from HIV-1 infected people are similar in their reactivities to oligomeric JRFL Envelope.

[Franke (1992)] L. Franke, R. Grunow, R. Meissner, T. Portsman, & R. von Baehr. Inhibition of HIV-1 infection in vitro by murine monoclonal anti-p24 antibodies. *J Med Virol* **37**:137–142, 1992. (Medline: 92333288).

[Frankel (1998)] S. S. Frankel, R. M. Steinman, N. L. Michael, S. R. Kim, N. Bhardwaj, M. Pope, M. K. Louder, P. K. Ehrenberg, P. W. Parren, D. R. Burton, H. Katinger, T. C. VanCott, M. L. Robb, D. L. Birx, & J. R. Mascola. Neutralizing monoclonal antibodies block human immunodeficiency virus type 1 infection of dendritic cells and transmission to T cells. *J Virol* **72**:9788–94, 1998. (Medline: 99030886) Notes: Investigation of three human MAbs to elicit a neutralizing effect and block HIV-1 infection in human dendritic cells. Preincubation with NAbs IgG1b12 or a combination of 2F5/2G12 prevented infection of purified DC and transmission in DC/T-cell cultures.

[Fujii (1993)] Y. Fujii, Y. Nishino, T. Nakaya, K. Tokunaga, & K. Ikuta. Expression of human immunodeficiency virus type 1 Nef antigen on the surface of acutely and persistently infected human T-cells. *Vaccine* **11**:1240, 1993. (Medline: 94078655).

[Fujii (1996a)] Y. Fujii, K. Otake, Y. Fujita, N. Yamaimoto, Y. Nagai, M. Tashiro, & A. Adachi. Clustered localization of oligomeric Nef protein of human immunodeficiency virus type 1 on the cell surface. *FEBS Letters* **395**:257–261, 1996a. (Medline: 8898107).

[Fujii (1996b)] Y. Fujii, K. Otake, M. Tashiro, & A. Adachi. Human immunodeficiency type 1 Nef protein on the cell surface is cytocidal for human CD4+ T cells. *FEBS Letters* **393**:105–108, 1996b. (Medline: 96397541).

[Fujii (1996c)] Y. Fujii, K. Otake, M. Tashiro, & A. Adachi. In vitro cytocidal effects of human immunodeficiency virus type 1 Nef on unprimed human CD4+ T cells without MHC restriction. *J Gen Virol* **77**:2943–2951, 1996c. (Medline: 9000084).

[Fujii (1996d)] Y. Fujii, K. Otake, M. Tashiro, & A. Adachi. Soluble Nef antigen of HIV-1 is cytotoxic for human CD4+ T cells. *FEBS Letters* **393**:93–96, 1996d. (Medline: 8804432).

[Fung (1992)] M. S. C. Fung, C. R. Y. Sun, W. L. Gordon, R.-S. Liou, T. W. Chang, W. N. C. Sun, E. S. Daar, & D. D. Ho. Identification and characterization of a neutralization site within the second variable region of human immunodeficiency virus type 1 gp120. *J Virol* **66**:848–856, 1992. (Medline: 92114188) Notes: Two anti-envelope V2 antibodies were raised that neutralize virus in either a conformation dependent (G3-136) or conformation independent (BAT085) manner. G3-136 has diminished reactivity with deglycosylation or DTT reduced gp120, and sCD4 inhibits binding in a competition assay; BAT085 is not sensitive to these alterations in gp120.

[Fung (1990)] M. S. C. Fung, C. R. Y. Sun, R. S. Liou, W. Gordon, N. T. Chang, T.-W. Chang, & N.-C. Sun. Monoclonal anti-idiotypic antibody mimicking the principal neutralization site in HIV-1 gp120 induces HIV-1 neutralizing antibodies in rabbits. *J Immunol* **145**:2199–2206, 1990. (Medline: 90375916).

[Fung (1987)] M. S. C. Fung, C. R. Y. Sun, N.-C. Sun, N. T. Chang, & T.-W. Chang. Monoclonal antibodies that neutralize HIV-1 virions and inhibit syncytium formation by infected cells. *Biotechnology* **5**:940–947, 1987.

[Gauduin (1996)] M.-C. Gauduin, G. P. Allaway, P. J. Maddon, C. F. Barbas III, D. R. Burton, & R. A. Koup. Effective Ex Vivo Neutralization of Human Immunodeficiency Virus Type 1 in Plasma by Recombinant Immunoglobulin Molecules. *J Virol* **70**:2586–2592, 1996. (Medline: 96183910) Notes: Virus direct from plasma from six HIV-1 infected individuals was used for neutralization assay. MAb 19b could neutralize 2/6 plasma samples, while MAb IgG1b12 could neutralize 5/6 plasma samples. CD4-based molecules

were also tested: CD4-IgG2 was effective in the it *ex vivo* assay, but sCD4 was not. Thus, MAbs IgG1b12 and CD4-IgG2 have broad and potent it *in vitro* and it *ex vivo* neutralizing activities.

[Gauduin (1995)] M. C. Gauduin, J. T. Safrit, R. Weir, M. S. Fung, & R. A. Koup. Pre- and post-exposure protection against human immunodeficiency virus type 1 infection mediated by a monoclonal antibody. *J Infect Dis* **171**:1203–1209, 1995. (Medline: 95271056) Notes: Passive protection against HIV-1 LAI with MAb BAT123 was achieved in SCID mice reconstituted with human peripheral blood lymphocytes (hu-PBL-SCID) BAT123 is specific for the V3 loop gp120 of HIV-1 LAI. Animals were protected against subsequent infection with LAI strain, but not other virus strains, when BAT123 was given 1 hour before virus inoculation, or up to 4 hours post-exposure. No therapeutic effect was observed when BAT123 was administered after infection had been established.

[Gauduin (1998)] M. C. Gauduin, R. Weir, M. S. Fung, & R. A. Koup. Involvement of the complement system in antibody-mediated post-exposure protection against human immunodeficiency virus type 1. *AIDS Res Hum Retroviruses* **14**:205–11, 1998. (Medline: 98150874) Notes: Post-exposure passive transfer of murine BAT123 can confer protection to hu-PBL-SCID mice challenged with HIV-1 LAI, and the mechanism is by complement-mediated cytolysis or virolysis. This protection was not conferred by CGP 47 439, a BAT123 chimera that has a human IgG_1 Fc domain, substituted in place of a murine IgG_1 Fc domain, suggesting that the protection is mediated by complement. Further evidence was that the protective ability of BAT123 is lost when mice were treated with cobra venom factor, which inactivates serum complement. IgG_1 does not fix complement efficiently, so an IgG_2 MAb might perform better. Therefore, in spite of the potential for enhancement in some circumstances, in this circumstance complement activation provided a protective advantage.

[Geffin (1998)] R. B. Geffin, G. B. Scott, M. Melenwick, C. Hutto, S. Lai, L. J. Boots, P. M. McKenna, J. Kessler, & A. J. Conley. Association of antibody reactivity to ELDKWA, a glycoprotein 41 neutralization epitope, with disease progression in children perinatally infected with HIV type 1. *AIDS Res Hum Retroviruses* **14**:579–90, 1998. (Medline: 98252386).

[Gershoni (1993)] J. M. Gershoni, G. Denisova, D. Raviv, N. I. Smorodinsky, & D. Buyaner. HIV binding to its receptor creates specific epitopes for the CD4/gp120 complex. *FASEB J* **7**:1185–1187, 1993. (Medline: 93387619) Notes: MAbs generated to a sCD4-gp120 complex, and the potential usefulness for vaccine design of epitopes specifically in the complex is discussed.

[Ghiara (1997)] J. B. Ghiara, D. C. Ferguson, A. C. Satterthwait, H. J. Dyson, & I. A. Wilson. Structure-based design of a constrained peptide mimic of the HIV-1 V3 loop neutralization site. *J Mol Biol* **266**:31–9, 1997. (Medline: 97207675).

[Ghiara (1993)] J. B. Ghiara, E. A. Stura, R. L. Stanfield, A. T. Profy, & I. A. Wilson. Crystal structure of the principal neutralization site of HIV-1. *Science* **264**:82–85, 1993. (Medline: 94188714) Notes: Crysal structure of V3 loop peptides bound to Fabs 59.1 and 50.1 was determined. The GPGRAF motif forms a double turn.

[Giraud (1999)] A. Giraud, Y. Ataman-Onal, N. Battail, N. Piga, D. Brand, B. Mandrand, & B. Verrier. Generation of monoclonal antibodies to native human immunodeficiency virus type 1 envelope glycoprotein by immunization of mice with naked RNA [In Process Citation]. *J Virol Methods* **79**:75–84, 1999. (Medline: 99259089).

[Glaser & Hausdorf(1996)] R. W. Glaser & G. Hausdorf. Binding kinetics of an antibody against HIV p24 core protein measured with real-time biomolecular interaction analysis suggest a slow conformational change in antigen p24. *J Immunological Methods* **189**:1–14, 1996. (Medline: 96163539) Notes: The MAb CD-4/1 and p24 have unusual biphasic kinetics of association.

[Golding (1995)] B. Golding, J. Inman, P. Highet, R. Blackburn, J. Manischewitz, N. Blyveis, R. D. Angus, & H. Golding. Brucella abortus conjugated with a gp120 or V3 loop peptide derived from human immunodeficiency virus type 1 induces neutralizing anti-HIV antibodies, and the V3-B. abortus conjugate is effective even after CD4+ T-cell depletion. *J Virol* **69**:3299–3307, 1995. (Medline: 95264417).

[Gordon & Delwart(2000)] C. J. Gordon & E. L. Delwart. Genetic diversity of primary HIV-1 isolates and their sensitivity to antibody-mediated neutralization. *Virology* **272**:326–30, 2000. (Medline: 20334796).

[Gorny (1992)] M. K. Gorny, A. J. Conley, S. Karwowska, A. Buchbinder, J.-Y. Xu, E. A. Emini, S. Koenig, & S. Zolla-Pazner. Neutralization of diverse human immunodeficiency virus type 1 variants by an anti-V3 human monoclonal antibody. *J Virol* **66**:7538–7542, 1992. (Medline: 93059712).

[Gorny (1989)] M. K. Gorny, V. Gianakakos, S. Sharpe, & S. Zolla-Pazner. Generation of human monoclonal antibodies to human immunodeficiency

virus. *Proc Natl Acad Sci USA* **86**:1624–1628, 1989. (Medline: 89160828) Notes: This paper described immortalization of B-cells from HIV-1 positive individuals with Epstein-Barr virus, to produce seven stable antibody producing cell lines.

[Gorny (1998)] M. K. Gorny, J. R. Mascola, Z. R. Israel, T. C. VanCott, C. Williams, P. Balfe, C. Hioe, S. Brodine, S. Burda, & S. Zolla-Pazner. A human monoclonal antibody specific for the V3 loop of HIV type 1 clade E cross-reacts with other HIV type 1 clades. *AIDS Res Hum Retroviruses* **14**:213–21, 1998. (Medline: 98150875).

[Gorny (1994)] M. K. Gorny, J. P. Moore, A. J. Conley, S. Karwowska, J. Sodroski, C. Williams, S. Burda, L. J. Boots, & S. Zolla-Pazner. Human anti-V2 monoclonal antibody that neutralizes primary but not laboratory isolates of human immunodeficiency virus type 1. *J Virol* **68**:8312–8320, 1994. (Medline: 95056063) Notes: Detailed characterization of the MAb 697-D.

[Gorny (2000)] M. K. Gorny, T. C. VanCott, C. Williams, K. Revesz, & S. Zolla-Pazner. Effects of oligomerization on the epitopes of the human immunodeficiency virus type 1 envelope glycoproteins. *Virology* **267**:220–8, 2000. (Medline: 20130736).

[Gorny (1997)] M. K. Gorny, T. C. VanCott and Catarina Hioe, Z. R. Israel, N. L. Michael, A. J. Conley and Constance Williams, J. A. Kessler II and Padmasree Chigurupati and Sherri Burda and, & S. Zolla-Pazner. Human Monoclonal Antibodies to the V3 Loop of HIV-1 With Intra- and Interclade Cross-Reactivity. *J. Immunol.* **159**:5114–5122, 1997. (Medline: 98031769).

[Gorny (1991)] M. K. Gorny, J.-Y. Xu, V. Gianakakos, S. Karwowska, C. Williams, H. W. Sheppard, C. V. Hanson, & S. Zolla-Pazner. Production of site-selected neutralizing human monoclonal antibodies against the third variable domain of the human immunodeficiency virus type 1 envelope glycoprotein. *Proc Natl Acad Sci USA* **88**:3238–3242, 1991. (Medline: 91195328).

[Gorny (1993)] M. K. Gorny, J.-Y. Xu, S. Karwowska, A. Buchbinder, & S. Zolla-Pazner. Repertoire of neutralizing human monoclonal antibodies specific for the V3 domain of HIV-1 gp120. *J Immunol* **150**:635–643, 1993. (Medline: 93123766) Notes: Characterizaton of 12 human MAbs that bind and neutralize the MN isolate with 50% neutralization. Two of these antibodies also bound and neutralized IIIB: 447-52-D and 694/98-D; all others could not bind HXB2 peptides. All but two, 418-D and 412-D could bind to SF2 peptides.

[Gorny & Zolla-Pazner(2000)] M. K. Gorny & S. Zolla-Pazner. Recognition by human monoclonal antibodies of free and complexed peptides representing the prefusogenic and fusogenic forms of human immunodeficiency virus type 1 gp41 [In Process Citation]. *J Virol* **74**:6186–92, 2000. (Medline: 20305015).

[Gosting (1987)] L. H. Gosting, J. McClure, E. S. Dickinson, S. M. Watanabe, K. Shriver, & L. C. Goldstein. Monoclonal antibodies to gp110 and gp41 of human immunodeficiency virus. *J Clin Microbiol* **25**:845–848, 1987. (Medline: 87222993).

[Grant (2000)] M. Grant, F. Smaill, S. Muller, H. Kohler, & K. Rosenthal. The anti-idiotypic antibody 1F7 selectively inhibits cytotoxic T cells activated in HIV-1 infection. *Immunol Cell Biol* **78**:20–7, 2000. (Medline: 20117840).

[Grassi (1991)] F. Grassi, R. Meneveri, M. Gullberg, L. Lopalco, G. B. Rossi, P. Lanza, C. DeSantis, G. Brattsand, S. Butto, E. Ginelli, A. Berretta, & A. G. Siccardi. Human Immunodeficiency Virus Type 1 gp120 Mimics a Hidden Monomorphic Epitope Borne by Class I Major Histocompatibility Complex Heavy Chains. *J Exp Med* **174**:53–62, 1991. (Medline: 91277627).

[Greenway (1994)] A. L. Greenway, D. A. McPhee, E. Grgacic, D. Hewish, A. Lucantoni, I. Macreadie, & A. Azad. Nef 27, but not the Nef 25 isoform of human immunodeficiency virus-type 1 pNL4.3 down-regulates surface CD4 and IL-2R expression in peripheral blood mononuclear cells and transformed T cells. *Virology* **198**:245–256, 1994. (Medline: 94082455).

[Grimison & Laurence(1995)] B. Grimison & J. Laurence. Immunodominant epitope regions of HIV-1 reverse transcriptase: correlations with HIV-1+ serum IgG inhibitory to polymerase activity and with disease progression. *J AIDS* **9**:58–68, 1995. (Medline: 95227740).

[Grovit-Ferbas (2000)] K. Grovit-Ferbas, J. F. Hsu, J. Ferbas, V. Gudeman, & I. S. Chen. Enhanced binding of antibodies to neutralization epitopes following thermal and chemical inactivation of human immunodeficiency virus type 1 [In Process Citation]. *J Virol* **74**:5802–9, 2000. (Medline: 20304970).

[Grunow (1990)] R. Grunow, R. Giess, T. Portsman, H. Dopel, K. Hansel, & R. von Baehr. Development and biological testing of human and murine antibodies against HIV antigens. *Z Klin Med* **45**:367–369, 1990.

[Gu (1996)] Z. Gu, Z. Li, Y. Quan, M. A. Parniak, & M. A. Wainberg. Studies of a Neutralizing Monoclonal Antibody to Human Immunodeficiency

Virus Type 1 Reverse Transcriptase: Antagonistic and Synergistic Effects in Reactions Performed in the Presence of Nucleoside and Nonnucleoside Inhibitors, Respectively. *J Virol* **70**:2620–2626, 1996. (Medline: 96183916).

[Guillerm (1998)] C. Guillerm, V. Robert-Hebmann, U. Hibner, M. Hirn, & C. Devaux. An anti-CD4 (CDR3-loop) monoclonal antibody inhibits human immunodeficiency virus type 1 envelope glycoprotein-induced apoptosis. *Virology* **248**:254–63, 1998. (Medline: 98389845).

[Gunthard (1994)] H. F. Gunthard, P. L. Gowland, J. Schupbach, M. S. C. Fung, J. Boni, R.-S. Liou, N. T. Chang, P. Grob, P. Graepel, D. G. Braun, & R. Luthy. A phase I/IIA clinical study with a chimeric mouse-human monoclonal antibody to the V3 loop of human immunodeficiency virus type I gp120. *J Inf Dis* **170**:1384–1393, 1994. (Medline: 95088417).

[Haaheim (1991)] L. R. Haaheim, J. P. Maskell, P. Mascagni, & A. R. M. Coates. Fine molecular specificity of linear and assembled antibody binding sites in HIV-1 p24. *Scand J Immunol* **34**:341–350, 1991. (Medline: 91352532) Notes: Seven murine MAbs to a 104-mer peptide spanning residues 270-373 of p24 gag were generated.

[Haugan (1995)] I. R. Haugan, B. M. Nilsen, S. Worland, L. Olsen, & D. E. Helland. Characterization of the DNA-binding activity of HIV-1 integrase using a filter binding assay. *Biochem Biophys Res Commun* **217**:802–810, 1995. (Medline: 96125314).

[He (1992)] X. M. He, F. Ruker, E. Casale, & D. C. Carter. Structure of a human monoclonal antibody Fab fragment against gp41 of human immunodeficiency virus type 1. *Proc Natl Acad Sci USA* **89**:7154–7158, 1992. (Medline: 92357790).

[Henderson & Percipalle(1997)] B. R. Henderson & P. Percipalle. Interactions between HIV Rev and nuclear import and export factors: the Rev nuclear localisation signal mediates specific binding to human importin-beta. *J Mol Biol* **274**:693–707, 1997. (Medline: 98070609).

[Hernandez (2000)] M. Hernandez, L. Pozo, I. Gomez, & A. Melchor. Chimeric synthetic peptide as antigen for immunodiagnosis of HIV-1 infection [In Process Citation]. *Biochem Biophys Res Commun* **272**:259–62, 2000. (Medline: 20329237).

[Hifumi (2000)] E. Hifumi, Y. Okamoto, & T. Uda. How and why 41S-2 antibody subunits acquire the ability to catalyze decomposition of the conserved sequence of gp41 of HIV-1 [In Process Citation]. *Appl Biochem Biotechnol* **83**:209–19; discussion 219–20, 297–313, 2000. (Medline: 20285237).

[Hill (1997)] C. M. Hill, H. Deng, D. Unutmaz, V. N. Kewalramani, L. Bastiani, M. K. Gorny, S. Zolla-Pazner, & D. R. Littman. Envelope glycoproteins from human immunodeficiency virus types 1 and 2 and simian immunodeficiency virus can use human CCR5 as a coreceptor for viral entry and make direct CD4-dependent interactions with this chemokine receptor. *J Virol* **71**:6296–6304, 1997. (Medline: 97404634).

[Hinkula (1994)] J. Hinkula, G. Bratt, G. Gilljam, S. Nordlund, P. Broliden, V. Holmberg, E. Olausson-Hansson, J. Albert, E. Sandstrom, & B. Wahren. Immunological and virological interaction in patients receiving passive immunotherapy with HIV-1 neutralizing monoclonal antibodies. *J AIDS* **7**:940–951, 1994. (Medline: 94328227) Notes: Eleven HIV-1 infected patients in the late stages were treated with mouse MAbs that showed high HIV-1 neutralization. The amount of p24 in the sera of patients decreased in five patients, but remained the same or increased in six of them. The level of viral RNA in the plasma of patients decreased in four, showed no changes in another four and increased in the other three. By themselves, the MAbs did not appear to be efficient enough to decrease the virus burden in a permanent form in late-stage HIV patients.

[Hinkula (1990)] J. Hinkula, J. Rosen, V.-A. Sundqvist, T. Stigbrand, & B. Wahren. Epitope mapping of the HIV-1 gag region with monoclonal antibodies. *Mol Immunol* **27**:395–403, 1990. (Medline: 90309760) Notes: Localization of immunogenic domains in p24, p17, and p15.

[Hioe (1997)] C. Hioe, S. Burda, P. Chigurupati, S. Xu, & S. Zolla-Pazner. Resting cell neutralization assay for HIV-1 primary isolates. *Methods: A companion to Methods in Enzymology* **12**:300–5, 1997. (Medline: 97401512) Notes: A technique is described for detecting the activity of neutralizing polyclonal or MAbs against HIV-1 primary isolates, using unstimulated PBMC as the target cell.

[Hioe (1999)] C. E. Hioe, J. E. Hildreth, & S. Zolla-Pazner. Enhanced HIV type 1 neutralization by human anti-glycoprotein 120 monoclonal antibodies in the presence of monoclonal antibodies to lymphocyte function-associated molecule 1. *AIDS Res Hum Retroviruses* **15**:523–31, 1999. (Medline: 99236718).

[Hioe (2000)] C. E. Hioe, G. J. Jones, A. D. Rees, S. Ratto-Kim, D. Birx, C. Munz, M. K. Gorny, M. Tuen, & S. Zolla-Pazner. Anti-CD4-binding do-

main antibodies complexed with HIV type 1 glycoprotein 120 inhibit CD4+ T cell-proliferative responses to glycoprotein 120 [In Process Citation]. *AIDS Res Hum Retroviruses* **16**:893–905, 2000. (Medline: 20331870).

[Ho (1991a)] D. D. Ho, M. S. C. Fung, Y. Cao, X. L. Li, C. Sun, T. W. Chang, & N.-C. Sun. Another discontinuous epitope on glycoprotein gp120 that is important in human immunodeficiency virus type 1 neutralization is identified by a monoclonal antibody. *Proc Natl Acad Sci USA* **88**:8949–8952, 1991a. (Medline: 92020968) Notes: A description of the neutralizing murine MAb G3-4. Evidence suggested that the G3-4 epitope was discontinuous, but later studies showed marginal peptide binding in the V2 region.

[Ho (1992)] D. D. Ho, M. S. C. Fung, H. Yoshiyama, Y. Cao, & J. E. Robinson. Discontinuous epitopes on gp120 important in HIV-1 neutralization. *AIDS Res Hum Retroviruses* **8**:1337–1339, 1992. (Medline: 93103804) Notes: Further description of the human MAb 15e and the murine MAb G3-4. gp120 mutants that affect 15e epitope binding: 113, 257, 368, 370, 421, 427, 475; four of these coincide with amino acids important for the CD4 binding domain. G3-4 is neutralizing and behaves like a discontinuous epitope, and partially blocks sCD4 binding.

[Ho (1991b)] D. D. Ho, J. A. McKeating, X. L. Li, T. Moudgil, E. S. Daar, N.-C. Sun, & J. E. Robinson. Conformational epitope of gp120 important in CD4 binding and human immunodeficiency virus type 1 neutralization identified by a human monoclonal antibody. *J Virol* **65**:489–493, 1991b. (Medline: 91087324) Notes: A description of the neutralizing human MAb 15e. It binds to HIV-1 with a broad specificity, and blocks gp120 binding to CD4, and is a discontinuous epitope; DTT reduction of env abrogates binding.

[Hochleitner (2000a)] E. O. Hochleitner, C. Borchers, C. Parker, R. J. Bienstock, & K. B. Tomer. Characterization of a discontinuous epitope of the human immunodeficiency virus (HIV) core protein p24 by epitope excision and differential chemical modification followed by mass spectrometric peptide mapping analysis. *Protein Sci* **9**:487–96, 2000a. (Medline: 20214275).

[Hochleitner (2000b)] E. O. Hochleitner, M. K. Gorny, S. Zolla-Pazner, & K. B. Tomer. Mass spectrometric characterization of a discontinuous epitope of the HIV envelope protein HIV-gp120 recognized by the human monoclonal antibody 1331A. *J Immunol* **164**:4156–61, 2000b. (Medline: 20219252).

[Hohne (1993)] W. E. Hohne, G. Kuttner, S. Kiessig, G. Housdorf, R. Grunow, K. Winkler, H. Wessner, E. Giessmann, R. Stieger, J. Schneider-Mergener, R. von Baehr, & D. Schomburg. Structural base of the interaction of a monoclonal antibody against p24 of HIV-1 with its peptide epitope. *Mol Immunol* **30**:1213–1221, 1993. (Medline: 94019411).

[Huang (1997)] X. Huang, J. J. Barchi Jr, F. D. Lung, P. P. Roller, P. L. Nara, J. Muschik, & R. R. Garrity. Glycosylation affects both the three-dimensional structure and antibody binding properties of the HIV-1IIIB GP120 peptide. *Biochemistry* **36**:10846–56, 1997. (Medline: 97454133) Notes: Glycosylated analogues of the V3 loop of gp120 were studied using NMR and circular dichroism spectroscopies, and by AB binding properties to MAb 0.5 β. A 24-residue peptide from the HIV-1 IIIB isolate (residues 308-331) designated RP135, was glycosylated with both N- and O- linked sugars.

[Hunt (1990)] J. C. Hunt, S. M. Desai, J. M. Casey, T. J. Bolling, T. K. Leung, R. H. Decker, S. G. Devare, & V. Sarin. Mouse monoclonal antibody 5-21-3 recognizes a contiguous, conformation- dependent epitope and maps to a hydrophilic region in HIV-1 gp41. *AIDS Res Hum Retroviruses* **6**:587–98, 1990. (Medline: 90298075).

[Inouye (1998)] P. Inouye, E. Cherry, M. Hsu, S. Zolla-Pazner, & M. A. Wainberg. Neutralizing antibodies directed against the V3 loop select for different escape variants in a virus with mutated reverse transcriptase (M184V) than in wild-type human immunodeficiency virus type 1. *AIDS Res Hum Retroviruses* **14**:735–40, 1998. (Medline: 98305526) Notes: The M184V substitution in RT yields high level resistance to 3TC and low level resistance to ddI and ddC, and alters the properties of RT. Virus containing the wt form of RT grown in the presence of the MAb 447-D develops 447-D resistance in 36 days, with the GPGR to GPGK substitutions (AGA(R) to AAA(K)). 447-D resistance took longer to acquire in virus with the M184V substituted RT, and had the form CTRPN to CTRPY (AAC(N) to TAC(Y)) at position 5 of the V3 loop.

[Ishikawa (1999)] T. Ishikawa, N. Okui, N. Kobayashi, R. Sakuma, T. Kitamura, & Y. Kitamura. Monoclonal antibodies against the minimal DNA-Binding domain in the carboxy-terminal region of human immunodeficiency virus type 1 Integrase. *J Virol* **73**:4475–80, 1999. (Medline: 99214393).

[Jackson (1999)] N. A. Jackson, M. Levi, B. Wahren, & N. J. Dimmock. Properties and mechanism of action of a 17 amino acid, V3 loop-specific mi-

croantibody that binds to and neutralizes human immunodeficiency virus type 1 virions. *J Gen Virol* **80 (Pt 1)**:225–36, 1999. (Medline: 99131405).

[Jacobson(1998)] J. M. Jacobson. Passive immunization for the treatment of HIV infection. *Mt Sinai J Med* **65**:22–6, 1998. (Medline: 98120263) Notes: Review.

[Jagodzinski & Trzeciak(2000)] P. P. Jagodzinski & W. H. Trzeciak. Application of monoclonal antibodies to monitor the synthesis of a glycoprotein core of envelope glycoproteins of human immunodeficiency virus (HIV-1). *Biomed Pharmacother* **54**:50–3, 2000. (Medline: 20186241).

[Jagodzinski (1996)] P. P. Jagodzinski, J. Wustner, D. Kmieciak, T. J. Wasik, A. Fertala, A. L. Sieron, M. Takahashi, T. Tsuji, T. Mimura, M. S. Fung, M. K. Gorny, M. Kloczewiak, Y. Kaneko, & D. Kozbor. Role of the V2, V3, and CD4-binding domains of GP120 in curdlan sulfate neutralization sensitivity of HIV-1 during infection of T lymphocytes. *Virology* **226**:217–227, 1996. (Medline: 97124646).

[Janvier (1990)] B. Janvier, P. Archinard, B. Mandrand, A. Goudeau, & F. Barin. Linear B-cell epitopes of the major core protein of human immunodeficiency virus types 1 and 2. *J Virol* **64**:4258–4263, 1990. (Medline: 90347819).

[Janvier (1992)] B. Janvier, P. Archinard, B. Mandrand, A. Goudeau, & F. Barin. Linear B-cell epitopes of the major core protein of human immunodeficiency virus types 1 and 2. (Author's Correction). *J Virol* **66**:613, 1992.

[Janvier (1996)] B. Janvier, J. J. Lasarte, P. Sarobe, J. Hoebeke, A. B.-B. F. Borras-Cuesta, & F. Barin. B-cell epitopes of HIV type 1 p24 capsid protein: a reassessment. *AIDS Res Hum Retroviruses* **12**:519–525, 1996. (Medline: 96296964) Notes: The reactivity pattern of 45 overlapping synthetic pentadecapeptides, spanning amino acids 133 to 363 (p24) of HIV-1 p55 gag precursor, using sera from 20 HIV-1 positive and 8 HIV negative individuals was determined by ELISA. A peptide covering aa 178-192 was recognized by 40%, and a peptide covering 288-302 of p55 by 45%, of HIV-1 positive people. A peptide covering aa 272-322 of p55 was recognized by most human sera. A conformational epitope involving sequences from aa 183-186 and 289-292 was proposed, based by analogy to the structure of the Mengovirus VP2 protein.

[Jeffs (1996)] S. A. Jeffs, J. McKeating, S. Lewis, H. Craft, D. Biram, P. E. Stephens, & R. L. Brady. Antigenicity of truncated forms of the human immunodeficiency virus type 1 envelope glycoprotein. *J Gen Virol* **77**:1403–1410, 1996. (Medline: 96335672).

[Jelonek (1999)] M. Jelonek, J. Maskrey, K. Steimer, B. Potts, K. Higgins, & M. Kellor. Maternal monoclonal antibody to the V3 loop alters specificity of the response to a human immunodeficiency virus vaccine. *J Inf Dis* **174**:866–9, 1999. (Medline: 97000089).

[Jensen (1997)] T. H. Jensen, A. Jensen, A. M. Szilvay, & J. Kjems. Probing the structure of HIV-1 Rev by protein footprinting of multiple monoclonal antibody-binding sites. *FEBS Lett* **414**:50–4, 1997. (Medline: 97449261) Notes: Rev was mapped using MAb protein footprinting, which gave results that agreed well with peptide mapping, but was useful for identifying a discontinuous interaction between two regions. Footprints supported a previously proposed structure (Auer *et al.*, Biochemistry, 33 (1994) 2988-2996) predicting that a helix-loop-helix motif in Rev brings the termini of the protein into proximity.

[Jeyarajah (1998)] S. Jeyarajah, C. E. Parker, M. T. Summer, & K. B. Tomer. Matrix-assisted laser desorption ionization/mass spectrometry mapping of human immunodeficiency virus-gp120 epitopes recognized by a limited polyclonal antibody. *J Am Soc Mass Spectrom* **9**:157–65, 1998. (Medline: 98344538).

[Jiang (1998)] S. Jiang, K. Lin, & M. Lu. A conformation-specific monoclonal antibody reacting with fusion-active gp41 from the human immunodeficiency virus type 1 envelope glycoprotein. *J Virol* **72**:10213–7, 1998. (Medline: 99030935) Notes: MAb NC-1 specifically recognizes the fusogenic core of gp41, which allows for analysis of CD4-induced conformational changes in gp120 and gp41 as well as identification of mediators for HIV-1 fusion.

[Kalland (1994a)] K. H. Kalland, A. M Szilvay, K. A. Brokstad, W. Saetrevik, & G. Haukenes. The human immunodeficiency virus type 1 Rev protein shuttles between the cytoplasm and nuclear compartments. *Mol Cell Biol* **14**:7436–7444, 1994a. (Medline: 95021273) Notes: Ten anti-Nef MAbs were generated and mapped. Nef is expressed in two isomorphic forms, and was shown to be expressed mainly in the Golgi complex and at the nuclear membrane, but occasionally x in the nucleus, particularly in MT-4 cells.

[Kalland (1994b)] K. H. Kalland, A. M Szilvay, E. Langhoff, & G. Haukenes. Subcellular distribution of human immunodeficiency virus type 1 Rev and colocalization of Rev with RNA splicing factors in a speckled pattern in the nucleoplasm. *J Virol* **68**:1475–1485, 1994b. (Medline: 94149836).

[Kaminchik (1990)] J. Kaminchik, N. Bashan, D. Pinchasi, B. Amit, N. Sarver, M. I. Johnston, M. Fischer, Z. Yavin and M Gorecki, & A. Panet. Expression and biochemical characterization of human immunodeficiency virus type 1 nef gene product. *J Virol* **64**:3447–3454, 1990. (Medline: 90279077).

[Kang (1994)] C.-Y. Kang, K. Hariharan, P. L. Nara, J. Sodroski, & J. P. Moore. Immunization with a soluble CD4-gp120 complex preferentially induces neutralizing anti-human immunodeficiency virus type 1 antibodies directed to conformation-dependent epitopes of gp120. *J Virol* **68**:5854–5862, 1994. (Medline: 94335102) Notes: Most of the MAbs generated in this study were conformational, but there were four that bound a V3 loop peptide. These four could neutralize lab strains with different efficiencies. These MAbs were very sensitive to substitutions in the V3 loop, but also to substitutions in the base of the V1/V2 loop structure (120/121 VK/LE), indicating an underlying conformational character. Additionally, many anti-CD4 binding site MAbs were described, that shared a sensitivity to substitutions at residues 368 and 370. Another class of MAbs was found that appeared to be conformationally sensitive, and shared a reduction in binding with the amino acid substitution 88 N/P in the C1 domain.

[Karwowska (1992a)] S. Karwowska, M. K. Gorny, A. Buchbinder, V. Gianakakos, C. Williams, T. Fuerst, & S. Zolla-Pazner. Production of human monoclonal antibodies specific for conformational and linear non-V3 epitopes of gp120. *AIDS Res Hum Retroviruses* **8**:1099–1106, 1992a. (Medline: 92368727) Notes: A single linear MAb was generated, to the immunodominant domain in the C-terminal portion of gp120. This antibody did not inhibit rCD4-rgp120 binding or neutralize IIIB or MN. Three conformational epitope binding MAbs were also described in this paper that could neutralize IIIB and MN.

[Karwowska (1992b)] S. Karwowska, M. K. Gorny, A. Buchbinder, & S. Zolla-Pazner. Type-specific human monoclonal antibodies cross-react with the V3-loop of various HIV-1 isolates. *Vaccines 92* pages 171–174, 1992b. Notes: Editors: F. Brown, H. S. Ginsberg and R. Lerner, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY.

[Karwowska (1993)] S. Karwowska, M. K. Gorny, S. Culpepper, S. Burda, S. Laal, K. Samanich, & S. Zolla-Pazner. The similarities and diversity among human monoclonal antibodies to the CD4-binding domain of HIV-1. *Vaccines 93* pages 229–232, 1993. Notes: Editors: F. Brown, H. Ginsberg and R. Lerner, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY. 447-D was the most broadly cross-reactive anti-V3 human MAb tested.

[Kaul (1999)] R. Kaul, D. Trabattoni, J. Bwayo, D. Arienti, A. Zagliani, F. Mwangi, C. Kariuki, E. Ngugi, K. MacDonald, T. Blake Ball, M. Clerici, & F. Plummer. HIV-1-specific mucosal IgA in a cohort of HIV-1 resistant Kenyan sex workers. *AIDS* **13**:23–29, 1999. (Medline: 99223948).

[Keller & Arora(1999)] M. Keller & Y. Arora. Inhibition of anti-V3 loop response to a recombinant gp120 SF2 vaccine be preexisting monoclonal Ab. *AIDS Res and Human Retroviruses* **15**:855–60, 1999. (Medline: 99308904).

[Keller (1993)] P. M. Keller, B. A. Arnold, A. R. Shaw, R. L. Tolman, F. Van Middlesworth, S. Bondy, V. K. Rusiecki, S. Koenig, S. Zolla-Pazner, P. Conard, E. A. Emini, & A. J. Conley. Identification of HIV vaccine candidate peptides by screening random phage epitope libraries. *Virology* **193**:709–716, 1993. (Medline: 93212503) Notes: A library of 15 mers was screened for reactivity with 447-52D. 100s of 15 mers reacted, of which 70 were sequenced. All but one contained the motif GPXR.

[Kessler (1995)] J. A. Kessler, P. M. McKenna, E. A. Emini, & A. J. Conley. In vitro assessment of the therapeutic potential of anti-HIV-1 monoclonal neutralizing antibodies. *Gen Meet Am Soc Microbiol* **95**:586, T–25, 1995. Notes: Aidsline: 96050622 Abstract.

[Kessler II (1997)] J. A. Kessler II, P. M. McKenna, E. A. Emini, C. P. Chan, M. D. Patel, S. K. Gupta, G. E. Mark III, C. F. Barbas III, D. R. Burton, & A. J. Conley. Recombinant human monoclonal antibody IgG1b12 neutralizes diverse human immunodeficiency virus type 1 primary isolates. *AIDS Res Hum Retroviruses* **13**:575–82, 1997. (Medline: 97281567) Notes: Anti-CD4 binding domain antibodies generally do not neutralize primary HIV-1 isolates, with the exception of IgG1b12. Many primary isolates were shown to be neutralized by IgG1b12, including several non-B clade international isolates. Neutralization of a primary isolate with MAb IgG1b12 did not require continuous exposure to the antibody. A complete IgG1 molecule of a selected b12 FAb mutant with a > 400-fold increase in affinity was assembled and evaluated in the infectivity reduction assay in comparative studies with the parent IgG1b12 antibody. The mutant did not retain the level of primary

isolate neutralization potency of IgG1b12, despite the increase in affinity for gp120.

[Khouri (1995)] Y. F. Khouri, K. McIntosh, L. Cavacini, M. Posner, M. Pagano, R. Tuomala, & W. A. Marasco. Vertical Transmission of HIV-1. Correlation with maternal viral load and plasma levels of CD4 binding site anti-gp120 antibodies. *J Clin Invest* **95**:732–737, 1995. (Medline: 95164706) Notes: Differences in levels of Abs directed against the monomeric gp120 and against the V3 loop region of gp120 were not significantly different between transmitting and non-transmitting mothers. Differences were observed in the levels of CD4 binding site antibodies, as determined by the ability of diluted maternal plasma to inhibit binding of the CD4 binding site monoclonal antibody F105 (MAb F105) to monomeric gp120.

[Kim (1997)] J. J. Kim, V. Ayyavoo, M. L. Bagarazzi, M. Chattergoon, J. D. Boyer, B. Wang, & D. B. Weiner. Development of a multicomponent candidate vaccine for HIV-1. *Vaccine* **15**:879–83, 1997. (Medline: 97378941).

[Kinney Thomas (1988)] E. Kinney Thomas, J. N. Weber, J. McClure, P. R. Clapham, M. C. Singhal, M. K. Shriver, & R. A. Weiss. Neutralizing monoclonal antibodies to the AIDS virus. *AIDS* **2**:25–29, 1988. (Medline: 88192838).

[Kitamura (1999)] Y. Kitamura, T. Ishikawa, N. Okui, N. Kobayashi, T. Kanda, T. Shimada, K. Miyake, & K. Yoshiike. Inhibition of replication of HIV-1 at both early and late stages of the viral life cycle by single-chain antibody against viral integrase. *J Acquir Immune Defic Syndr Hum Retrovirol* **20**:105–14, 1999. (Medline: 99139918).

[Klasse (1993a)] P. Klasse, J. A. McKeating, M. Schutten, M. S. Reitz, & M. Robert-Guroff. An immune-selected point mutation in the transmembrane protein of human immunodeficiency virus type 1 (HXB2-Env:Ala 582(–> Thr)) decreases viral neutralization by monoclonal antibodies to the CD4-binding site. *Virology* **196**:332–337, 1993a. (Medline: 93362423).

[Klasse (1991)] P. J. Klasse, R. Pipkorn, & J. Blomberg. A cluster of continuous antigenic structures in the transmembrane protein of HIV-1: Individual patterns of reactivity in human sera. *Mol Immunol* **28**:613–622, 1991. (Medline: 91319155).

[Klasse (1993b)] P. J. Klasse, R. Pipkorn, J. Blomberg, K.-Y. Han, B. Hilton, & J. A. Ferretti. Three-dimensional structure and antigenicity of transmembrane-protein peptides of the human immunodeficiency virus type 1. *FEBS Letters* **323**:68–72, 1993b. (Medline: 93265946).

[Klasse & Sattentau(1996)] P. J. Klasse & Q. J. Sattentau. Altered CD4 interactions of HIV type 1 LAI variants selected for the capacity to induce membrane fusion in the presence of a monoclonal antibody to domain 2 of CD4. *AIDS Res Hum Retroviruses* **12**:1015–1021, 1996. (Medline: 96424756).

[Koup (1991)] R. A. Koup, J. E. Robinson, Q. V. Nguyen, C. A. Pikora, B. Blais, A. Roskey, D. Panicali, & J. L. Sullivan. Antibody-dependent cell-mediated cytotoxicity directed by a human monoclonal antibody reactive with gp120 of HIV-1. *AIDS* **5**:1309–1314, 1991. (Medline: 92118257).

[Kropelin (1998)] M. Kropelin, C. Susal, V. Daniel, & G. Opelz. Inhibition of HIV-1 rgp120 binding to CD4+ T cells by monoclonal antibodies directed against the gp120 C1 or C4 region. *Immunol Lett* **63**:19–25, 1998. (Medline: 98383939).

[Kunert (1998)] R. Kunert, F. Ruker, & H. Katinger. Molecular characterization of five neutralizing anti-HIV type 1 antibodies: identification of nonconventional D segments in the human monoclonal antibodies 2G12 and 2F5. *AIDS Res Hum Retroviruses* **14**:1115–28, 1998. (Medline: 98407601) Notes: Study identifies five human MAbs which were able to neturalize primary isolates of different clades *in vitro* and reports the nucleotide and amino acid sequences of the heavy and light chain V segments of the antibodies.

[Kunert (2000)] R. Kunert, W. Steinfellner, M. Purtscher, A. Assadian, & H. Katinger. Stable recombinant expression of the anti HIV-1 monoclonal antibody 2F5 after IgG3/IgG1 subclass switch in CHO cells. *Biotechnol Bioeng* **67**:97–103, 2000. (Medline: 20050117).

[Kusk (1992)] P. Kusk, T. H. Bugge, B. O. Lindhardt, E. F. Hulgaard, & K. Holmback. Mapping of linear B-cell epitopes on the major core protein p24 of human immunodeficiency virus type 1. *AIDS Res Hum Retroviruses* **8**:1789–1794, 1992. (Medline: 93090461) Notes: . The epitope for MAb F5-2 was found to be reactive with human sera from HIV-1 infected individuals, and reactivity to this epitope was associated with disease progression and low CD4 T-cell counts.

[Kusk (1988)] P. Kusk, K. Ulrich, J. Zeuthen, & G. Pallesen. Immunological characterization and detection of the major core protein p24 of the human immunodeficiency virus (HIV) using monoclonal antibodies. *J AIDS* **1**:326–332, 1988. (Medline: 89110736).

[Kuttner (1992)] G. Kuttner, E. Giessmann, B. Niemann, K. Winkler, R. Grunow, J. Hinkula, J. Rosen, B. Wahren, & R. von Baehr. Immunoglobulin V regions and epitope mapping of a murine monoclonal antibody against p24 core protein of HIV-1. *Mol Immunol* **29**:561–564, 1992. (Medline: 92227956) Notes: The nucleotide sequence of the VDJ_H and VJ_L regions of a murine MAb (CB-mab-p24/13-5) against p24 was obtained.

[Kwong (1998)] P. D. Kwong, R. Wyatt, J. Robinson, R. W. Sweet, J. Sodroski, & W. A. Hendrickson. Structure of an HIV gp120 envelope glycoprotein in complex with the CD4 receptor and a neutralizing human antibody. *Nature* **393**:648–659, 1998. (Medline: 98303379) Notes: Comment in: Nature 1998 Jun 18;393(6686):630-1. The X-ray crystal structure was solved at 2.5 A resolution of HIV-1 gp120 core complexed with human CD4 and the antigen-binding fragment of a neutralizing antibody that blocks chemokine-receptor binding.

[Laal (1994)] S. Laal, S. Burda, M. K. Gorny, S. Karwowska, A. Buchbinder, & S. Zolla-Pazner. Synergistic neutralization of human immunodeficiency virus type 1 by combinations of human monoclonal antibodies. *J Virol* **68**:4001–4008, 1994. (Medline: 9424674) Notes: Antibodies to the C-terminal part of gp120 and the V3 loop were shown to act synergistically with anti-CD4 binding site MAbs in terms of neutralization. C-terminal antibodies did not synergize V3 loop MAb neutralization.

[LaCasse (1998)] R. A. LaCasse, K. E. Follis, T. Moudgil, M. Trahey, J. M. Binley, V. Planelles, S. Zolla-Pazner, & J. H. Nunberg. Coreceptor utilization by human immunodeficiency virus type 1 is not a primary determinant of neutralization sensitivity. *J Virol* **72**:2491–5, 1998. (Medline: 98139151) Notes: A T-cell line-adapted (TCLA) derivative of SI primary isolate 168P acquired the ability to to be neutralized by anti-V3 MAbs 257-D, 268-D and 50.1. The primary isolate could use either CCR5 or CXCR4, and was not neutralized when infection was directed via either pathway, but the TCLA derivative uses CXCR4 only and is neutralized. Thus coreceptor usage is not the primary determinant of differential neutralization sensitivity in primary versus TCLA strains.

[Laisney & Strosberg(1999)] I. L. Laisney & A. D. Strosberg. Dual specificity of a human neutralizing monoclonal antibody, specific for the V3 loop of GP120 (HIV-1). *Immunol Lett* **67**:185–92, 1999. (Medline: 99295799).

[Lake (1989)] D. Lake, T. Sugano, Y. Matsumoto, Y. Masuho, E. A. Petersen, P. Feorino, & E. M. Hersh. A Hybridoma Producing Human Monoclonal Antibody Specific for Glycoprotein 120kDa of Human Immunodeficiency Virus (HIV-1). *Life Sciences* **45**:iii–x, 1989. (Medline: 90043018).

[Lake (1992)] D. F. Lake, T. Kawamura, T. Tomiyama, W. E. Robinson, Y. Matsumoto, Y. Masuho, & E. M. Hersh. Generation and characterization of a human monoclonal antibody that neutralizes diverse HIV-1 isolates in vitro. *AIDS* **6**:17–24, 1992. (Medline: 92181621).

[Laman (1992)] J. D. Laman, M. M. Schellekens, Y. H. Abacioglu, G. K. Lewis, M. Tersmette, R. A. M. Fouchier, J. P. M. Langeduk, E. Claassen, & W. J. A. Boersma. Variant-specific monoclonal and group-specific polyclonal human immunodeficiency virus type 1 neutralizing antibodies raised with synthetic peptides from the gp120 third variable domain. *J Virol* **66**:1823–1831, 1992. (Medline: 92333709).

[Laman (1993)] J. D. Laman, M. M. Schellekens, G. K. Lewis, J. P. Moore, T. J. Matthews, J. P. M. Langedijk, R. H. Meloen, W. J. A. Boersma, & E. Claassen. A Hidden Region in the Third Variable Domain of HIV-1 IIIB gp120 Identified by a Monoclonal Antibody. *AIDS Res Hum Retroviruses* **9**:605–612, 1993. (Medline: 93378781) Notes: A peptide (FVTIGKIGNM-RQAHC) induced MAb binds to the carboxy-terminal flank of the V3-loop, but the epitope is only exposed on gp120 when it is treated with SDS-DTT.

[Langedijk (1991)] J. P. M. Langedijk, N. K. T. Back, P. J. Durda, J. Goudsmit, & R. H. Meloen. Neutralizing activity of anti-peptide antibodies against the principal neutralization domain of human immunodeficiency virus type 1. *J Gen Virol* **72**:2519–2526, 1991. (Medline: 92013970) Notes: MAbs were raised against RIQRGPGRAFVTIGK by immunizing mice. Fine structure of MAb binding sites was mapped using pepscan. Preservation of the β turn at the tip of the loop was critical.

[Langedijk (1992)] J. P. M. Langedijk, N. K. T. Back, E. Kinney-Thomas, C. Bruck, M. Francotte, J. Goudsmit, & R. H. Meloen. Comparison and fine mapping of both high and low neutralizing monoclonal antibodies against the principal neutralization domain of HIV-1. *Arch Virol* **126**:129–146, 1992. (Medline: 92398435).

[Langedijk (1995)] J. P. M. Langedijk, G. Zwart, J. Goudsmit, & R. H. Meloen. Fine Specificity of antibody recognition may predict amino acid substitution in the third variable region of gp120 during HIV Type 1 infection. *AIDS Res Hum Retroviruses* **11**:1153–62, 1995. (Medline: 96157202) Notes: To investigate how HIV-1 escapes from recognition, a panel of V3 peptides

based on sequences derived from 6 HIV-1 positive individuals was tested for reactivity with autologous sera sampled over time. The V3 region undergoes immune escape through mutation.

[Lasky (1987)] L. A. Lasky, G. Nakamura, D. H. Smith, C. Fennie, C. Shimasaki, E. Patzer, P. Berman, T. Gregory, & D. J. Capon. Delineation of a Region of the Human Immunodeficiency Virus Type 1 gp120 Glycoprotein Critical for Interaction with the CD4 Receptor. *Cell* **50**:975–985, 1987. (Medline: 87301741).

[Lee (1995)] C.-N. Lee, J. Robinson, G. Mazzara, Y.-L. Cheng, M. Essex, & T.-H. Lee. Contribution of hypervariable domains to the conformation of a broadly neutralizing glycoprotein 120 epitope. *AIDS Res Hum Retroviruses* **11**:777–781, 1995. (Medline: 96053839) Notes: Deletion of the V4 or V5 domains, in contrast to the V1, V2 and V3 domains of gp120, affect the broadly neutralizing epitope recognized by 1.5e by disturbing the overall conformation of the envelope protein.

[Lee (1997)] S. Lee, K. Peden, D. S. Dimitrov, C. C. Broder, J. Manischewitz, G. Denisova, J. M. Gershoni, & H. Golding. Enhancement of human immunodeficiency virus type 1 envelope-mediated fusion by a CD4-gp120 complex-specific monoclonal antibody. *J Virol* **71**:6037–43, 1997. (Medline: 97366665).

[Legastelois & Desgranges(2000)] I. Legastelois & C. Desgranges. Design and intracellular activity of a human single-chain antibody to human immunodeficiency virus type 1 conserved gp41 epitope. *J Virol* **74**:5712–5, 2000. (Medline: 20283832).

[Lescar (1999)] J. Lescar, J. Brynda, P. Rezacova, R. Stouracova, M. M. Riottot, V. Chitarra, M. Fabry, M. Horejsi, J. Sedlacek, & G. A. Bentley. Inhibition of the HIV-1 and HIV-2 proteases by a monoclonal antibody. *Protein Sci* **8**:2686–96, 1999. (Medline: 20095845).

[Lescar (1996)] J. Lescar, R. Stouracova, M. M. Riottot, V. Chitarra, J. Brynda, M. Fabry, M. Horejsi, J. Sedlacek, & G. A. Bentley. Preliminary crystallographic studies of an anti-HIV-1 protease antibody which inhibits enzyme activity. *Protein Sci* **5**:966–968, 1996. (Medline: 96303819).

[Lescar (1997)] J. Lescar, R. Stouracova, M. M. Riottot, V. Chitarra, J. Brynda, M. Fabry, M. Horejsi, J. Sedlacek, & G. A. Bentley. Three-dimensional structure of an Fab-peptide complex: structural basis of HIV-1 protease inhibition by a monoclonal antibody. *J Mol Biol* **267**:1207–22, 1997. (Medline: 97294651) Notes: (Genbank: U62632 U62633) F11.2.32 is a MAb raised against HIV-1 protease which inhibits proteolytic activity. The structure of the complex of the Fab fragment and the synthetic peptide that it binds to, residues 36 to 46 of protease, have been determined at 2.2 AA resolution, and that of the Fab in the free state has been determined at 2.6 AA resolution. The conformation of the bound peptide shows no overall structural similarity to the corresponding segment in HIV-1 protease.

[Levin (1997)] R. Levin, A. M. Mhashilkar, T. Dorfman, A. Bukovsky, C. Zani, J. Bagley, J. Hinkula, M. Niedrig, J. Albert, B. Wahren, H. G. Gottlinger, & W. A. Marasco. Inhibition of early and late events of the HIV-1 replication cycle by cytoplasmic Fab intrabodies against the matrix protein, p17. *Mol Med* **3**:96–110, 1997. (Medline: 97239591).

[Levy-Mintz (1996)] P. Levy-Mintz, L. Duan, H. Zhang, B. Hu, G. Dornadula, M. Zhu, J. Kulkosky, D. Bizub-Bender, A. M. Skalka, & R. J. Pomerantz. Intracellular expression of single-chain variable fragments to inhibit early stages of the viral life cycle by targeting human immunodeficiency virus type 1 Integrase. *J Virol* **70**:8821–8832, 1996. (Medline: 97126087) Notes: See comments in J Virol 1998 Apr;72(4):3505-6.

[Lewis (1991)] G. Lewis, Y. Abacioglu, T. Fouts, J. Samson, M. Mooreman, G. Baue r, R. Tuskan, G. Cole, & R. Kamin-Lewis. Epitope dominance in the antibody response to recombinant gp160 of HIV-IIIB. *Vaccines 91* pages 157–163, 1991. Notes: Editors: F. Brown, R. Chanock and H. S. Ginsberg and R. Lerner Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY.

[Li (1997)] A. Li, T. W. Baba, J. Sodroski, S. Zolla-Pazner, M. K. Gorny, J. Robinson, M. R. Posner, H. Katinger, C. F. Barbas III, D. R. Burton, T.-C. Chou, & R. M Ruprecht. Synergistic neutralization of a chimeric SIV/HIV type 1 virus with combinations of human anti-HIV type 1 envelope monoclonal antibodies or hyperimmune globulins. *AIDS Res and Human Retroviruses* **13**:647–656, 1997. (Medline: 9168233) Notes: Multiple combinations of MAbs were tested for their ability to synergize neutralization of a SHIV construct containing HIV IIIB env. All of the MAb combinations tried were synergistic, suggesting such combinations may be useful for passive immunotherapy or immunoprophylaxis. Because SHIV can replicate in rhesus macaques, such approaches can potentially be studied in an it *in vivo* monkey model.

[Li (1998)] A. Li, H. Katinger, M. R. Posner, L. Cavacini, S. Zolla-Pazner, M. K. Gorny, J. Sodroski, T. C. Chou, T. W. Baba, & R. M. Ruprecht. Synergistic neutralization of simian-human immunodeficiency virus SHIV-vpu+ by triple and quadruple combinations of human monoclonal antibodies and high-titer anti-human immunodeficiency virus type 1 immunoglobulins. *J Virol* **72**:3235–40, 1998. (Medline: 98184563).

[Li (1993)] X. Li, E. Amandoron, M. A. Wainberg, & M. A. Parniak. Generation and characterization of murine monoclonal antibodies reactive against N-terminal and other regions of HIV-1 reverse transcriptase. *J Med Virol* **39**:251–259, 1993. (Medline: 93224919).

[Liao (2000)] M. Liao, Y. Lu, Y. Xiao, M. P. Dierich, & Y. Chen. Induction of high level of specific antibody response to the neutralizing epitope ELDKWA on HIV-1 gp41 by peptide-vaccine* [In Process Citation]. *Peptides* **21**:463–8, 2000. (Medline: 20283864).

[Linsley (1988)] P. S. Linsley, J. A. Ledbetter, E. Kinney-Thomas, & S.-L. Hu. Effects of Anti-gp120 Monoclonal Antibodies on CD4 Receptor Binding by the env Protein of Human Immunodeficiency Virus Type 1. *J Virol* **62**:3695–3702, 1988. (Medline: 88333143).

[Liou (1989)] R. S. Liou, E. M. Rosen, M. S. C. Fung, W. N. C. Sun, C. Sun, W. Gordon, N. T. Chang, & T. W. Chang. A chimeric mouse-human antibody that retains specificity for HIV-1 gp120 and mediates the lysis of the HIV-1-infected cells. *J Immunol* **143**:3967–3975, 1989. (Medline: 90078997).

[Litwin (1996)] V. Litwin, K. A. Nagashima, A. M. Ryder, C. H. Chang, J. M. Carver, W. C. Olson, M. Alizon, K. W. Hasel, P. J. Maddon, & G. P. Allaway. Human immunodeficiency virus type 1 membrane fusion mediated by a laboratory-adapted strain and a primary isolate analyzed by resonance energy transfer. *J Virol* **70**:6437–6441, 1996. (Medline: 96323171) Notes: Fusion of primary (JRFL) and TCLA (LAI) strains of the virus were studied. The degree, kinetics, neutral pH and divalent cations requirements were similar for membrane fusion for both viruses. However, the inhibition of fusion by sCD4 and CD4-IgG2 occurred at virus neutralization concentrations for JRFL, but higher concentrations were required to inhibit LAI fusion than to neutralize LAI, suggesting that viral neutralization and fusion-inhibition are distinct.

[Liu (1995)] X. Liu, A. Ota, M. Watanabe, S. Ueda, A. Saitoh, H. Shinagawa, A. Nakata, T. Kurimura, X. Wang, Y. Zhao, & et al. Three antigenic regions in p17 of human immunodeficiency virus type 1 (HIV-1) revealed by mouse monoclonal antibodies and human antibodies in HIV-1 carrier sera. *Microbiol Immunol* **39**:775–85, 1995. (Medline: 96156439).

[Llorente (1999)] M. Llorente, S. Sanchez-Palomino, S. Manes, P. Lucas, L. Kremer, I. M. De Alboran, J. L. Toran, J. Alcami, G. Del Real, & M.-A. C. Natural human antibodies retrieved by phage display libraries from healthy donors: polyreactivity and recognition of human immunodeficiency virus type 1gp120 epitopes. *Scand J Immunol* **50**:270–9, 1999. (Medline: 99377229).

[Locher (1999)] C. P. Locher, R. M. Grant, E. A. Collisson, G. Reyes-Teran, T. Elbeik, J. O. Kahn, & J. A. Levy. Antibody and cellular immune responses in breakthrough infection subjects after HIV type 1 glycoprotein 120 vaccination. *AIDS Res Hum Retroviruses* **15**:1685–9, 1999. (Medline: 20072107).

[Loomis-Price (1997)] L. D. Loomis-Price, M. Levi, P. R. Burnett, J. E. van Hamont, R. A. Shafer, B. Wahren, & D. L. Birx. Linear epitope mapping of humoral responses induced by vaccination with recombinant HIV-1 Envelope protein gp160. *J Ind Microbiol Biotechnol* **19**:58–65, 1997. (Medline: 97426676).

[Lopalco (1993)] L. Lopalco, R. Longhi, F. Ciccomascolo, A. De Rossi, M. Pelagi, F. Andronico, J. P. Moore, B. T. Schulz, A. Beretta, & A. G. Siccardi. Identification of human immunodeficiency virus type 1 glycoprotein gp120/gp41 interacting sites by the idiotypic mimicry of two monoclonal antibodies. *AIDS Res Hum Retroviruses* **9**:33–39, 1993. (Medline: 93152284) Notes: The MAb M38 binds to the carboxy terminus of gp120, in a gp41 binding region. This MAb was used to create an anti-idiotype MAb, 9G5A, which can bind to gp41 at the base of the cysteine loop. The binding domains of these two monoclonals are consistent with the C5 domain of gp120 being able to bind to the gp41 cysteine loop. The MAb M38 also binds to human HLA molecules, in antigenic homology or possibly molecular mimicry.

[Lu (2000a)] Y. Lu, Y. Xiao, J. Ding, M. Dierich, & Y. H. Chen. Immunogenicity of neutralizing epitopes on multiple-epitope vaccines against HIV-1. *Int Arch Allergy Immunol* **121**:80–4, 2000a. (Medline: 20153311).

[Lu (2000b)] Y. Lu, Y. Xiao, J. Ding, M. P. Dierich, & Y. H. Chen. Multi-epitope vaccines intensively increased levels of antibodies recognizing three neutralizing epitopes on human immunodeficiency virus-1 envelope protein. *Scand J Immunol* **51**:497–501, 2000b. (Medline: 20253466).

[Lundin (1996)] K. Lundin, A. Samuelsson, M. Jansson, J. Hinkula J, B. Wahren, H. Wigzell, & M. A. Persson. Peptides isolated from random peptide libraries on phage elicit a neutralizing anti-HIV-1 response: analysis of immunological mimicry. *Immunology* **89**:579–586, 1996. (Medline: 9014825).

[Ly & Stamatatos(2000)] A. Ly & L. Stamatatos. V2 loop glycosylation of the human immunodeficiency virus type 1 SF162 envelope facilitates interaction of this protein with CD4 and CCR5 receptors and protects the virus from neutralization by anti-V3 loop and anti-CD4 binding site antibodies [In Process Citation]. *J Virol* **74**:6769–76, 2000. (Medline: 20347338).

[Maciejewski (1995)] J. P. Maciejewski, F. F. Weichold, N. S. Young, A. Cara, D. Zella, M. S. Reitz Jr, & R. C. Gallo. Intracellular expression of antibody fragments directed against HIV reverse transcriptase prevents HIV infection in vitro. *Nat Med* **1**:667–673, 1995. (Medline: 96071529) Notes: Transduction of genes that encode and express anti-RT Fab inhibit the enzyme, making cells resistant to HIV infection by blocking an early stage of viral replication. The authors propose that if transduction of a vector into lymphohaematopoietic stem cells or mature lymphocytes becomes feasible, gene transfer therapy has promise for treating AIDS.

[Maeda (1992)] Y. Maeda, S. Matsushita, T. Hattori, T. Murakami, & K. Takatsuki. Changes in the Reactivity and Neutralizing Activity of a Type-Specific Neutralizing Monoclonal Antibody Induced by Interaction of Soluble CD4 with gp120. *AIDS Res Hum Retroviruses* **8**:2049–2054, 1992. (Medline: 93152278).

[Manca (1995)] F. Manca, D. Fenoglio, M. T. Valle, G. L. Pira, A. Kunkl, R. S. Balderas, R. G. Baccala, D. H. Kono, A. Ferraris, D. Saverino, F. Lancia, L. Lozzi, & A. N. Theofilopoulos. Human T helper cells specific for HIV reverse transcriptase: possible role in intrastructural help for HIV envelope-specific antibodies. *Eur J Immunol* **25**:1217–1223, 1995. (Medline: 95293014).

[Mani (1994)] J.-C. Mani, V. Marchi, & C. Cucurou. Effect of HIV-1 peptide presentation on the affinity constants of two monoclonal antibodies determined by BIAcore technology. *Mol Immunol* **31**:439–444, 1994. (Medline: 94239428) Notes: Two MAbs are described; one 41-1 did not require the Cys-Cys disulfide bridge and loop formation, the other 9-11 depends on loop formation.

[Marasco (1992)] W. A. Marasco, J. Bagley, C. Zani, M. Posner, L. Cavacini, W. A. Haseltine, & J. Sodroski. Characterization of the cDNA of a Broadly Reactive Neutralizing Human anti-gp120 Monoclonal Antibody. *J Clin Invest* **90**:1467–1478, 1992. (Medline: 930168791).

[Marasco (1993)] W. A. Marasco, W. A. Haseltine, & S. Y. Chen SY. Design, intracellular expression, and activity of a human anti-human immunodeficiency virus type 1 gp120 single-chain antibody. *Proc Natl Acad Sci USA* **90**:7889–7893, 1993. (Medline: 93361551) Notes: Comment in: Proc Natl Acad Sci USA 1993 90:7427-8.

[Marks (1992)] J. D. Marks, B. Wahren, G. Gilljam, J. Hinkula, & G. Winter. Cloning of an HIV-1 neutralizing V3 specific monoclonal antibody and expression as a mouse-human chimaeric antigen binding fragment and antibody. *J Acquir Immune Defic Syndr* **1991**:1162, 1992. Notes: Aidsline: 1116291Abstract: VIIth International Conference on AIDS, Florence, Italy, proceedings.

[Maroun (1999)] R. G. Maroun, D. Krebs, M. Roshani, H. Porumb, C. Auclair, F. Troalen, & S. Fermandjian. Conformational aspects of HIV-1 integrase inhibition by a peptide derived from the enzyme central domain and by antibodies raised against this peptide. *Eur J Biochem* **260**:145–55, 1999. (Medline: 99191694).

[Mascola (1997)] J. R. Mascola, M. K. Louder, T. C. VanCott, C. V. Sapan, J. S. Lambert, L. R. Muenz, B. Bunow, D. L. Birx, & M. L. Robb. Potent and synergistic neutralization of human immunodeficiency virus (HIV) type 1 primary isolates by hyperimmune anti-HIV immunoglobulin combined with monoclonal antibodies 2F5 and 2G12. *J Virol* **71**:7198–206, 1997. (Medline: 97456478) Notes: HIVIG derived from the plasma of HIV-1-infected donors, and MAbs 2F5 and 2G12 were tested against a panel of 15 clade B HIV-1 isolates, using a single concentration that is achievable *in vivo* (HIVIG, 2,500 microg/ml; MAbs, 25 microg/ml). While the three antibody reagents neutralized many of the viruses tested, potency varied. The virus neutralization achieved by double or triple combinations was generally equal to or greater than that predicted by the effect of individual antibodies, and the triple combination was shown to be synergistic and to have the greatest breadth and potency. Passive immunotherapy for treatment or prophylaxis of HIV-1 should consider mixtures of these potent neutralizing antibody reagents.

[Matsuo (1992)] K. Matsuo, Y. Nishino, T. Kimura, R. Yamaguchi, A. Yamazaki, T. Mikami, & K. Ikuta. Highly conserved epitope domain in major core protein p24 is structurally similar among human, simian and feline immunodeficiency viruses. *J Gen Virol* **73**:2445–2450, 1992. (Medline: 93019072) Notes: Two MAbs are described that bind to a highly conserved region in p24, with antigenic conservation between FIV, SIV and HIV-1. The authors suggest this might be an immunodominant domain.

[Matsushita (1992)] S. Matsushita, H. Maeda, K. Kimachi, Y. Eda, Y. Maeda, T. Murakami, S. Tokiyoshi, & K. Takatsuki. Characterization of a mouse/human chimeric monoclonal antibody (Cβ1) to a principal neutralizing domain of the human immunodeficiency virus type 1 envelope protein. *AIDS Res Hum Retroviruses* **8**:1107–1115, 1992. (Medline: 92368728).

[Matsushita (1995)] S. Matsushita, S. Matsumi, K. Yoshimura, T. Morikita, T. Murakami, & K. Takatsuki. Neutralizing monoclonal antibodies against human immunodeficiency virus type 2 gp120. *J Virol* **69**:3333–3340, 1995. (Medline: 95264421).

[Matsushita (1988)] S. Matsushita, M. Rober-Guroff, J. Rusche, A. Koito, T. Hattori, H. Hoshino, K. Javaherian, K. Takatsuki, & S. Putney. Characterization of a Human Immunodeficiency Virus neutralizing monoclonal antibody and mapping the neutralizing epitope. *J Virol* **62**:2107–2114, 1988. (Medline: 88215041).

[McDougal (1996)] J. S. McDougal, M. S. Kennedy, S. L. Orloff, J. K. A. Nicholson, & T. J. Spira. Mechanisms of human immunodeficiency virus type 1 (HIV-1) neutralization: Irreversible inactivation of infectivity by anti-HIV-1 antibody. *J Virol* **70**:5236–5245, 1996. (Medline: 96357049) Notes: Studies of polyclonal sera autologous virus inactivation indicates that in individuals over time, viral populations emerge that are resistant to inactivating effects of earlier sera.

[McElrath (2000)] M. J. McElrath, L. Corey, D. Montefiori, M. Wolff, D. Schwartz, M. Keefer, R. Belshe, B. S. Graham, T. Matthews, P. Wright, G. Gorse, R. Dolin, P. Berman, D. Francis, A. M. Duliege, D. Bolognesi, D. Stablein, N. Ketter, & P. Fast. A phase II study of two HIV type 1 envelope vaccines, comparing their immunogenicity in populations at risk for acquiring HIV type 1 infection. AIDS Vaccine Evaluation Group [In Process Citation]. *AIDS Res Hum Retroviruses* **16**:907–19, 2000. (Medline: 20331871).

[McKeating(1996)] J. A. McKeating. Biological consequences of human immunodeficiency virus type 1 envelope polymorphism: does variation matter? 1995 Fleming Lecture. *J Gen Virol* **77**:2905–2919, 1996. (Medline: 97152498).

[McKeating (1993a)] J. A. McKeating, J. Bennett, S. Zolla-Pazner, M. Schutten, S. Ashelford, A. Leigh-Brown, & P. Balfe. Resistance of a human serum-selected human immunodeficiency virus type 1 escape mutant to neutralization by CD4 binding site monoclonal antibodies is conferred by a single amino acid change in gp120. *J Virol* **67**:5216–5225, 1993a. (Medline: 93353595).

[McKeating (1992a)] J. A. McKeating, J. Cordell, C. J. Dean, & P. Balfe. Synergistic interaction between ligands binding to the CD4 binding site and V3 domain of human immunodeficiency virus type I gp120. *Virology* **191**:732–742, 1992a. (Medline: 93079876).

[McKeating (1992b)] J. A. McKeating, J. P. Moore, M. Ferguson, H. S. Marsden, S. Graham, J. W. Almond, D. J. Evans, & R. A. Weiss. Monoclonal antibodies to the C4 region of human immunodeficiency virus type 1 gp120: use in topological analysis of a CD4 binding site. *AIDS Res Hum Retroviruses* **8**:451–459, 1992b. (Medline: 92287630) Notes: Antibodies were generated using an antigen poliovirus chimera, expressing aa430-446 of gp120. Results suggest that WQEVGKAMYA may be exposed on the surface of rec gp120.

[McKeating (1993b)] J. A. McKeating, C. Shotton, J. Cordell, S. Graham, P. Balfe, N. Sullivan, M. Charles, M. Page, A. Bolmstedt, S. Olofsson, S. C. Kayman, Z. Wu, A. Pinter, C. Dean, J. Sodroski, & R. A. Weiss. Characterization of neutralizing monoclonal antibodies to linear and conformation-dependent epitopes within the first and second variable domains of human immunodeficiency virus type 1 gp120. *J Virol* **67**:4932–4944, 1993b. (Medline: 93323237) Notes: Substitutions in the V2 loop can result in complete dissociation of gp120 and gp41, suggesting alterations in V2 can affect subunit assembly. Other substitutions allowed gp120-gp41 association and expression, but inhibited viral entry or syncytia. Binding of some neutralizing MAbs was altered by V2 substitutions. For MAb CRA-4, changes at residues 191/192/193 (YSL/GSS), and for 11/68b, changes at residues 183/184 (PI/SG), within V2, and for both MAbs a position 435 (Y/H) change in C4, abrogate binding. These MAbs can bind to V1 and V2 domains in the

absence of C4 domain, so the C4 substitution probably results in conformational change.

[McKeating (1992c)] J. A. McKeating, M. Thali, C. Furman, S. Karwowska, M. K. Gorny, J. Cordell, S. Zolla-Pazner, J. Sodroski, & R. A. Weiss. Amino acid residues of the human immunodeficiency virus type 1 gp120 critical for the binding of rat and human neutralizing antibodies that block the gp120-sCD4 interaction. *Virology* **190**:134–142, 1992c. (Medline: 92410588).

[McKeating (1996)] J. A. McKeating, Y. J. Zhang, C. Arnold, R. Fredriksson, E. M. Fenyo, & P. Balfe. Chimeric viruses expressing primary envelope glycoproteins of human immunodeficiency virus type I show increased sensitivity to neutralization by human sera. *Virology* **220**:450–460, 1996. (Medline: 8661395) Notes: Chimeric viruses for HXB2 with primary isolate gp120 gave patterns of cell tropism and cytopathicity identical to the original primary viruses. Sera that were unable to neutralize the primary isolates were in some cases able to neutralize chimeric viruses, indicating that some of the neutralizing epitopes were in gp41.

[McKnight (1995)] A. McKnight, R. A. Weiss, C. Shotton, Y. Takeuchi, H. Hoshino, & P. R. Clapham. Change in tropism upon immune escape by human immunodeficiency virus. *J Virol* **69**:3167–3170, 1995. (Medline: 95222771).

[McLain & Dimmock(1994)] L. McLain & N. J. Dimmock. Single- and multi-hit kinetics of immunoglobulin G neutralization of human immunodeficiency virus type 1 by monoclonal antibodies. *J Gen Virol* **75**:1457–1460, 1994. (Medline: 94267431).

[Metlas (1999a)] R. Metlas, D. Trajkovic, T. Srdic, V. Veljkovic, & A. Colombatti. Human immunodeficiency virus V3 peptide-reactive antibodies are present in normal HIV-negative sera. *AIDS Res Hum Retroviruses* **15**:671–7, 1999a. (Medline: 99260289).

[Metlas (1999b)] R. Metlas, D. Trajkovic, T. Srdic, V. Veljkovic, & A. Colombatti. Anti-V3 and anti-IgG antibodies of healthy individuals share complementarity structures. *J Acquir Immune Defic Syndr* **21**:266–70, 1999b. (Medline: 99355057).

[Mhashilkar (1995)] A. M. Mhashilkar, J. Bagley, S. Y. Chen, A. M. Szilvay, D. G. Helland, & W. A. Marasco. Inhibition of HIV-1 Tat-mediated LTR transactivation and HIV-1 infection by anti-Tat single chain intrabodies. *EMBO J* **14**:1542–1551, 1995. (Medline: 95246747) Notes: Anti-Tat intrabodies specific for the N-terminal activation domain of Tat, block Tat-mediated transactivation of the HIV-1 LTR and intracellular trafficking of Tat in mammalian cells. Thus single chain intrabodies can effectively target molecules in the cytoplasm and nuclear compartments of eukaryotic cells and anti-Tat intrabodies may be useful for gene therapy of HIV-1 infection and AIDS.

[Millar (1998)] A. L. Millar, N. A. Jackson, H. Dalton, K. R. Jennings, M. Levi, B. Wahren, & N. J. Dimmock. Rapid analysis of epitope-paratope interactions between HIV-1 and a 17- amino-acid neutralizing microantibody by electrospray ionization mass spectrometry. *Eur J Biochem* **258**:164–9, 1998. (Medline: 99067031).

[Mitchell (1998)] W. M. Mitchell, L. Ding, & J. Gabriel. Inactivation of a common epitope responsible for the induction of antibody-dependent enhancement of HIV. *AIDS* **12**:147–56, 1998. (Medline: 98127881).

[Mo (1997)] H. Mo, L. Stamatatos, J. E. Ip, C. F. Barbas, P. W. H. I. Parren, D. R. Burton, J. P. Moore, & D. D. Ho. Human immunodeficiency virus type 1 mutants that escape neutralization by human monoclonal antibody IgG1b12. *J Virol* **71**:6869–6874, 1997. (Medline: 97404700) Notes: A JRCSF resistant variant was selected by culturing in the presence of IgG1b12. The resistant virus remained sensitive to 2G12 and 2F5 and to CD4-IgG, encouraging for the possibility of combination therapy.

[Moja (2000)] P. Moja, C. Tranchat, I. Tchou, B. Pozzetto, F. Lucht, C. Desgranges, & C. Genin. Neutralization of human immunodeficiency virus type 1 (HIV-1) mediated by parotid IgA of HIV-1-infected patients [In Process Citation]. *J Infect Dis* **181**:1607–13, 2000. (Medline: 20283727).

[Momany (1996)] C. Momany, L. C. Kovari, A. J. Prongay, W. Keller, R. K. Gitti, B. M. Lee, A. E. Gorbalenya, L. Tong, J. McClure, L. S. Ehrlich, M. F. Summers, C. Carter, & M. G. Rossman. Crystal structure of dimeric HIV-1 capsid protein. *Nature Struct Biol* **3**:763–770, 1996. (Medline: 96378787).

[Mondor (1998)] I. Mondor, S. Ugolini, & Q. J. Sattentau. Human immunodeficiency virus type 1 attachment to HeLa CD4 cells is CD4 independent and gp120 dependent and requires cell surface heparans. *J Virol* **72**:3623–34, 1998. (Medline: 98216721).

[Montefiori & Evans(1999)] D. Montefiori & T. Evans. Toward an HIV Type 1 vaccine that generates potent broadly cross-reactive neutralizing antibodies. *AIDS Res and Human Retroviruses* **15**:689–98, 1999. (Medline: 99284356).

[Montefiori (1993)] D. C. Montefiori, B. S. Graham, J. Zhou, J. Zhou, R. A. Bucco, D. H. Schwartz, L. A. Cavacini, M. R. Posner, & the NIH-NIAID AIDS Vaccine Clinical Trials Network. V3-Specific Neutralizing Antibodies in Sera From HIV-1 gp160-immunized Volunteers Block Virus Fusion and Act Synergistically with Human Monoclonal Antibody to the Conformation-dependent CD4 Binding Site of gp120. *J Clin Invest* **92**:840–847, 1993. (Medline: 93352832).

[Montefiori (1991)] D. C. Montefiori, I. Y. Zhou, B. Barnes, D. Lake, E. M. Hersh, Y. Masuho, & L. B. Lefkowitz Jr. Homotypic antibody responses to fresh clinical isolates of human immunodeficiency virus. *Virology* **182**:635–643, 1991. (Medline: 91220713).

[Moore & Trkola(1997)] J. Moore & A. Trkola. HIV type 1 coreceptors, neutralization serotypes and vaccine development. *AIDS Res Hum Retroviruses* **13**:733–736, 1997. (Medline: 97315042).

[Moore(1990)] J. P. Moore. Simple methods for monitoring HIV-1 and HIV-2 gp120 binding to soluble CD4 by enzyme-linked immunosorbent assay: HIV-2 has a 25-fold lower affinity and HIV-1 for soluble CD4. *AIDS NY* **4**:297, 1990. (Medline: 90274915).

[Moore & Binley(1998)] J. P. Moore & J. Binley. HIV Envelope's letters boxed into shape. *Nature* **393**:630–631, 1998. (Medline: 98303375) Notes: Comment on Nature 1998 Jun 18;393(6686):648-59 and Nature 1998 Jun 18;393(6686):705-11.

[Moore (1994a)] J. P. Moore, Y. Cao, D. D. Ho, & R. A. Koup. Development of the anti-gp120 antibody response during seroconversion to human immunodeficiency virus type 1. *J Virol* **68**:5142–5155, 1994a. (Medline: 94309181) Notes: Three seroconverting individuals were studied. The earliest detectable anti-gp120 antibodies were both conformational and anti-V3 loop, and could be detected only after the peak viremia has passed. No uniform pattern of autologous neutralizing anti-CD4BS or anti-V3 MAbs was observed.

[Moore (1995a)] J. P. Moore, Y. Cao, L. Qing, Q. J. Sattentau, J. Pyati, R. Koduri, J. Robinson, C. F. Barbas III, D. R. Burton, & D. D. Ho. Primary isolates of human immunodeficiency virus type I are relatively resistant to neutralization by monoclonal antibodies to gp120, and their neutralization is not predicted by studies with monomeric gp120. *J Virol* **69**:101–109, 1995a. (Medline: 95074853) Notes: A panel of anti-gp120 MAbs and sera from HIV-1 infected individuals was tested for its ability to neutralize primary isolates. Most MAbs bound with high affinity to gp120 monomers from the various isolates, but were not effective at neutralizing. The MAb IgG1b12, which binds to a discontinuous anti-CD4 binding site epitope, was able to neutralize most of the primary isolates.

[Moore & Ho(1993)] J. P. Moore & D. D. Ho. Antibodies to discontinuous or conformationally sensitive epitopes on the gp120 glycoprotein of human immunodeficiency virus type 1 are highly prevalent in sera of infected humans. *J Virol* **67**:863–875, 1993. (Medline: 93124581) Notes: CD4BS antibodies are prevalent in HIV-1-positive sera, while neutralizing MAbs to C4, V2, and V3 and MAbs to linear epitopes are less common. Most linear epitope MAbs in human sera are directed against the V3 region, and cross-reactive MAbs tend to be directed against discontinuous epitopes.

[Moore & Ho(1995)] J. P. Moore & D. D. Ho. HIV-1 neutralization: the consequences of adaptation to growth on transformed T-cells. *AIDS* **9 suppl A**:S117–S136, 1995. (Medline: 96416784) Notes: This review considers the relative importance of a neutralizing antibody response for the development of a vaccine, and for disease progression during the chronic phase of HIV-1 infection. It suggests that T-cell immunity may be more important. The distinction between MAbs that can neutralize primary isolates, and those that are effective at neutralizing only laboratory adapted strains is discussed in detail. Alternative conformations of envelope and non-contiguous interacting domains in gp120 are discussed. The suggestion that soluble monomeric gp120 may serve as a viral decoy that diverts the humoral immune response it *in vivo* is put forth.

[Moore (1994b)] J. P. Moore, F. E. McCutchan, S.-W. Poon, J. Mascola, J. Liu, Y. Cao, & D. D. Ho. Exploration of antigenic variation in gp120 from clades A through F of human immunodeficiency virus type 1 by using monoclonal antibodies. *J Virol* **68**:8350–8364, 1994b. (Medline: 95056067) Notes: Four of five anti-V3 MAbs were slightly cross-reactive within clade B, but not very reactive outside clade B. Two discontinuous CD4 binding site Mabs appear to be pan-reactive. Anti-V2 MAbs were only sporadically reactive inside and outside of clade B.

[Moore (1990)] J. P. Moore, J. A. McKeating, R. A. Weiss, & Q. J. Sattentau. Dissociation of gp120 from HIV-1 virions induced by soluble CD4. *Science* **250**:1139–1142, 1990. (Medline: 91068008).

[Moore (1994c)] J. P. Moore, Q. J. Sattentau, R. Wyatt, & J. Sodroski. Probing the Structure of the Human Immunodeficiency Virus Surface Glycoprotein gp120 with a Panel of monoclonal antibodies. *J Virol* **68**:469–484, 1994c. (Medline: 94076440) Notes: . This study compared a large number of MAbs that bind to linear epitopes of gp120, and compared binding affinities for: i) native and SDS-DDT denatured gp120, (clone BH10 of the LAI isolate expressed in CHO cells); ii) recombinant gp120 lacking the V1, V2, V3 loops; iii) a panel of 20 mer peptides; iv) a panel of gp120 mutants; and v) oligomeric versus monomeric gp120. The binding ratio of native versus denatured monomeric gp120 is included in the table in this database. These numbers should be considered with the following points in mind: a continuous epitope may be partially exposed on the surface; and a preparation of rgp120 is not homogeneous and contains fully folded, partly denatured, and some completely unfolded species, so the conformation of what is considered to be a native protein will not only reflect fully folded gp120. The authors suggest that a fivefold increase in the affinity for a MAb binding to denatured versus native gp120 indicates that the epitope is inaccessible in the native form. We also have included here information extracted from Moore *et al*'s list of the gp120 mutations that reduced the binding of a particular MAb. In mapping of exposed regions of gp120, C2, C3, and C5 domain epitopes were found to bind preferentially to denatured gp120. V1, V2 and V3, part of C4, and the extreme carboxy terminus of C5 were exposed on the native monomer. In the oligomeric form of the molecule, only V2, V3 and part of C4 are well exposed as continuous epitopes.

[Moore (1993a)] J. P. Moore, Q. J. Sattentau, H. Yoshiyama, M. Thali, M. Charles, N. Sullivan, S.-W. Poon, M. S. Fung, F. Traincard, M. Pinkus, G. Robey, J. E. Robinson, D. D. Ho, & J. Sodroski. Probing the structure of the V2 domain of human immunodeficiency virus type 1 surface glycoprotein gp120 with a panel of eight monoclonal antibodies: human immune response to the V1 and V2 domains. *J Virol* **67**:6136–6151, 1993a. (Medline: 93381817).

[Moore & Sodroski(1996)] J. P. Moore & J. Sodroski. Antibody cross-competition analysis of the human immunodeficiency virus type 1 gp120 exterior envelope glycoprotein. *J Virol* **70**:1863–1872, 1996. (Medline: 96190589) Notes: 46 anti-gp120 monomer MAbs were used to create a competition matrix, and MAb competition groups were defined. The data suggests that there are two faces of the gp120 glycoprotein: a face occupied by the CD4BS, which is presumably also exposed on the oligomeric envelope glycoprotein complex, and a second face which is presumably inaccessible on the oligomer and interacts with a number of nonneutralizing antibodies.

[Moore (1993b)] J. P. Moore, M. Thali, B. A. Jameson, F. Vignaux, G. K. Lewis, S.-W. Poon, M. S. Fung, P. J. Durda, L. Akerblom, B. Wahren, D. D. Ho, Q. J. Sattentau, & J. Sodroski. Immunochemical analysis of the gp120 surface glycoprotein of human immunodeficiency virus type 1: Probing the structure of the C4 and V4 domains and the interaction of the C4 domain with the V3 loop. *J Virol* **73**:4785–4796, 1993b. (Medline: 93323221) Notes: General observations: C4 and V3 MAbs are sensitive to the way the epitopes are presented, and this sensitivity cannot be correlated to peptide binding. Some V3-C4 domain interaction was indicated based on mutation and interference studies.

[Moore (1995b)] J. P. Moore, A. Trkola, B. Korber, L. J. Boots, J. A. Kessler II, F. E. McCutchan, J. Mascola, D. D. Ho, J. Robinson, & A. J. Conley. A human monoclonal antibody to a complex epitope in the V3 region of gp120 of human immunodeficiency virus type 1 has broad reactivity within and outside clade B. *J Virol* **69**:122–130, 1995b. (Medline: 95074855) Notes: The epitope was defined as including amino acids on both sides of the loop of the V3 loop: -I—-G–FY-T, where the G is the second G of the GPGR tip of the loop. This antibody bound well to gp120 molecules from clades A,B,C,E, and F, when the critical amino acids were present. Binding did not parallel neutralization however; 19b could produce a 50-fold reduction of infectivity in some primary B isolates, and in C clade isolates at low virus input concentrations, but not in isolates from all clades where binding could occur (A,E, and F).

[Moore (1994d)] J. P. Moore, R. L. Willey, G. K. Lewis, J. Robinson, & J. Sodroski. Immunological evidence for interactions between the first, second and fifth conserved domains of the gp120 surface glycoprotein of human immunodeficiency virus type 1. *J Virol* **68**:6836–6847, 1994d. (Medline: 95018590) Notes: Mutation 267N/Q in C2 region results in exposing the carboxy-terminal end gp120.

[Moore (1993c)] J. P. Moore, H. Yoshiyama, D. D. Ho, J. E. Robinson, & J. Sodroski. Antigenic variation in gp120s from molecular clones of HIV-1 LAI. *AIDS Res Hum Retroviruses* **9**:1185–1193, 1993c. (Medline: 94190623) Notes: The binding of MAbs to four molecular clones of HIV-1 LAI: HxB2, HxB3, Hx10, and NL4-3, was measured. Despite the close relationship between these clones, there is considerable variation in their antigenic structure,

judged by MAb reactivities to the V2, V3, and C4 domains and to discontinuous epitopes. Small variations in sequence can profoundly affect recognition of gp120 by all five groups of defined anti-gp120 neutralizing antibodies.

[Moran (1993)] M. J. Moran, J. S. Andris, Y.-I. Matsumato, J. D. Capra, & E. M. Hersh. Variable region genes of anti-HIV human monoclonal antibodies: Non-restricted use of the V gene repertoire and extensive somatic mutation. *Mol Immunol* **30**:1543–1551, 1993. (Medline: 94049845) Notes: Sequenced variable regions from four human anti-HIV-1 MAbs: anti-gp120 13, S1-1 and HBW4; and anti-gp41 No.86. Extensive somatic mutation was observed and under-representation of V_H III usage.

[Morner (1999)] A. Morner, A. Achour, M. Norin, R. Thorstensson, & E. Bjorling. Fine characterization of a V3-region neutralizing epitope in human immunodeficiency virus type 2 [In Process Citation]. *Virus Res* **59**:49–60, 1999. (Medline: 20311226).

[Muhlbacher (1999)] M. Muhlbacher, M. Spruth, F. Siegel, R. Zangerle, & M. P. Dierich. Longitudinal study of antibody reactivity against HIV-1 envelope and a peptide representing a conserved site on Gp41 in HIV-1-infected patients. *Immunobiology* **200**:295–305, 1999. (Medline: 99344625).

[Muller (1991)] S. Muller, H.-T. Wang, S.-V. Kaveri, S. Chattopadhyay, & H. Kohler. Generation and Specificity of Monoclonal Anti-Idiotypic Antibodies Against Human HIV-Specific Antibodies. *J Immunol* **147**:933–941, 1991. (Medline: 91318181).

[Muster (1995)] T. Muster, B. Ferko, A. Klima, M. Purtscher, A. Trkola, P. Schulz, A. Grassauer, O. G. Englehard, A. Garcia-Sastre, P. Palese, & H. Katinger. Mucosal Model of Immunization against human immunodeficiency virus type 1 with a chimeric influenza virus. *J Virol* **69**:6678–6686, 1995. (Medline: 96013760).

[Muster (1994)] T. Muster, R. Guinea, A. Trkola, M. Purtscher, A. Klima, F. Steindl, P. Palese, & H. Katinger. Cross-Neutralization activity against divergent human immunodeficiency virus type 1 isolates induced by the gp41 sequence ELDKWAS. *J Virol* **68**:4031–4034, 1994. (Medline: 94246751).

[Muster (1993)] T. Muster, F. Steindl, M. Purtscher, A. Trkola, A. Klima, G. Himmler, F. Ruker, & H. Katinger. A conserved neutralizing epitope on gp41 of human immunodeficiency virus type 1. *J Virol* **67**:6642–6647, 1993. (Medline: 94016848) Notes: Peptides containing the amino acid sequence LDKWAS or DKWASL showed reduced reactivity. The peptides LELDKW and KWASLW showed no significant reaction. These data suggest that the epitope of the MAb 2F5 comprises the amino acid sequence ELDKWA, with DKWA being the core sequence.

[Myers (1993)] R. Myers, T. Meiller, W. Falkler, J. Patel, & J. Joseph. A human monoclonal antibody to a cryptic gp41 epitope on HIV-1 infected cells. *Abstr Gen Meet Am Soc Microbiol* **93**:444, 1993. Notes: Aidsline: 93291838 Abstract T70.

[Nakamura (1992)] G. R. Nakamura, R. Byrn, K. Rosenthal, J. P. Porter, M. R. Hobbs, L. Riddle, D. J. Eastman, D. Dowbenko, T. Gregory, B. M. Fendly, & P. W. Berman. Monoclonal antibodies to the extracellular domain of HIV-1 IIIB gp160 that neutralize infectivity, block binding to CD4, and react with diverse isolates. *AIDS Res Hum Retroviruses* **8**:1875–1885, 1992. (Medline: 93143997).

[Nakamura (1993)] G. R. Nakamura, R. Byrn, D. M. Wilkes, J. A. Fox, M. R. Hobbs, R. Hastings, H. C. Wessling, M. A. Norcross, B. M. Fendly, & P. W. Berman. Strain specificity and binding affinity requirements of neutralizing monoclonal antibodies to the C4 domain of gp120 from human immunodeficiency virus type 1. *J Virol* **67**:6179–6191, 1993. (Medline: 93381821) Notes: Multiple CD4 binding domain antibodies are described; only one has a linear peptide reactivity (13H8). A V3 loop binding antibody is also described (1026).

[Nara (1990)] P. L. Nara, L. Smit, N. Dunlop, W. Hatch, M. Merges, D. Waters, J. Kelliher, R. C. Gallo, P. J. Fischinger, & J. Goudsmit. Emergence of viruses resistant to neutralization by V3-specific antibodies in experimental human immunodeficiency virus type 1 IIIB infection of chimpanzees. *J Virol* **64**:3779–3791, 1990. (Medline: 90317876).

[Neshat (2000)] M. N. Neshat, L. Goodglick, K. Lim, & J. Braun. Mapping the B cell superantigen binding site for HIV-1 gp120 on a V(H)3 Ig. *Int Immunol* **12**:305–12, 2000. (Medline: 20166982).

[Neurath (1995)] A. R. Neurath, N. Strick, K. Lin, & S. Jiang. Multifaceted consequences of anti-gp41 monoclonal antibody 2F5 binding to HIV type 1 virions. *AIDS Res Hum Retroviruses* **11**:687–96, 1995. (Medline: 96078229).

[Niedrig (1992a)] M. Niedrig, M. Broker, G. Walter, W. Stuber, H.-P. Harthus, S. Mehdi, H. R. Gelderblom, & G. Pauli. Murine monoclonal antibodies

directed against the transmembrane protein gp41 of human immunodeficiency virus type 1 enhance its infectivity. *J Gen Virol* **73**:951–954, 1992a. (Medline: 92341076).

[Niedrig (1992b)] M. Niedrig, H.-P. Harthus, M. Broker, H. Bickhard, G. Pauli, H. R. Gelderblom, & B. Wahren. Inhibition of viral replication by monoclonal antibodies directed against human immunodeficiency virus gp120. *J Gen Virol* **73**:2451–2455, 1992b. (Medline: 93019073).

[Niedrig (1991)] M. Niedrig, J. Hinkula, H.-P. Harthus, M. Broker, L. Hopp, G. Pauli, & B. Wahren. Characterization of murine monoclonal antibodies directed against the core proteins of human immunodeficiency virus types 1 and 2. *J Virol* **65**:4529–4533, 1991. (Medline: 91303716) Notes: Multiple anti-HIV p24 MAbs were generated using HIV-1 IIIB p24 or HIV-2 ROD p26 as immunogens. The epitopes for these MAbs were mapped, and the cross-reactivity between HIV-1 IIIB, HIV-2 ROD and SIV MAC antigens were compared using multiple antibody binding assays. While some of the antibodies raised were cross-reactive by some or all of the assays, (ELISA, WB, immunofluorescence, immunoprecipitation and alkaline phosphatase anti-alkaline phosphatase assay), the different assays often gave different results. Only the antibodies raised to HIV-1 IIIB p24 are included in this database.

[Niedrig (1989)] M. Niedrig, J. Hinkula, W. Weigelt, J. L'Age-Stehr, G. Pauli, J. Rosen, & B. Wahren. Epitope mapping of monoclonal antibodies against human immunodeficiency virus type 1 structural proteins by using peptides. *J Virol* **63**:3525–3528, 1989. (Medline: 89311648) Notes: Multiple linear MAb epitopes were described in p24 and p17. Several MAbs were able to react with HIV-2 ROD and SIV MAC in an immunoblot assay, as well as with HIV-1.

[Niedrig (1988)] M. Niedrig, J.-P. Rabanus, J. L. Stehr, H. R. Gelderblom, & G. Pauli. Monoclonal antibodies directed against human immunodeficiency virus gag proteins with specificity for conserved epitopes in HIV-1, HIV-2 and simian immunodeficiency virus. *J Gen Virol* **69**:2109–2114, 1988. (Medline: 88299973).

[Nilsen (1996)] B. M. Nilsen, I. R. Haugan, K. Berg, L. Olsen, P. O. Brown, & D. E. Helland. Monoclonal Antibodies against Human Immunodeficiency virus type 1 integrase: epitope mapping and differential effects of integrase activities in vitro. *J Virol* **70**:1580–1587, 1996. (Medline: 96190555) Notes: In this study, 17 anti-integrase murine Mabs were generated and epitopes were mapped by deletion mutations and peptide scanning. The ability of MAb binding to inhibit (or stimulate) end-processing, DNA joining, reintegration, and disintegration enzyme functions it *in vitro* was determined.

[Nyambi (1998)] P. N. Nyambi, M. K. Gorny, L. Bastiani, G. van der Groen, C. Williams, & S. Zolla-Pazner. Mapping of epitopes exposed on intact human immunodeficiency virus type 1 (HIV-1) virions: a new strategy for studying the immunologic relatedness of HIV-1. *J Virol* **72**:9384–91, 1998. (Medline: 98440613) Notes: 18 human MAbs binding to gp120 and gp41 were tested using a novel assay to test binding to intact HIV-1 virions. The new method involves using MAbs to the host proteins incorporated into virions to bind them to ELIZA plates. Antigenic conservation in epitopes of HIV-1 in clades A, B, D, F, G, and H was studied. MAbs were selected that were directed against V2, V3, CD4bd, C5 or gp41 regions. Antibodies against V2, the CD4BS, and sp41 showed weak and sporadic reactivities, while binding strongly to gp120, suggesting these epitopes are hidden when gp120 is in its native, quaternary structure.

[Nyambi (2000)] P. N. Nyambi, H. A. Mbah, S. Burda, C. Williams, M. K. Gorny, A. Nadas, & S. Zolla-Pazner. Conserved and exposed epitopes on intact, native, primary human immunodeficiency virus type 1 virions of group M. *J Virol* **74**:7096–107, 2000. (Medline: 20347373).

[Oggioni (1999)] M. R. Oggioni, D. Medaglini, L. Romano, F. Peruzzi, T. Maggi, L. Lozzi, L. Bracci, M. Zazzi, F. Manca, P. E. Valensin, & G. Pozzi. Antigenicity and immunogenicity of the V3 domain of HIV type 1 glycoprotein 120 expressed on the surface of Streptococcus gordonii. *AIDS Res Hum Retroviruses* **15**:451–9, 1999. (Medline: 99210130).

[O'Hagan (2000)] D. T. O'Hagan, M. Ugozzoli, J. Barackman, M. Singh, J. Kazzaz, K. Higgins, T. C. Vancott, & G. Ott. Microparticles in MF59, a potent adjuvant combination for a recombinant protein vaccine against HIV-1. *Vaccine* **18**:1793–801, 2000. (Medline: 20165132).

[Ohlin (1989)] M. Ohlin, P.-A. Broliden, L. Danielsson, B. Wahren, J. Rosen, M. Jondal, & C. A. K. Borrebaeck. Human monoclonal antibodies against a recombinant HIV envelope antigen produced by primary in vitro immunization. Characterization and epitope mapping. *Immunology* **68**:325–331, 1989. (Medline: 90077507).

[Ohlin (1992)] M. Ohlin, J. Hinkula, P.-A. Broliden, R. Grunow, C. A. K. Borrebaeck, & B. Wahren. Human MoAbs produced from normal, HIV-1-

negative donors and specific for glycoprotein gp120 of the HIV-1 envelope. *Clin Exp Immunol* **89**:290–295, 1992. (Medline: 92346904).

[Ohno (1991)] T. Ohno, M. Terada, Y. Yoneda, K. W. Shea, R. F. Chambers, D. M. Stroka, M. Nakamura, & D. W. Kufe. A broadly neutralizing monoclonal antibody that recognizes the V3 region of human immunodeficiency virus type 1 glycoprotein gp120. *Proc Natl Acad Sci USA* **88**:10726–10729, 1991. (Medline: 92073360).

[Okada (1994)] T. Okada, B. K. Patterson, P. A. Otto, & M. E. Gurney. HIV Type 1 Infection of CD4+ T-cells Depends Critically on Basic Amino Acid Residues in the V3 Domain of Envelope Glycoprotein 120. *AIDS Res Hum Retroviruses* **10**:803–811, 1994. (Medline: 95077999).

[Okamoto (1998)] Y. Okamoto, Y. Eda, A. Ogura, S. Shibata, T. Amagai, Y. Katsura, T. Asano, K. Kimachi, K. Makizumi, & M. Honda. In SCID-hu mice, passive transfer of a humanized antibody prevents infection and atrophic change of medulla in human thymic implant due to intravenous inoculation of primary HIV-1 isolate. *J Immunol* **160**:69–76, 1998. (Medline: 98211683).

[Oldstone (1991)] M. B. A. Oldstone, A. Tishon, H. Lewicki, H. J. Dyson, V. A. Feher, N. Assa-Munt, & P. E. Wright. Mapping the anatomy of the immunodominant domain of the human immunodeficiency virus gp41 transmembrane protein: peptide conformation analysis using monoclonal antibodies and proton nuclear magnetic resonance spectroscopy. *J Virol* **65**:1727–1734, 1991. (Medline: 91162718) Notes: Disulfide bond between cysteines and type I reverse turn about the residues SGKL are structural features of the immunodominant domain of gp41: CSGKLIC.

[Orsini (1995)] M. J. Orsini, A. N. Thakur, W. W. Andrews, M.-L. Hammarskjold, & D. Rekosh. Expression and Purification of the HIV Type 1 Rev Protein Produced in Escherichia coli and Its Use in the Generation of Monoclonal Antibodies. *AIDS Res Hum Retroviruses* **11**:945–953, 1995. (Medline: 96020095).

[Orvell (1991)] C. Orvell, T. Unge, R. Bhikhabhai, K. Backbro, U. Ruden, B. Strandberg, B. Wahren, & E. M. Fenyo. Immunological characterization of the human immunodeficiency virus type 1 reverse transcriptase protein by the use of monoclonal antibodies. *J Gen Virol* **72**:1913–1918, 1991. (Medline: 91341478).

[Oscherwitz (1999)] J. Oscherwitz, F. M. Gotch, K. B. Cease, & J. A. Berzofsky. New insights and approaches regarding B- and T-cell epitopes in HIV vaccine design [In Process Citation]. *AIDS* **13 Suppl A**:S163–74, 1999. (Medline: 20340299).

[Ota (1999)] A. Ota, A. N. Bautista, M. L. Yadav, & S. Ueda. Anti-P30-52 monoclonal antibody cross-reacted to Env V3 and inhibited the viral multiplication of HIV-1-infected MT-4 cells. *Hybridoma* **18**:139–47, 1999. (Medline: 99306681).

[Ota (1998)] A. Ota, X. Liu, H. Fujio, N. Sakato, & S. Ueda. Random expression of human immunodeficiency virus-1 (HIV-1) p17 (epitopes) on the surface of the HIV-1-infected cell. *Hybridoma* **17**:73–5, 1998. (Medline: 98183842).

[Ota & Ueda(1998)] A. Ota & S. Ueda. Evaluation of the affinity measurement of anti-HIV-1 p17 monoclonal antibody by BIAcore. *Hybridoma* **17**:471–7, 1998. (Medline: 99089389).

[Ota & Ueda(1999)] A. Ota & S. Ueda. Inhibitory mechanism of anti-P30-52 monoclonal antibody against human immunodeficiency virus type 1 (HIV-1) multiplication in infected MT-4 cells. *Hybridoma* **18**:235–41, 1999. (Medline: 99402222).

[Otake (1994)] K. Otake, Y. Fujii, Y. Nishino, Q. Zhong, K. Fujinaga, M. Kameoka, K. Ohki, & K. Ikuta. The carboxyl-terminal region of HIV-1 nef protein is a cell surface domain that can interact with CD4+ T cells. *J Immunol* **153**:5826–5837, 1994. (Medline: 95081631) Notes: This study shows that the C-terminal end of Nef is accessible to Abs. This domain could bind in a soluble form to CD4+, uninfected cells, and this interaction is inhibited in the presence of the C-terminal specific antibodies. Syncytium formation was reduced by these Abs or peptides. Abs could stain IIIB/M10, but not MN/M10, infected cells, in a membrane immunofluorescence assay.

[Otteken (1996)] A. Otteken, P. L. Earl, & B. Moss. Folding, assembly, and intracellular trafficking of the human immunodeficiency virus type 1 Envelope glycoprotein analyzed with monoclonal antibodies recognizing maturational intermediates. *J Virol* **70**:3407–15, 1996. (Medline: 96211471).

[Otteken (1992)] A. Otteken, S. Nick, W. Bergter, G. Voss, A. Faisst, C. Stahl-Hennig, & G. Hunsmann. Identification of a gag protein epitope conserved among all four groups of primate immunodeficiency viruses by using monoclonal antibodies. *J Gen Virol* **73**:2721–2724, 1992. (Medline: 93019029)

Notes: Anti-SIVagmTYO-7 Mabs were obtained by intraperitoneal immunization of mice. Two reacted with p17 and three with p24. The anti-p24 MAbs recognized an epitope present in SIVagmTYO-7, SIVagmTYO-5, and HIV-2/SIVmac. The anti-p17 recognized an epitope present in SIVagmTYO-7, SIVagmTYO-5, HIV-2/SIVmac, SIVagmTYO-1, HIV-1, and SIVmnd. This study shows that the matrix protein expresses at least one highly conserved epitope.

[Ovod (1992)] V. Ovod, A. Lagerstedt, A. Ranki, F. O. Gombert, R. Spohn, M. Tahtinen, G. Jung, & K. J. Krohn. Immunological variation and immunohistochemical localization of HIV-1 Nef demonstrated with monoclonal antibodies. *AIDS* **6**:25–34, 1992. (Medline: 92181622) Notes: Ten anti-Nef MAbs were generated and mapped. Nef is expressed in two isomorphic forms, and was shown to be expressed mainly in the Golgi complex and at the nuclear membrane, but occasionally x in the nucleus, particularly in MT-4 cells.

[Pal (1992)] R. Pal, F. di Marzo Veronese, B. C. Nair, R. Rahman, G. Hoke, S. W. Mumbauer, & M. G. Sarngadharan. Characterization of a neutralizing monoclonal antibody to the external glycoprotein of HIV-1. *Intervirology* **86**:86–93, 1992. (Medline: 93186358).

[Palker (1987)] T. J. Palker, T. J. Matthews, M. E. Clark, G. J. Ciancolo, R. R. Randall, A. J. Langlois, G. C. White, B. Safei, R. Snyderman, D. P. Bolognesi, & B. F. Haynes. A conserved epitope at the COOH terminus of human immunodeficiency virus gp120 envelope protein contains an immunodominant epitope. *Proc Nat Acad Sci USA* **84**:2479–2483, 1987. (Medline: 87175697).

[Papsidero (1988)] L. D. Papsidero, B. J. Poiesz, & R. A. Montagna. Monoclonal Antibody Identifies a Highly Conserved and Immunodominant Epitope of the Human Immunodeficiency Virus Transmembrane Protein. *Hybridoma* **7**:117–128, 1988. (Medline: 88226664).

[Papsidero (1989)] L. D. Papsidero, M. Sheu, & F. W. Ruscetti. Human immunodeficiency virus type 1-neutralizing monoclonal antibodies which react with p17 core protein: characterization and epitope mapping. *J Virol* **63**:267–272, 1989. (Medline: 89068840) Notes: Two Mabs with overlapping binding sites on p17 reduced the infectivity of free virus. A p24 monoclonal was not able to do this.

[Park (2000)] E. J. Park, M. K. Gorny, S. Zolla-Pazner, & G. V. Quinnan. A global neutralization resistance phenotype of human immunodeficiency virus type 1 is determined by distinct mechanisms mediating enhanced infectivity and conformational change of the envelope complex. *J Virol* **74**:4183–91, 2000. (Medline: 20219411).

[Parker (1996)] C. E. Parker, D. I. Papac, S. K. Trojak, & K. B. Tomer. Epitope mapping by mass spectrometry: determination of an epitope on HIV-1 IIIB p26 recognized by a monoclonal antibody. *J Immunol* **157**:198–206, 1996. (Medline: 96264691).

[Parren & Burton(1997)] P. W. Parren & D. Burton. Antibodies Against HIV-1 from Phage Display Library: Mapping of an Immune Response and Progress toward Antiviral Immunotherapy. *Chem Immunol* **65**:18–56, 1997. (Medline: 97171699) Notes: Editor, J. D. Capra. An excellent review of the potential for antiviral immune therapy using anti-HIV human monoclonal antibodies, emphasizing phage display library technology, and application to HIV. Fabs to gp120 and gp41 are summarized. The methodology of selection for enhanced affinity is discussed, and affinity shown to be related to neutralization. Fabs expressed in phage display libraries were generally converted to IgG molecules only if they show neutralization potential *in vitro*, and this conversion to an IgG enhances neutralizing potential for immunotherapeutics. The use of phage display libraries to assess vaccines is discussed. gp120, gp160 and gp140-oligomeric vaccines were compared as antigen for selection from phage display libraries. Despite the fact that CD4BS, V3 loop, and CD4BS-V2 loop directed Abs were obtained in vaccinees, none of these vaccines efficiently selected neutralizing Abs from long-term asymptomatic donors in phage display libraries. The protein with the best potential using this method was found to be native oligomeric HIV-1 Envelope expressed on infected cells. The possibility of using 2G12, IgG1 b12 and 2F5 in combination for immunotherapy is discussed.

[Parren (1995)] P. W. Parren, H. J. Ditzel, R. J. Gulizia, J. M. Binley, C. F. B. 3rd, D. R. Burton, & D. E. Mosier. Protection against HIV-1 infection in hu-PBL-SCID mice by passive immunization with a neutralizing human monoclonal antibody against the gp120 CD4-binding site. *AIDS* **9**:F1–F6, 1995. (Medline: 95391159) Notes: The Fab b12, at 1.9 mg/kg, was able to protect 25% of hu-PBL-SCID mice from HIV-1 infection showing that complete protection against HIV-1 infection can be achieved in the hu-PBL-SCID model by passive immunization with physiologically relevant doses of antibody.

[Parren (1997a)] P. W. Parren, M. C. Gauduin, R. A. Koup, P. Poignard, P. Fisicaro, D. R. Burton, & Q. J. Sattentau. Relevance of the antibody response against human immunodeficiency virus type 1 Envelope to vaccine design [corrected and republished in Immunol Lett 1997 Jul;58(2):125-32]. *Immunol Lett* **57**:105–12, 1997a. (Medline: 97376324).

[Parren (1997b)] P. W. Parren, M. C. Gauduin, R. A. Koup, P. Poignard, Q. J. Sattentau, P. Fisicaro, & D. R. Burton. Erratum to Relevance of the antibody response against human immunodeficiency virus type 1 Envelope to vaccine design [corrected and republished article originally printed in Immunol Lett 1997 Jun 1;57(1-3):105-12]. *Immunol Lett* **58**:125–32, 1997b. (Medline: 97415525).

[Parren (1998a)] P. W. Parren, I. Mondor, D. Naniche, H. J. Ditzel, P. J. Klasse, D. R. Burton, & Q. J. Sattentau. Neutralization of human immunodeficiency virus type 1 by antibody to gp120 is determined primarily by occupancy of sites on the virion irrespective of epitope specificity. *J Virol* **72**:3512–9, 1998a. (Medline: 98216707) Notes: The authors propose that the occupancy of binding sites on HIV-1 virions is the major factor in determining neutralization, irrespective of epitope specificity. Neutralization was assayed T-cell-line-adapted HIV-1 isolates. Binding of Fabs to monomeric rgp120 was not correlated with binding to functional oligomeric gp120 or neutralization, while binding to functional oligomeric gp120 was highly correlated with neutralization. The ratios of oligomer binding/neutralization were similar for antibodies to different neutralization epitopes, with a few exceptions.

[Parren (1999)] P. W. Parren, J. P. Moore, D. R. Burton, & Q. J. Sattentau. The neutralizing antibody response to HIV-1: viral evasion and escape from humoral immunity [In Process Citation]. *AIDS* **13 Suppl A**:S137–62, 1999. (Medline: 20340298).

[Parren (1998b)] P. W. Parren, M. Wang, A. Trkola, J. M. Binley, M. Purtscher, H. Katinger, J. P. Moore, & D. R. Burton. Antibody neutralization-resistant primary isolates of human immunodeficiency virus type 1. *J Virol* **72**:10270–4, 1998b. (Medline: 99030946).

[Peet (1998)] N. M. Peet, J. A. McKeating, J. B. de Souza, I. M. Roitt, P. J. Delves, & T. Lund. The effect of low-profile serine substitutions in the V3 loop of HIV-1. *Virology* **251**:59–70, 1998. (Medline: 99033093).

[Petrov (1990)] R. V. Petrov, R. M. Khaitov, I. G. Sidorovich, S. P. Pavlikov, I. A. Nikolaeva, M. E. Ivachenko, S. M. Andreev, & L. Y. U. Sklyarov. The use of synthetic peptides in the diagnosis of HIV infections. *Biomed Sci* **1**:239–244, 1990. (Medline: 91363760) Notes: Peptides from 2 regions of Env were particularly immunoreactive in ELISA tests with human sera from HIV-1 positive individuals: 495-516 of gp120 (SP-III), peptide 584-602 of gp41 (LS-19), and peptide 601-616 of gp41 (SP-15). Uganda sera reacted with both SP-III from HTLV-III and SP-29 (gp41, 598-609) from the LAV-ELI isolate. HIV-1 peptides from gp32 were not cross-reactive.

[Pincus (1991)] S. H. Pincus, R. L. Cole, E. M. Hersh, D. Lake, Y. Masuho, P. J. Durda, & J. McClure. In Vitro Efficacy of Anti-HIV Immunotoxins Targeted by Various Antibodies to the Envelope Protein. *J Immunol* **146**:4315–4324, 1991. (Medline: 91250725) Notes: Six MAbs, (907, 924, 110.1, 41.1, 86 and P5-3) and polyclonal pooled serum antibodies purified on gp160 were coupled to RAC to create immunotoxins. Only 41.1-RAC, an anti-gp41 MAb-immunotoxin and the polyclonal immunotoxin showed direct activity against multiple strains, and activity of an immunotoxin was found not to be directly correlated with cell surface binding.

[Pincus (1998)] S. H. Pincus, R. L. Cole, R. Watson-McKown, A. Pinter, W. Honnen, B. Cole, & K. S. Wise. Immunologic cross-reaction between HIV type 1 p17 and Mycoplasma hyorhinis variable lipoprotein. *AIDS Res Hum Retroviruses* **14**:419–25, 1998. (Medline: 98206878).

[Pincus & McClure(1993)] S. H. Pincus & J. McClure. Soluble CD4 enhances the efficacy of immunotoxins directed against gp41 of the human immunodeficiency virus. *Proc Natl Acad Sci USA* **90**:332–6, 1993. (Medline: 93126370).

[Pincus (1993)] S. H. Pincus, K. G. Messer, D. H. Schwartz, G. K. Lewis, B. S. Graham, W. A. Blattner, & G. Fisher. Differences in the antibody response to human immunodeficiency virus-1 Envelope glycoprotein (gp160) in infected laboratory workers and vaccinees. *J Clin Invest* **91**:1987–96, 1993. (Medline: 93253041).

[Pincus (1989)] S. H. Pincus, K. Wehrly, & B. Chesebro. Treatment of HIV tissue culture infection with monoclonal antibody-ricin A chain conjugates. *J Immunol* **142**:3070–3075, 1989. (Medline: 89215266).

[Pincus (1996)] S. H. Pincus, K. Wehrly, R. Cole, H. Fang, G. K. Lewis, J. McClure, A. J. Conley, B. Wahren, M. R. Posner, A. L. Notkins, S. A. Tilley, A. Pinter, L. Eiden, M. Teintze, D. Dorward, & V. V. Tolstikov. In vitro effects of anti-HIV immunotoxins directed against multiple epitopes on HIV type

1 envelope glycoprotein 160. *AIDS Res Hum Retroviruses* **12**:1041–1051, 1996. (Medline: 96424759) Notes: A panel of anti-gp160 MAbs to was used to construct anti-HIV immunotoxins by coupling antibodies to ricin A chain (RAC). The ability of the immunotoxins to kill HIV-1-infected cells was tested in tissue culture. Immunotoxins that bind epitopes on the cell surface killed infected cells, although killing was not directly proportional to binding. The activity of anti-gp41 immunotoxins was markedly enhanced in the presence of sCD4.

[Pinter (1993a)] A. Pinter, W. J. Honnen, M. E. Racho, & S. A. Tilley. A potent, neutralizing human monoclonal antibody against a unique epitope overlapping the CD4-binding site of HIV-1 gp120 that is broadly conserved across North American and African viral isolates. *AIDS Res Hum Retroviruses* **9**:985–996, 1993a. (Medline: 94107600).

[Pinter (1993b)] A. Pinter, W. J. Honnen, & S. A. Tilley. Conformational changes affecting the V3 and CD4-binding domains of human immunodeficiency virus type 1 gp120 associated with env processing and with binding of ligands to these sites. *J Virol* **67**:5692–5697, 1993b. (Medline: 93353654).

[Pinter (1989)] A. Pinter, W. J. Honnen, S. A. Tilley, C. Bona, H. Zaghouani, M. K. Gorny, & S. Zolla-Pazner. Oligomeric Structure of gp41, the Transmembrane Protein of Human Immunodeficiency Virus Type 1. *J Virol* **63**:2674–2679, 1989. (Medline: 89259048).

[Pinter (1995)] C. Pinter, A. G. Siccardi, & A. Clivio. Production of human immunodeficiency virus by chronically infected cells grown in protein-free medium. *Cell Biol Int* **19**:507–515, 1995. (Medline: 95368020).

[Pirofski (1993)] L.-A. Pirofski, E. K. Thomas, & M. D. Scharff. Variable region gene utilization and mutation in a group of neutralizing murine anti-human immunodeficiency virus type 1 principal neutralizing determinant antibodies. *AIDS Res Hum Retroviruses* **9**:41–49, 1993. (Medline: 93152285) Notes: Observed restricted subset of murine V heavy and light chain gene elements in a set of 5 antibodies that bind to the tip of the V3 loop.

[Poignard (1996a)] P. Poignard, T. Fouts, D. Naniche, J. P. Moore, & Q. J. Sattentau. Neutralizing antibodies to human immunodeficiency virus type-1 gp120 induce envelope glycoprotein subunit dissociation. *J Exp Med* **183**:473–484, 1996a. (Medline: 96195201) Notes: Binding of Anti-V3 and the CD4I neutralizing MAbs induces shedding of gp120 on cells infected with the T-cell line-adapted HIV-1 molecular clone Hx10. This was shown by significant increases of gp120 in the supernatant, and exposure of a gp41 epitope that is masked in the oligomer. MAbs binding either to the V2 loop or to CD4BS discontinuous epitopes do not induce gp120 dissociation. This suggests HIV neutralization probably is caused by several mechanisms, and one of the mechanisms may involve gp120 dissociation.

[Poignard (1996b)] P. Poignard, P. J. Klasse, & Q. J. Sattentau. Antibody neutralization of HIV-1. *Immunology Today* **17**:239–246, 1996b. (Medline: 97104961) Notes: Comprehensive review of HIV envelope gp120 and gp41 antibody binding domains, and different cross-reactivity groups of MAbs ability to neutralize primary isolates. The distinction between neutralization of laboratory strains and primary isolates is discussed. The only three epitopes that have confirmed broad neutralization against a spectrum of isolates are gp120 epitopes for IgG1b12 and 2G12, and the gp41 epitope of 2F5.

[Poignard (1999)] P. Poignard, R. Sabbe, G. R. Picchio, M. Wang, R. J. Gulizia, H. Katinger, P. W. Parren, D. E. Mosier, & D. R. Burton. Neutralizing antibodies have limited effects on the control of established HIV-1 infection in vivo. *Immunity* **10**:431–8, 1999. (Medline: 99244192).

[Pollock (1989)] B. J. Pollock, A. S. McKenzie, B. E. Kemp, D. A. McPhee, & A. J. F. D'Apice. Human monoclonal antibodies to HIV-1: cross-reactions with gag and env proteins. *Clin Exp Immunol* **78**:323–328, 1989. (Medline: 90125211).

[Posner (1992a)] M. Posner, L. Cavacini, C. Emes, J. Power, M. Gorny, & S. Zolla-Pazner. Human Monoclonal Antibodies to the V3 Loop of gp120 Mediate Variable and Distinct Effects on Binding and Viral Neutralization by a Human Monoclonal Antibody to the CD4 Binding Site. *J Cell Biochem* **Suppl O (16 part E)**:69, 1992a.

[Posner (1993)] M. R. Posner, L. A. Cavacini, C. L. Emes, J. Power, & R. Byrn. Neutralization of HIV-1 by F105, a Human Monoclonal Antibody to the CD4 Binding Site of gp120. *J AIDS* **6**:7–14, 1993. (Medline: 93108253).

[Posner (1995)] M. R. Posner, L. A. Cavacini, J. Gambertoglio, C. Spino, E. Wolfe, C. Trapnell, N. Ketter, S. Hammer, & M. Samore. An ACTG phase Ia safety and pharmacokinetic trial of immunotherapy with the anti-CD4 binding site human monoclonal antibody F105. *Natl Conf Hum Retroviruses Relat Infect (2nd)* **1995**:150, 1995. Notes: Aidsline: 95920546 Abstract: Eight HIV-positive asymptomatic individuals were given F105 by

intravenous infusion. There were no clinical side effects or changes in biochemical tests among the eight volunteers. The plasma half life of F105 had a range of 8.7-18.6 days.

[Posner (1992b)] M. R. Posner, H. S. Elboim, T. Cannon, L. Cavicini, & T. Hideshima. Functional Activity of an HIV-1 Neutralizing IgG Human Monoclonal Antibody: ADCC and Complement-Mediated Lysis. *AIDS Res Hum Retroviruses* **8**:553–558, 1992b. (Medline: 92385156).

[Posner (1991)] M. R. Posner, T. Hideshima, T. Cannon, M. Mukherjee, K. H. Mayer, & R. A. Byrn. An IgG human monoclonal antibody that reacts with HIV-I/gp120, inhibits virus binding to cells, and neutralizes infection. *J Immunol* **146**:4325–4332, 1991. (Medline: 91250726) Notes: Original paper describing the neutralizing MAb F105.

[Potts (1993)] B. J. Potts, K. G. Field, Y. Wu, M. Posner, L. Cavacini, & M. White-Scharf. Synergistic Inhibition of HIV-1 by CD4 Binding Domain Reagents and V3-Directed Monoclonal Antibodies. *Virology* **197**:415–419, 1993. (Medline: 94025592) Notes: Four anti-V3 loop MAbs, (59.1, 83.1, 50.1, and 58.2), were evaluated for their affinity, neutralization potencies, and their ability to synergize F105 or sCD4 neutralization. The most important parameter for synergy was the capacity to neutralize a given virus independently.

[Poumbourios (1995)] P. Poumbourios, W. El Ahmar, D. A. McPhee, & B. E. Kemp. Determinants of human immunodeficiency virus type 1 envelope glycoprotein oligomeric structure. *J Virol* **69**:1209–1218, 1995. (Medline: 95115079).

[Poumbourios (1992)] P. Poumbourios, D. A. McPhee, & B. E. Kemp. Antibody epitopes sensitive to the state of human immunodeficiency virus type 1 gp41 oligomerization map to a putative alpha-helical region. *AIDS Res Hum Retroviruses* **8**:2055–2062, 1992. (Medline: 93152279).

[Purtscher (1996)] M. Purtscher, A. Trkola, A. Grassauer, P. M. Schulz, A. Klima, S. Dopper, G. Gruber, A. Buchacher, T. Muster, & H. Katinger. Restricted antigenic variability of the epitope recognized by the neutralizing gp41 antibody 2F5. *AIDS* **10**:587–593, 1996. (Medline: 96374585) Notes: Binding and neutralization to gp41 ELDKWA variants by anti-gp41 MAb 2F5 were studied. LDKW is the core binding motif.

[Purtscher (1994)] M. Purtscher, A. Trkola, G. Gruber, A. Buchacher, R. Predl, F. Steindl, C. Tauer, R. Berger, N. Barrett, A. Jungbauer, & H. Katinger. A broadly neutralizing human monoclonal antibody against gp41 of human immunodeficiency virus type 1. *AIDS Res Hum Retroviruses* **10**:1651–1658, 1994. (Medline: 95194731).

[Qian & Tomer(1998)] X. H. Qian & K. B. Tomer. Affinity capillary electrophoresis investigation of an epitope on human immunodeficiency virus recognized by a monoclonal antibody. *Electrophoresis* **19**:415–9, 1998. (Medline: 98211519).

[Ranki (1994)] A. Ranki, A. Lagerstedt, V. Ovod, E. Aavik, & K. Krohn. Expression kinetics and subcellular localization of HIV-1 regulatory proteins Nef and Tat in established lymphoid cell lines. *Arch Virol* **139**:365–378, 1994. (Medline: 95134092).

[Ranki (1995)] A. Ranki, M. Nyberg, V. Ovod, M. Haltia, I. Elovaara, R. Raininko, H. Haapasalo, & K. Krohn. Abundant expression of HIV Nef and Rev proteins in brain astrocytes in vivo is associated with dementia. *AIDS* **9**:1001–1008, 1995. (Medline: 96085714) Notes: HIV Nef protein was found in the brain cells of infected individuals with clinical neurological disease.

[Reitz (1988)] M. S. Reitz, C. Wilson, C. Naugle, & M. Robert-Guroff. Generation of a neutralization-resistant variant of HIV-1 is due to selection for a point mutation in the envelope gene. *Cell* **54**:57–63, 1988. (Medline: 88253426) Notes: Growth of HXB2 in the constant presence of a neutralizing antiserum yielded a viral population resistant to the same serum. gp41 mutation 582 (Ala to Thr) conferred the resistant phenotype.

[Richardson Jr (1996)] T. M. Richardson Jr, B. L. Stryjewski, C. C. Broder, J. A. Hoxie, J. R. Mascola, P. L. Earl, & R. W. Doms. Humoral response to oligomeric human immunodeficiency virus type 1 envelope protein. *J Virol* **70**:753–62, 1996. (Medline: 96135183) Notes: An Env antigen capture enzyme-linked immunosorbent assay using a soluble, oligomeric form of HIV-1IIIB Env (gp140) that contains gp120 and the gp41 ectodomain was developed. The gp140, captured by various monoclonal antibodies (MAbs), retained its native oligomeric structure: it bound CD4 and was recognized by MAbs to conformational epitopes in gp120 and gp41, including oligomer-specific epitopes in gp41.

[Rini (1993)] J. M. Rini, E. A. Stura, P. A. Salinas, A. T. Profy, & I. A. Wilson. Crystal structure of a human immunodeficiency virus type 1 neutralizing antibody, 50.1, in complex with its V3 loop peptide antigen. *Proc Natl Acad Sci USA* **90**:6325–6329, 1993. (Medline: 93317674) Notes: The V3

antigenic site is stretched out, not the β turn seen as the primary determinant in other published anti-V3 peptide Fab structures.

[Rizzuto (1998)] C. D. Rizzuto, R. Wyatt, N. Hernandez-Ramos, Y. Sun, P. D. Kwong, W. A. Hendrickson, & J. Sodroski. A conserved HIV gp120 glycoprotein structure involved in chemokine receptor binding. *Science* **280**:1949–53, 1998. (Medline: 98296366) Notes: This paper compares the epitope for CD4 inducible MAbs with the chemokine co-receptor binding site on the gp120 molecule. Site-directed mutagenesis of YU2 Env was guided by information obtained from the crystallized CD4-17b-gp120 core structure, Kwong *et al*, 1998. YU2 is a primary macrophage tropic R5 isolate with high affinity for both CD4 and CCR5. A protein with the V1-V2 loops deleted, called wtΔ was the basis for the assay which detected binding of virus to cells expressing CCR5 in the presence of sCD4. Preincubaton with MAb 17b blocks binding, as did the natural ligand for CCR5, MIP-1β and anti-CCR5 MAb 2D7. Mutations 437 P/A and 442 Q/L increased CCR5 binding affinity. The region of gp120 CCR5 binding is shown to be the highly conserved β-sheet bridging structure, located proximal to the V3 loop.

[Roben (1994)] P. Roben, J. P. Moore, M. Thali, J. Sodroski, C. F. Barbas III, & D. R. Burton. Recognition Properties of a Panel of Human Recombinant Fab fragments to the CD4 binding site of gp120 that show differing abilities to neutralize human immunodeficiency virus type 1. *J Virol* **68**:4821–4828, 1994. (Medline: 94309144).

[Robert-Guroff (1994)] M. Robert-Guroff, A. Louie, M. Myagkikh, F. Michaels, M. P. Kieny, M. E. White-Scharf, B. Potts, D. Grogg, & M. S. Reitz. Alteration of V3 loop context within the envelope of human immunodeficiency virus type 1 enhances neutralization. *J Virol* **68**:3459–3466, 1994. (Medline: 94246688) Notes: MN-V3 loop inserted into a HBX2 background results in enhanced neutralization of anti-MN V3 MAb 50.1 and human HIV+ sera when the chimeric virus was compared to MN. Enhanced affinity, and greater proportions of labeled infected H9 cells by FACS analysis, were also observed using two anti-MN V3 MAbs, 50.1 and 83.1.

[Robert-Hebmann (1992a)] V. Robert-Hebmann, S. Emiliani, F. Jean, M. Resnicoff, & C. Devaux. Clonal analysis of murine B-cell response to the human immunodeficiency virus type 1 (HIV-1)-gag p17 and p25 antigens. *Mol Immunol* **29**:729–738, 1992a. (Medline: 92293165).

[Robert-Hebmann (1992b)] V. Robert-Hebmann, S. Emiliani, M. Resnicoff, F. Jean, & C. Devaux. Subtyping of human immunodeficiency virus isolates with a panel of monoclonal antibodies: identification of conserved and divergent epitopes on p17 and p25 core proteins. *Mol Immunol* **29**:1175–1183, 1992b. (Medline: 92408665).

[Robinson (1992)] J. Robinson, H. Yoshiyama, D. Holton, S. Elliot, & D. D. Ho. Distinct antigenic sites on HIV gp120 identified by a panel of human monoclonal antibodies. *J Cell Biochem* **Suppl 16E**:71, 1992.

[Robinson (1990a)] J. E. Robinson, D. Holton, S. Pacheco-Morell, J. Liu, & H. McMurdo. Identification of conserved and variable epitopes of human immunodeficiency virus type-1 (HIV-1) gp120 by human monoclonal antibodies produced by EBV transformed cell lines. *AIDS Res Hum Retroviruses* **6**:567–579, 1990a. (Medline: 90298073).

[Robinson (1991)] W. E. Robinson, M. K. Gorny, J.-Y. Xu, W. M. Mitchell, & S. Zolla-Pazner. Two Immunodominant Domains of gp41 Bind Antibodies Which Enhance Human Immunodeficiency Virus Type 1 Infection In Vitro. *J Virol* **65**:4169–4176, 1991. (Medline: 91303668).

[Robinson (1990b)] W. E. Robinson, T. Kawamura, M. K. Gorny, D. Lake, J.-Y. Xu, Y. Matsumoto, T. Sugano, Y. Masuho, W. M. Mitchell, E. Hersh, & S. Zolla-Pazner. Human monoclonal antibodies to the human immunodeficiency virus type 1 (HIV-1) transmembrane glycoprotein gp41 enhance HIV-1 infection in vitro. *Proc Natl Acad Sci USA* **87**:3185–3189, 1990b. (Medline: 90222194) Notes: Three gp41 MAbs out of 16 Env and Gag MAbs tested enhanced HIV-1 IIIB infection of MT-2 cells. The enhancing antibodies were competitive with the immunodominant epitopes of gp41 recognized by sera from HIV-1 infected subjects.

[Rovinski (1995)] B. Rovinski, L. Rodrigues, S. X. Cao, F. L. Yao, U. McGuinness, C. Sia, G. Cates, S. Zolla-Pazner, S. Karwowska, T. J. Matthews, C. B. McDanal, J. Mascola, & M. H. Klein. Induction of HIV type 1 neutralizing and env-CD4 blocking antibodies by immunization with genetically engineered HIV type 1-like particles containing unprocessed gp160 glycoproteins. *AIDS Res Hum Retroviruses* **11**:1187–1195, 1995. (Medline: 96157206).

[Saarloos (1995)] M. N. Saarloos, T. F. Lint, & G. T. Spear. Efficacy of HIV-specific and 'antibody-independent' mechanisms for complement activation by HIV-infected cells. *Clin Exp Immunol* **99**:189–195, 1995. (Medline: 95153900).

[Safrit (1993)] J. T. Safrit, M. S. C. Fung, C. A. Andrews, D. G. Braun, W. N. C. Sun, T. W. Chang, & R. A. Koup. hu-PBL-SCID mice can be protected from HIV-1 infection by passive transfer of monoclonal antibody to the principal neutralizing determinant of envelope gp120. *AIDS* **7**:15–21, 1993. (Medline: 93183427).

[Saito (1994)] Y. Saito, L. Sharer, L. Epstein,. Overexpression of Nef as a marker for restricted HIV-1 infection of astrocytes in postmortem pediatric central nervous tissues. *Neurology* **44**:474–481, 1994. (Medline: 94195501).

[Sakaida (1997)] H. Sakaida, T. Murakami, S. Kawamata, T. Hattori, & T. Uchiyama. V3 loop of human immunodeficiency virus type 1 suppresses interleukin 2-induced T cell growth. *AIDS Res Hum Retroviruses* **13**:151–9, 1997. (Medline: 97159684) Notes: See comments in AIDS Res Hum Retroviruses 13:633 (1997).

[Salzwedel (2000)] K. Salzwedel, E. D. Smith, B. Dey, & E. A. Berger. Sequential CD4-coreceptor interactions in human immunodeficiency virus type 1 Env function: soluble CD4 activates Env for coreceptor-dependent fusion and reveals blocking activities of antibodies against cryptic conserved epitopes on gp120. *J Virol* **74**:326–33, 2000. (Medline: 20057926).

[Sasaki (1998)] S. Sasaki, K. Sumino, K. Hamajima, J. Fukushima, N. Ishii, S. Kawamoto, H. Mohri, C. R. Kensil, & K. Okuda. Induction of systemic and mucosal immune responses to human immunodeficiency virus type 1 by a DNA vaccine formulated with QS-21 saponin adjuvant via intramuscular and intranasal routes. *J Virol* **72**:4931–9, 1998. (Medline: 98241732).

[Sattentau(1995)] Q. J. Sattentau. Conservation of HIV-1 gp120 neutralizing epitopes after formalin inactivation. *AIDS* **9**:1383–1385, 1995. (Medline: 96188319).

[Sattentau(1996)] Q. J. Sattentau. Neutralization of HIV-1 by antibody. *Curr Opin in Immunol* **8**:540–545, 1996. (Medline: 96391802) Notes: Review.

[Sattentau & Moore(1991)] Q. J. Sattentau & J. P. Moore. Conformational changes induced in the human immunodeficiency virus envelope glycoprotein by soluble CD4 binding. *J Exp Med* **174**:407–415, 1991. (Medline: 91311300) Notes: sCD4 binding to gp120 induces conformational changes within envelope oligomers. This was measured on HIV-1-infected cells by the increased binding of gp120/V3 loop specific MAbs, and on the surface of virions by increased cleavage of the V3 loop by an exogenous proteinase.

[Sattentau & Moore(1995)] Q. J. Sattentau & J. P. Moore. Human immunodeficiency virus type 1 neutralization is determined by epitope exposure on the gp120 oligomer. *J Exp Med* **182**:185–196, 1995. (Medline: 95310850) Notes: This study suggests that antibodies specific for one of five different binding regions on gp120 are associated with viral neutralization: V2, V3, C4, the CD4 binding site, and a complex discontinuous epitope that does not interfere with CD4 binding. Kinetic binding properties of a set of MAbs that bind to these regions were studied, analyzing binding to both functional oligomeric LAI gp120 and soluble monomeric LAI BH10 gp120; neutralization ID_{50}s were also evaluated. It was found that the neutralization ID_{50}s was related to the ability to bind oligomeric, not monomeric, gp120, and concluded that with the exception of the V3 loop, regions of gp120 that are immunogenic will be poorly presented on cell-line-adapted virions. Further, the association rate, estimated as the $t_{1/2}$ to reach equilibrium binding to multimeric, virion associated, gp120, appears to be a major factor relating to affinity and potency of the neutralization response to cell-line-adapted virus.

[Sattentau (1993)] Q. J. Sattentau, J. P. Moore, F. Vignaux, F. Traincard, & P. Poignard. Conformational changes induced in the envelope glycoproteins of the human and simian immunodeficiency viruses by soluble receptor binding. *J Virol* **67**:7383–7393, 1993. (Medline: 94047353).

[Sattentau (1995)] Q. J. Sattentau, S. Zolla-Pazner, & P. Poignard. Epitope exposure on functional, oligomeric HIV-1 gp41 molecules. *Virology* **206**:713–717, 1995. (Medline: 95133216) Notes: Most gp41 epitopes are masked when associated with gp120 on the cell surface. Weak binding of anti-gp41 MAbs can be enhanced by treatment with sCD4. MAb 2F5 binds to a membrane proximal epitope which binds in the presence of gp120 without sCD4.

[Scheffel (1999)] J. W. Scheffel, R. Ziemann, D. Hawksworth, J. Tyner, R. K. Hickman, & J. Hackett. Monoclonal antibodies to an HIV-1 group O envelope recombinant. *J Acquir Immune Defic Syndr* **22**:221–7, 1999. (Medline: 20231110).

[Schneider (1991)] T. Schneider, H.-P. Harthus, P. Heldebrandt, M. Niedrig, M. Broker, W. Weigelt, A. Beck, & G. Pauli. Epitopes of the HIV-1-negative factor reactive with murine monoclonal antibodies and human HIV-1-positive sera. *AIDS Res Hum Retroviruses* **7**:37–43, 1991. (Medline: 91197564) Notes: Epitopes for 9 murine MAbs were mapped, and found to be located in 4 immunogenic regions. 7/10 sera from HIV-1 positive individuals reacted to the four nef immunogenic regions.

[Schonning (1998)] K. Schonning, A. Bolmstedt, J. Novotny, O. S. Lund, S. Olofsson, & J. E. Hansen. Induction of antibodies against epitopes inaccessible on the HIV type 1 envelope oligomer by immunization with recombinant monomeric glycoprotein 120. *AIDS Res Hum Retroviruses* **14**:1451–6, 1998. (Medline: 99039929).

[Schonning (1999)] K. Schonning, O. Lund, O. S. Lund, & J. E. Hansen. Stoichiometry of monoclonal antibody neutralization of T-cell line-adapted human immunodeficiency virus type 1. *J Virol* **73**:8364–70, 1999. (Medline: 99412352).

[Schutten (1995a)] M. Schutten, A. C. Andeweg, M. L. Bosch, & A. D. Osterhaus. Enhancement of Infectivity of a Non-Syncytium Inducing HIV-1 by sCD4 and by Human Antibodies that Neutralize Syncytium Inducing HIV-1. *Scand J Immunol* **41**:18–22, 1995a. (Medline: 95125392).

[Schutten (1997)] M. Schutten, A. C. Andeweg, G. F. Rimmelzwaan, & A. D. Osterhaus. Modulation of primary human immunodeficiency virus type 1 envelope glycoprotein-mediated entry by human antibodies. *J Gen Virol* **78**:999–1006, 1997. (Medline: 97296947) Notes: A series of HIV-1 envelope glycoproteins from related primary virus isolates of different SI phenotypes, together with chimeras of these proteins, were tested in an envelope trans-complementation assay for their sensitivity to either antibody mediated inhibition or enhancement of HIV-1 entry. In contrast to the inhibition of HIV-1 entry, antibody mediated enhancement was not temperature dependent and could not be mediated by F(ab) fragments, implicating cross-linking as an important step. Enhancement or inhibition seemed to be determined by virus isolate rather than by the specificity of the antiserum used. 2F5 was the only MAb that inhibited the entry of all viruses.

[Schutten (1995b)] M. Schutten, J. P. Langedijk, A. C. Andeweg, R. C. Huisman, R. H. Meloen, & A. D. Osterhaus. Characterization of a V3 domain-specific neutralizing human monoclonal antibody that preferentially recognizes non-syncytium-inducing human immunodeficiency virus type 1 strains. *J Gen Virol* **76**:1665–1673, 1995b. (Medline: 9049372) Notes: Characterization of HuMAb MN215.

[Schutten (1993)] M. Schutten, A. McKnight, R. C. Huisman, M. Thali, J. A. McKeating, J. Sodroski, J. Goudsmit, & A. D. Osterhaus. Further characterization of an antigenic site of HIV-1 gp120 recognized by virus neutralizing human monoclonal antibodies. *AIDS* **7**:919–923, 1993. (Medline: 93363254) Notes: Three human anti-CD4 binding site MAbs were characterized. Amino acid substitutions that block MAb binding were similar but slightly different than those found in murine anti-CD4 binding site MAbs.

[Schutten (1996)] M. Schutten, K. Tenner-Racz, P. Racz, D. W. van Bekkum, & A. D. Osterhaus. Human antibodies that neutralize primary human immunodeficiency virus type 1 in vitro do not provide protection in an *in vivo model*. *J Gen Virol* **77**:1667–1675, 1996. (Medline: 96332503).

[Scott Jr (1990)] C. F. Scott Jr, S. Silver, A. T. Profy, S. D. Putney, A. Langlois, K. Weinhold, & J. E. Robinson. Human monoclonal antibody that recognizes the V3 region of human immunodeficiency virus gp120 and neutralizes the human T-lymphotropic virus type IIIMN strain. *Proc Natl Acad Sci USA* **87**:8597–8601, 1990. (Medline: 91046042).

[Seligman (1996)] S. J. Seligman, J. M. Binley, M. K. Gorny, D. R. Burton, S. Zolla-Pazner, & K. A. Sokolowski. Characterization by serial deletion competition ELISAs of HIV-1 V3 loop epitopes recognized by monoclonal antibodies. *Mol Immunol* **33**:737–745, 1996. (Medline: 96406982).

[Shafferman (1989)] A. Shafferman, J. Lennox, H. Grosfeld, J. Sadoff, R. R. Redfield, & D. S. Burke. Patterns of antibody recognition of selected conserved amino acid sequences from the HIV envelope in sera from different stages of HIV infection. *AIDS Res Hum Retroviruses* **5**:33–39, 1989. (Medline: 89247164).

[Shang (1991)] F. Shang, H. Huang, K. Revesz, H.-C. Chen, R. Herz, & A. Pinter. Characterization of monoclonal antibodies against the human immunodeficiency virus matrix protein, p17gag: identification of epitopes exposed at the surfaces of infected cells. *J Virol* **65**:4798–4804, 1991. (Medline: 91333022) Notes: Six MAbs with linear epitopes were mapped. These Abs could only bind to HIV-infected cells that had been permeablized with acetone. Only G11g1 and G11h3, two antibodies that did not bind to peptides, but only to intact p17, could react with live HIV-1 infected cells. These antibodies were not neutralizing.

[Shibata (1999)] R. Shibata, T. Igarashi, N. Haigwood, A. Buckler-White, R. Ogert, W. Ross, R. Willey, M. Cho, & M. Martin. Neutralizing antibody directed against the HIV-1 envelope glycoprotein can completely block HIV-1/SIV chimeric infections of macaques monkeys. *Nat Med* **5**:204–210, 1999. (Medline: 99128059).

[Shiver (1997)] J. W. Shiver, M. E. Davies, Y. Yasutomi, H. C. Perry, D. C. Freed, N. L. Letvin, & M. A. Liu. Anti-HIV env immunities elicited by nucleic acid vaccines. *Vaccine* **15**:884–7, 1997. (Medline: 97378942).

[Shotton (1995)] C. Shotton, C. Arnold, Q. Sattentau, J. Sodroski, & J. A. McKeating. Identification and characterization of monoclonal antibodies specific for polymorphic antigenic determinants within the V2 region of the human immunodeficiency virus type 1 envelope glycoprotein. *J Virol* **69**:222–230, 1995. (Medline: 95074868) Notes: Anti-V2 linear and conformation dependent MAbs were studied. All V2 Abs studied could bind IIIB, but failed to neutralize non-clonal stocks. Epitope exposure is different in rgp120 compared to native gp120. HXB2 V2-MAb neutralization escape mutants were sequenced.

[Sidorova(1999)] E. Sidorova. Human monoclonal antibodies to MN-24 peptide of gp 120 HIV-1. *Hum Antibodies* **9**:107–10, 1999. (Medline: 99334303).

[Skinner (1988a)] M. A. Skinner, A. J. Langlois, C. B. McDanal, J. S. McDougal, D. P. Bolognesi, & T. J. Matthews. Neutralizing Antibodies to an Immunodominant Envelope Sequence Do Not Prevent gp120 Binding to CD4. *J Virol* **62**:4195–4200, 1988a. (Medline: 89012192) Notes: This report was an early suggestion that there are at least two classes of biologically active antibodies to HIV: one class is isolate restricted, primarily directed to a hypervariable loop structure of gp120 and not involved in CD4 binding; the second class is directed at more conserved structures that may directly block CD4 binding.

[Skinner (1988b)] M. A. Skinner, R. Ting, A. J. Langlois, K. J. Weinhold, H. K. Lyerly, K. Javaherian, & T. J. Matthews. Characteristics of a neutralizing monoclonal antibody to the HIV envelope glycoprotein. *AIDS Res Hum Retroviruses* **4**:187–197, 1988b. (Medline: 88281280).

[Smith (1998)] A. D. Smith, S. C. Geisler, A. A. Chen, D. A. Resnick, B. M. Roy, P. J. Lewi, E. Arnold, & G. F. Arnold. Human rhinovirus type 14:human immunodeficiency virus type 1 (HIV-1) V3 loop chimeras from a combinatorial library induce potent neutralizing antibody responses against HIV-1. *J Virol* **72**:651–9, 1998. (Medline: 98080459) Notes: The tip of the MN V3 loop, IGPGRAFYTTKN, was inserted into cold-causing human rhinovirus 14 (HRV14) and chimeras were immunoselected using MAbs 447-52-D, 694/98-D, NM-01, and 59.1, for good presentation of the V3 antigenic region. The selected chimeric viruses were neutralized by anti-V3 loop MAbs. The chimeric viruses elicited potent NAbs against ALA-1 and MN in guinea pigs.

[Sorensen (1994)] A. Sorensen, C. Nielsen, M. Arendrup, H. Clausen, J. Nielsen, E. Osinaga, A. Roseto, & J.-E. S. Hansen. Neutralization epitopes on HIV pseudotyped with HTLV-I: Conservation of carbohydrate epitopes. *J Acq Immune Def Synd* **7**:116–123, 1994. (Medline: 94133079) Notes: Pseudotypes were formed with HIV and HTLV-I. MAb 9284, directed at the V3 loop of gp120, failed to inhibit the infection of CD-4 negative cells with pseudotypes, but anti-HTLV serum did inhibit infection. HIV and HTLV-I appear to induce common carbohydrate neutralizing epitopes.

[Spear (1994)] G. T. Spear, D. M. Takefman, S. Sharpe, M. Ghassemi, & S. Zolla-Pazner. Antibodies to the HIV-1 V3 loop in serum from infected persons contribute a major proportion of immune effector functions including complement activation, antibody binding, and neutralization. *Virology* **204**:609–15, 1994. (Medline: 95027690).

[Spear (1993)] G. T. Spear, D. M. Takefman, B. L. Sullivan, A. L. Landay, & S. Zolla-Pazner. Complement activation by human monoclonal antibodies to human immunodeficiency virus. *J Virol* **67**:53–59, 1993. (Medline: 93100837) Notes: This study looked at the ability of 16 human MAbs to activate complement. MAbs directed against the V3 region could induce C3 deposition on infected cells and virolysis of free virus, but antibodies to the CD4BS and C-terminal region and two regions in gp41 could induce no complement mediated effects. Pre-treatment with sCD4 could increase complement-mediated effects of anti-gp41 MAbs, but decreased the complement-mediated effects of V3 MAbs. Anti-gp41 MAbs were able to affect IIIB but not MN virolysis, suggesting spontaneous shedding of gp120 on IIIB virions exposes gp41 epitopes. IgG isotype did not appear to have an effect on virolysis or C3 deposition.

[Sperlagh (1993)] M. Sperlagh, K. Stefano, F. Gonzalez-Scarano, S. Liang, J. Hoxie, H. Maruyama, M. Prewett, S. Matsushito, & D. Herlyn. Monoclonal anti-idiotype antibodies that mimic the epitope on gp120 defined by the anti-HIV-1 monoclonal antibody 0.5β. *AIDS* **7**:1553–1559, 1993. (Medline: 94114127).

[Stamatatos & Cheng-Mayer(1995)] L. Stamatatos & C. Cheng-Mayer. Structural modulations of the envelope gp120 glycoprotein of human immunodeficiency virus type 1 upon oligomerization and the differential V3 loop

epitope exposure of isolates displaying distinct tropism upon viral-soluble receptor binding. *J Virol* **69**:6191–6198, 1995. (Medline: 95395953).

[Stamatatos & Cheng-Mayer(1998)] L. Stamatatos & C. Cheng-Mayer. An envelope modification that renders a primary, neutralization- resistant clade B human immunodeficiency virus type 1 isolate highly susceptible to neutralization by sera from other clades. *J Virol* **72**:7840–5, 1998. (Medline: 98406184).

[Stamatatos (1997)] L. Stamatatos, S. Zolla-Pazner, M. K. Gorny, & C. Cheng-Mayer. Binding of antibodies to virion-associated gp120 molecules of primary-like human immunodeficiency virus type 1 (HIV-1) isolates: effect on HIV-1 infection of macrophages and peripheral blood mononuclear cells. *Virology* **229**:360–9, 1997. (Medline: 97271298).

[Stanfield (1999)] R. Stanfield, E. Cabezas, A. Satterthwait, E. Stura, A. Profy, & I. Wilson. Dual conformations for the HIV-1 gp120 V3 loop in complexes with different neutralizing Fabs. *Structure* **7**:131–42, 1999. (Medline: 99148121).

[Stigler (1995)] R. D. Stigler, F. Ruker, D. Katinger, G. Elliott, W. Hohne, P. Henklein, J. X. Ho, K. Keeling, D. C. Carter, E. Nugel, & et al. Interaction between a Fab fragment against gp41 of human immunodeficiency virus 1 and its peptide epitope: characterization using a peptide epitope library and molecular modeling. *Protein Eng* **8**:471–9, 1995. (Medline: 96016641).

[Stoiber (1996)] H. Stoiber, C. Pinter, A. G. Siccardi, A. Clivio, & M. P. Dierich. Efficient destruction of human immunodeficiency virus in human serum by inhibiting the protective action of complement factor H and decay accelerating factor (DAF, CD55). *J Exp Med* **183**:307–310, 1996. (Medline: 96136775) Notes: HIV and HIV-infected cells are not subject to efficient complement-mediated lysis, even in the presence of HIV-specific antibodies. HIV is intrinsically resistant to human complement. Decay accelerating factor (DAF) and human complement factor H (CFH), a humoral negative regulator of complement which binds to gp41 are critical for this resistance. MAb 2F5 can inhibit CHF binding and facilitate complement mediated lysis.

[Sugiura (1999)] W. Sugiura, C. C. Broder, B. Moss, & P. L. Earl. Characterization of conformation-dependent anti-gp120 murine monoclonal antibodies produced by immunization with monomeric and oligomeric human immunodeficiency virus type 1 envelope proteins. *Virology* **254**:257–67, 1999. (Medline: 99143340).

[Sullivan (1998a)] N. Sullivan, Y. Sun, J. Binley, J. Lee, C. 3rd. Barbas, P. W. Parren, D. R. Burton, & J. Sodroski. Determinants of human immunodeficiency virus type 1 envelope glycoprotein activation by soluble CD4 and monoclonal antibodies. *J Virol* **72**:6332–8, 1998a. (Medline: 98325144).

[Sullivan (1995)] N. Sullivan, Y. Sun, J. Li, W. Hofmann, & J. Sodroski. Replicative function and neutralization sensitivity of envelope glycoproteins from primary and T-cell line-passaged human immunodeficiency virus type 1 isolates. *J Virol* **69**:4413–4422, 1995. (Medline: 95287498) Notes: Three gp120 molecules derived from primary isolates were compared to T-cell adapted lines HXBc2 and MN. Complementation experiments showed viral entry into peripheral blood mononuclear cell targets was five-fold less efficient for primary isolates. Anti-CD4 binding site neutralizing MAbs were far less potent against primary isolates, and the single anti-V3 MAb tested was 3-fold less potent. The differences in neutralization efficiency could not be attributed to differences in affinity for monomeric gp120, but were related to binding to the oligomeric complex. Enhanced infectivity of primary isolates was observed using sCD4 and MAb F105, which can neutralize T-cell adapted strains.

[Sullivan (1998b)] N. Sullivan, Y. Sun, Q. Sattentau, M. Thali, D. Wu, G. Denisova, J. Gershoni, J. Robinson, J. Moore, & J. Sodroski. CD4-Induced conformational changes in the human immunodeficiency virus type 1 gp120 glycoprotein: consequences for virus entry and neutralization. *J Virol* **72**:4694–703, 1998b. (Medline: 98241704) Notes: A study of the sCD4 inducible MAb 17bi, and the MAb CG10 that recognizes a gp120-CD4 complex. These epitopes are minimally accessible upon attachment of gp120 to the cell. The CD4-binding induced changes in gp120 were studied, exploring the sequestering of chemokine receptor binding sites from the humoral response.

[Sullivan (1993)] N. Sullivan, M. Thali, C. Furman, D. Ho, & J. Sodroski. Effect of amino acid changes in the V2 region of the human immunodeficiency virus type 1 gp120 glycoprotein on subunit association, syncytium formation, and recognition by a neutralizing antibody. *J Virol* **67**:3674–3679, 1993. (Medline: 93267832) Notes: Recognition of neutralizing MAb G3-4 was altered by substitutions in 176 to 184 in the V2 loop. Some changes in the V2 loop can affect subunit assembly; other changes allow expression and CD4 binding but inhibit syncytium formation and viral entry, suggesting that V1/V2 may be involved in post receptor binding events.

[Sun (1989)] N. C. Sun, D. D. Ho, C. R. Y. Sun, R.-S. Liou, W. Gordon, M. S. C. Fung, X. L. Li, R. C. Ting, T.-H. Lee, N. T. Chang, & T. W. Chang. Generation and characterization of monoclonal antibodies to the putative CD4-binding domain of human immunodeficiency virus type 1 gp120. *J Virol* **63**:3579–3585, 1989. (Medline: 89342591).

[Szilvay (1995)] A. M. Szilvay, K. A. Brokstad, R. Kopperud, G. Haukenes, & K. H. Kalland. Nuclear export of the human immunodeficiency virus type 1 nucleocytoplasmic shuttle protein Rev is mediated by its activation domain and is blocked by transdominant negative mutants. *J Virol* **69**:3315–3323, 1995. (Medline: 95264419).

[Szilvay (1992)] A. M. Szilvay, S. Nornes, I. R. Haugan, L. Olsen, V. R. Prasad, C. Endresen, S. P. Goff, & D. E. Helland. Epitope mapping of HIV-1 reverse transcriptase with monoclonal antibodies that inhibit polymerase and RNase H activities. *J AIDS* **5**:647–657, 1992. (Medline: 92309178) Notes: 20 MAbs are described, only five are able to bind to short peptides. These five MAbs are insensitive to mutations through out the rest of RT.

[Takeda (1992)] A. Takeda, J. E. Robinson, D. D. Ho, C. Debouck, N. L. Haigwood, & F. A. Ennis. Distinction of human immunodeficiency virus type 1 neutralization and infection enhancement by human monoclonal antibodies to glycoprotein 120. *J Clin Inv* **89**:1952–1957, 1992. (Medline: 92291314) Notes: Complement receptors for IgG on monocytic cells can serve as a means for MAb mediated enhancement of HIV-1 infection. MAbs N70-1.5 and N70-2.3a bind distinct discontinuous epitopes in gp120. N70-1.5 is a potent neutralizing MAb with no enhancing activity, while N70-2.3a doesn‘t neutralize and mediates enhancement of HIV-1 infection.

[Takefman (1998)] D. M. Takefman, B. L. Sullivan, B. E. Sha, & G. T. Spear. Mechanisms of resistance of HIV-1 primary isolates to complement- mediated lysis. *Virology* **246**:370–8, 1998. (Medline: 98327785).

[Tanchou (1995)] V. Tanchou, T. Delaunay, M. Bodeus, B. Roques, J. L. Darlix, & R. Benarous. Conformational changes between human immunodeficiency virus type 1 nucleocapsid protein NCp7 and its precursor NCp15 as detected by anti-NCp7 monoclonal antibodies. *J Gen Virol* **76**:2457–2466, 1995. (Medline: 96030855).

[Tanchou (1994)] V. Tanchou, T. Delaunay, H. de Rocquigny, M. Bodeus, J.-L. Darlix, B. Roques, & R. Benarous. Monoclonal antibody-mediated inhibition of RNA binding and annealing activities of HIV type 1 nucleocapsid protein. *AIDS Res Hum Retroviruses* **10**:983–993, 1994. (Medline: 95110646).

[Tani (1994)] Y. Tani, E. Donoghue, S. Sharpe, E. Boone, H. C. Lane, S. Zolla-Pazner, & D. I. Cohen. Enhanced in vitro human immunodeficiency virus type 1 replication in B cells expressing surface antibody to the TM env protein. *J Virol* **68**:1942–1950, 1994. (Medline: 94149889) Notes: The MAb 98-6 was expressed as a surface anti-gp41 monoclonal antibody receptor for gp41 (sIg/gp41) by transfection into a CD4-negative B-cell line. Transfected cells could bind HIV envelope, but could not be infected by HIV-1. When CD4 delivered by retroviral constructs was expressed on these cells, they acquired the ability to replicate HIV-1, and sIg/gp41 specifically enhanced viral replication.

[Tatsumi (1990)] M. Tatsumi, C. Devaux, F. Kourilsky, & J. C. Chermann. Characterization of monoclonal antibodies directed against distinct conserved epitopes of human immunodeficiency virus type 1 core proteins. *Mol Cell Biochem* **96**:127–136, 1990. (Medline: 91109746).

[Teeuwsen (1990)] V. J. Teeuwsen, K. H. Siebelink, S. Crush-Stanton, B. Swerdlow, J. J. Schalken, J. Goudsmit, R. van de Akker, M. J. Stukart, F. G. Uytdehaag, & A. D. Osterhaus. Production and characterization of a human monoclonal antibody, reactive with a conserved epitope on gp41 of human immunodeficiency virus type I. *AIDS Res Hum Retroviruses* **6**:381–392, 1990. (Medline: 90253925).

[Tewari (1998)] D. Tewari, S. L. Goldstein, A. L. Notkins, & P. Zhou. cDNA encoding a single-chain antibody to HIV p17 with cytoplasmic or nuclear retention signals inhibits HIV-1 replication. *J Immunol* **161**:2642–7, 1998. (Medline: 98391083).

[Thali (1994)] M. Thali, M. Charles, C. Furman, L. Cavacini, M. Posner, J. Robinson, & J. Sodroski. Resistance to neutralization by broadly reactive antibodies to the human immunodeficiency virus type 1 gp120 glycoprotein conferred by a gp41 amino acid change. *J Virol* **68**:674–680, 1994. (Medline: 94118414) Notes: A T→A amino acid substitution at position 582 of gp41 conferred resistance to neutralization to 30% of HIV positive sera (Wilson *et al*. J Virol 64:3240-48 (1990)). Monoclonal antibodies that bound to the CD4 binding site were unable to neutralize this virus, but the mutation did not reduce the neutralizing capacity of a V2 region MAb G3-4, V3 region MAbs, or gp41 neutralizing MAb 2F5.

[Thali (1992a)] M. Thali, C. Furman, D. D. Ho, J. Robinson, S. Tilley, A. Pinter, & J. Sodroski. Discontinuous, conserved neutralization epitopes overlapping

the CD4-binding region of human immunodeficiency virus type 1 gp120 envelope glycoprotein. *J Virol* **66**:5635–5641, 1992a. (Medline: 92365162) Notes: Maps the relationship between amino acid substitutions that reduce CD4-gp120 interaction, and amino acid substitutions that reduce the binding of discontinuous epitope MAbs that inhibit CD4 binding.

[Thali (1992b)] M. Thali, C. Furman, B. Wahren, M. Posner, D. Ho, J. Robinson, & J. Sodroski. Cooperativity of neutralizing antibodies directed against the V3 and CD4 binding regions of the HIV-1 gp120 envelope glycoprotein. *J Acq Immune Def Synd* **5**:591–599, 1992b. (Medline: 92269113).

[Thali (1993)] M. Thali, J. P. Moore, C. Furman, M. Charles, D. D. Ho, J. Robinson, & J. Sodroski. Characterization of conserved human immunodeficiency virus type 1 gp120 neutralization epitopes exposed upon gp120-CD4 binding. *J Virol* **67**:3978–3988, 1993. (Medline: 93287215) Notes: Five regions are likely to contribute to the 48d and 17b discontinuous epitopes, either directly or through local conformational effects: the hydrophobic ring-like structure formed by the disulfide bond that links C3 and C4, the base of the stem-loop that contains V1 and V2, and the hydrophobic region in C2 from Arg 252 to Asp 262. Additionally changes in Glu 370, and Met 475 in C5, affected binding and neutralization. The hydrophobic character of these critical regions is consistent with the limited exposure on gp120 prior to CD4 binding.

[Thali (1991)] M. Thali, U. Olshevsky, C. Furman, D. Gabuzda, M. Posner, & J. Sodroski. Characterization of a discontinuous human immunodeficiency virus type 1 gp120 epitope recognized by a broadly reactive neutralizing human monoclonal antibody. *J Virol* **65(11)**:6188–6193, 1991. (Medline: 92015517) Notes: An early detailed characterization of the mutations that inhibit the neutralization capacity of the MAb F105, that binds to a discontinuous epitope and inhibits CD4 binding to gp120.

[Thiriart (1989)] C. Thiriart, M. Francotte, J. Cohen, C. Collignon, A. Delers, S. Kummert, C. Molitor, D. Gilles, P. Roelants, F. Van Wijnendaele, M. De Wilde, & C. Bruck. Several antigenic determinants exposed on the gp120 moiety of HIV-1 gp160 are hidden on the mature gp120. *J Immunol* **143**:1832–1836, 1989. (Medline: 89381316).

[Till (1989)] M. A. Till, S. Zolla-Pazner, M. K. Gorny, J. W. Uhr, & E. S. Vitetta. Human immunodeficiency virus-infected T cells and monocytes are killed by monoclonal human anti-gp41 antibodies coupled to ricin A chain. *Proc Natl Acad Sci USA* **86**:1987–1991, 1989. (Medline: 89184552).

[Tilley (1992)] S. A. Tilley, W. J. Honnen, M. E. Racho, T.-C. Chou, & A. Pinter. Synergistic neutralization of HIV-1 by human monoclonal antibodies against the V3 loop and the CD4-binding site of gp120. *AIDS Res Hum Retroviruses* **8**:461–467, 1992. (Medline: 92287631).

[Tilley (1991a)] S. A. Tilley, W. J. Honnen, M. E. Racho, M. Hilgartner, & A. Pinter. A human monoclonal antibody against the CD4-binding site of HIV-1 gp120 exhibits potent, broadly neutralizing activity. *Res Virol* **142**:247–259, 1991a. (Medline: 92179521) Notes: Characterization of human neutralizing MAb 1125H.

[Tilley (1991b)] S. A. Tilley, W. J. Honnen, M. E. Racho, M. Hilgartner, & A. Pinter. Human Monoclonal Antibodies Against the Putative CD4 Binding Site and the V3 Loop of HIV gp120 Act in Concert to Neutralize Virus. *VII International Conference on AIDS* **1991**:p. 39, 1991b. Notes: Aidsline: 1007091 Abstract 70.

[Tisdale (1988)] M. Tisdale, P. Ertl, B. A. Larder, D. J. M. Purifoy, G. Darby, & K. L. Powell. Characterization of human immunodeficiency virus type 1 reverse transcriptase by using monoclonal antibodies: role of the C terminus in antibody reactivity and enzyme function. *J Virol* **62**:3662–3667, 1988. (Medline: 88333139).

[Toohey (1995)] K. Toohey, K. Wehrly, J. Nishio, S. Perryman, & B. Chesebro. Human immunodeficiency virus envelope V1 and V2 regions influence replication efficiency in macrophages by affecting virus spread. *Virology* **213**:70–9, 1995. (Medline: 96036481).

[Tornatore (1994)] C. Tornatore, K. Meyers, W. Atwood, K. Conant, & E. Major. Temporal patterns of human immunodeficiency virus type 1 transcripts in human fetal astrocytes. *J Virol* **68**:93–102, 1994. (Medline: 94076466).

[Trkola (1996a)] A. Trkola, T. Dragic, J. Arthos, J. M. Binley, W. C. Olson, G. P. Allaway, C. Cheng-Mayer, J. Robinson, P. J. Maddon, & J. P. Moore. CD4-dependent, antibody-sensitive interactions between HIV-1 and its co-receptor CCR-5. *Nature* **384**:184–187, 1996a. (Medline: 97064177) Notes: CCR-5 is a co-factor for fusion of HIV-1 strains of the non-syncytium-inducing (NSI) phenotype with CD4+ T-cells. CD4 binding greatly increases the efficiency of gp120-CCR-5 interaction. Neutralizing MAbs against the V3 loop and CD4-induced epitopes on gp120 inhibited the interaction of gp120 with CCR-5, without affecting gp120-CD4 binding.

[Trkola (1998)] A. Trkola, T. Ketas, V. N. Kewalramani, F. Endorf, J. M. Binley, H. Katinger, J. Robinson, D. R. Littman, & J. P. Moore. Neutralization sensitivity of human immunodeficiency virus type 1 primary isolates to antibodies and CD4-based reagents is independent of coreceptor usage. *J Virol* **72**:1876–85, 1998. (Medline: 98139079).

[Trkola (1995)] A. Trkola, A. B. Pomales, H. Yuan, B. Korber, P. J. Maddon, G. P. Allaway, H. Katinger, C. F. Barbas III, D. R. Burton, D. D. Ho, & J. P. Moore. Cross-clade neutralization of primary isolates of human immunodeficiency virus type 1 by human monoclonal antibodies and tetrameric CD4-IgG. *J Virol* **69**:6609–6617, 1995. (Medline: 96013752) Notes: Three MAbs, IgG1b12, 2G12, and 2F5 tetrameric CD4-IgG2 were tested for their ability to neutralize primary isolates from clades A-F. 2F5 and CD4-IgG2 were able to neutralize within and outside clade B with a high potency. IgG1b12 and 2G12 could potently neutralize isolates from within clade B, but showed a reduction in efficacy outside of clade B. 2F5 neutralization was dependent on the presence of the sequence: LDKW.

[Trkola (1996b)] A. Trkola, M. Purtscher, T. Muster, C. Ballaun, A. Buchacher, N. Sullivan, K. Srinivasan, J. Sodroski, J. P. Moore, & H. Katinger. Human monoclonal antibody 2G12 defines a distinctive neutralization epitope on the gp120 glycoprotein of human immunodeficiency virus type 1. *J Virol* **70**:1100–1108, 1996b. (Medline: 96135224).

[Trujillo (1993)] J. R. Trujillo, M. F. McLane, T.-H. Lee, & M. Essex. Molecular mimicry between the human immunodeficiency virus type 1 gp120 V3 loop and human brain proteins. *J Virol* **67**:7711–7715, 1993. (Medline: 94047398).

[Tugarinov (2000)] V. Tugarinov, A. Zvi, R. Levy, Y. Hayek, S. Matsushita, & J. Anglister. NMR structure of an anti-gp120 antibody complex with a V3 peptide reveals a surface important for co-receptor binding [In Process Citation]. *Structure Fold Des* **8**:385–95, 2000. (Medline: 20264305).

[Turbica (1995)] I. Turbica, M. Posner, C. Bruck, & F. Barin. Simple enzyme immunoassay for titration of antibodies to the CD4- binding site of human immunodeficiency virus type 1 gp120. *J Clin Microbiol* **33**:3319–3323, 1995. (Medline: 96156153).

[Turbica (1997)] I. Turbica, F. Simon, J. M. Besnier, B. LeJeune, P. Choutet and A Goudeau, & F. Barin. Temporal development and prognostic value of antibody response to the major neutralizing epitopes of gp120 during HIV-1 infection. *J Med Virol* **52**:309–315, 1997. (Medline: 97353800).

[Tyler (1990)] D. S. Tyler, S. D. Stanley, S. Zolla-Pazner, M. K. Gorny, P. P. Shadduck, A. J. Langlois, T. J. Matthews, D. P. Bolognesi, T. J. Palker, & K. J. Weinhold. Identification of sites within gp41 that serve as targets for antibody-dependent cellular cytotoxicity by using human monoclonal antibodies. *J Immunol* **145**:3276–3282, 1990. (Medline: 91036969).

[Ugen (1993)] K. E. Ugen, Y. Refaleli, U. Ziegner, M. Agadjanyan, M. A. R. Satre, V. Srikantan, B. Wang, A. Sato, W. V. Williams, & D. B. Weiner. Generation of monoclonal antibodies against the amino terminus of gp120 that elicit antibody-dependent cellular cytotoxicity. *Vaccines 93* pages 215–221, 1993. Notes: Editors: F. Brown, H. S. Ginsberg and R. Lerner, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY.

[Ugolini (1997)] S. Ugolini, I. Mondor, P. W. H. I Parren, D. R. Burton, S. A. Tilley, P. J. Klasse, & Q. J. Sattentau. Inhibition of virus attachment to CD4+ target cells is a major mechanism of T cell line-adapted HIV-1 neutralization. *J Exp Med* **186**:1287–1298, 1997. (Medline: 97477412).

[Valenzuela (1998)] A. Valenzuela, J. Blanco, B. Krust, R. Franco, & A. G. Hovanessian. Neutralizing Antibodies against the V3 loop of human immunodeficiency type 1 gp120 block the CD4-dependent and independent binding of the virus to cells. *J Virol* **71**:8289–8298, 1998. (Medline: 98001346).

[Valvatne (1996)] H. Valvatne, A. M. Szilvay, & D. E. Helland. A monoclonal antibody defines a novel HIV type 1 Tat domain involved in trans-cellular trans-activation. *AIDS Res Hum Retroviruses* **12**:611–619, 1996. (Medline: 96291772) Notes: CAT and beta-galactosidase assays, and immunofluorescence analysis were used to study the cellular uptake of the HIV-1 Tat protein. A MAb binding to the basic domain and the RGD sequence inhibits transactivation by exogenous Tat. The inhibition of the cellular uptake of Tat by an anti-Tat monoclonal antibody and by the serum components implies specific binding of Tat to the cell membrane.

[VanCott (1995)] T. C. VanCott, F. R. Bethke, D. S. Burke, R. R. Redfield, & D. L. Birx. Lack of induction of antibodies specific for conserved, discontinuous epitopes of HIV-1 envelope glycoprotein by candidate AIDS vaccines. *J Immunol* **155**:4100–4110, 1995. (Medline: 96003456) Notes: The Ab response in both HIV-1 infected and uninfected volunteers immunized with HIV-1 rec envelope subunit vaccines (Genentech gp120IIIB, MicroGeneSys gp160IIIB, or ImmunoAG gp160IIIB) preferentially induced Abs reactive only to the denatured form of gp120. This may explain the inability of the vaccinee sera to neutralize primary HIV-1 isolates.

[VanCott (1994)] T. C. VanCott, F. R. Bethke, V. R. Polonis, M. K. Gorny, S. Zolla-Pazner, R. R. Redfield, & D. L. Birx. Dissociation rate of antibody-gp120 binding interactions is predictive of V3-mediated neutralization of HIV-1. *J Immunol* **153**:449–459, 1994. (Medline: 94267254) Notes: Using surface plasmon resonance it was found that the rate of the dissociation of the MAb-gp120 complex, but not the association rate, correlated with MAbs ability to neutralize homologous virus (measured by 50% inhibition of p24 production). Association constants were similar for all MAbs tested, varying less than 4-fold. Dissociation rate constants were quite variable, with 100-fold differences observed.

[Vella (1993)] C. Vella, M. Ferguson, G. Dunn, R. Meloen, H. Langedijk, D. Evans, & P. D. Minor. Characterization and primary structure of a human immunodeficiency virus type 1 (HIV-1) neutralization domain as presented by a poliovirus type 1/HIV-1 chimera. *J Gen Virol* **7**:15–21, 1993. (Medline: 94103763) Notes: This study elaborated on a set of antibodies first reported in Evans *et al.*, 1989. Not all of the neutralization results are congruent between the studies. The antibodies in this study were raised to a region including the cytoplasmic domain of gp41 inserted into a poliovirus type 1/HIV-1 chimera.

[von Brunn (1993)] A. von Brunn, M. Brand, C. Reichhuber, C. Morys-Wortmann, F. Deinhardt, & F. Schodel. Principal neutralizing domain of HIV-1 is highly immunogenic when expressed on the surface of hepatitis B core particles. *Vaccine* **11**:817–24, 1993. (Medline: 93362473).

[Wagner (1996)] R. Wagner, L. Deml, R. Schirmbeck, M. Niedrig, J. Reimann, & H. Wolf. Construction, expression, and immunogenicity of chimeric HIV-1 virus-like particles. *Virology* **220**:128–140, 1996. (Medline: 96240635).

[Wagner (1998)] R. Wagner, V. J. Teeuwsen, L. Deml, F. Notka, A. G. Haaksma, S. S. Jhagjhoorsingh, H. Niphuis, H. Wolf, & J. L. Heeney. Cytotoxic T cells and neutralizing antibodies induced in rhesus monkeys by virus-like particle HIV vaccines in the absence of protection from SHIV infection. *Virology* **245**:65–74, 1998. (Medline: 98277073) Notes: Self assembled non-infectious virus.

[Wainberg & Gu(1995)] M. A. Wainberg & Z. Gu. Targeting HIV reverse transcriptase in novel ways. *Nat Med* **1**:628–629, 1995. (Medline: 96071518) Notes: Commentary on Maciejewski *et al*., 1995.

[Warrier (1995)] S. V. Warrier, E. Murphy, I. Yokoyama, & S. A. Tilley. Characterization of the Variable Regions of a Chimpanzee Monoclonal Antibody with Potent Neutralizing Activity Against HIV-1. *Mol Immunol* **32**:1081–1092, 1995. (Medline: 96128277).

[Warrier (1994)] S. V. Warrier, A. Pinter, W. J. Honnen, M. Girard, E. Muchmore, & S. A. Tilley. A novel, glycan-dependent epitope in the V2 domain of human immunodeficiency virus type 1 gp120 is recognized by a highly potent, neutralizing chimpanzee monoclonal antibody. *J Virol* **68**:4636–4642, 1994. (Medline: 94267927).

[Warrier (1996)] S. V. Warrier, A. Pinter, W. J. Honnen, & S. A. Tilley. Synergistic Neutralization of Human Immunodeficiency Virus Type 1 by a Chimpanzee Monoclonal Antibody against the V2 Domain of gp120 in Combination with Monoclonal Antibodies against the V3 Loop and the CD4-Binding Site. *J Virol* **70**:4466–4473, 1996. (Medline: 96256757).

[Watkins (1996)] B. A. Watkins, A. E. Davis, S. Fiorentini, F. di Marzo Veronese, & M. S. Reitz Jr. Evidence for distinct contributions of heavy and light chains to restriction of antibody recognition of the HIV-1 principal neutralization determinant. *J Immunol* **156**:1676–1683, 1996. (Medline: 96164601).

[Watkins (1993)] B. A. Watkins, M. S. Reitz, C. A. Wilson, K. Aldrich, A. E. Davis, & M. Robert-Guroff. Immune escape by human immunodeficiency virus type 1 from neutralizing antibodies: evidence for multiple pathways. *J Virol* **67**:7493–7500, 1993. (Medline: 94047366) Notes: A neutralization resistance point mutation (HXB2 A281V) was studied using a variety of MAbs, and it was shown that this substitution affects a different epitope than a previously characterized neutralization escape mutant (A582T) (Reitz 1988, Wilson 1990).

[Wehrly & Chesebro(1997)] K. Wehrly & B. Chesebro. p24 antigen capture assay for quantification of human immunodeficiency virus using readily available inexpensive reagents. *Methods: A companion to Methods in Enzymology* **12**:288–93, 1997. (Medline: 97401510).

[Weinberg (1997)] J. Weinberg, H. X. Liao, J. V. Torres, T. J. Matthews, J. Robinson, & B. F. Haynes. Identification of a synthetic peptide that mimics an HIV glycoprotein 120 envelope conformational determinant exposed following ligation of glycoprotein 120 by CD4. *AIDS Res Hum Retroviruses* **13**:657–64, 1997. (Medline: 97311517).

[Weissenhorn (1996)] W. Weissenhorn, S. A. Wharton, L. J. Calder, P. L. Earl, B. Moss, E. Aliprandis, J. J. Skehel, & D. C. Wiley. The ectodomain of HIV-

1 Env subunit gp41 forms a soluble, alpha- helical, rod-like oligomer in the absence of gp120 and the N-terminal fusion peptide. *EMBO J* **15**:1507–14, 1996. (Medline: 96203067).

[White-Scharf (1993)] M. E. White-Scharf, B. J. Potts, L. M. Smith, K. A. Sokolowski, J. R. Rusche, & S. Silver. Broadly neutralizing monoclonal antibodies to the V3 region of HIV-1 can be elicited by peptide immunization. *Virology* **192**:197–206, 1993. (Medline: 93297106) Notes: Using a V3 loop peptide as immunogen, a panel of 50 anti-V3 neutralizing monoclonal antibodies were generated. Four of them were characterized in detail in this paper.

[Wisnewski (1995)] A. Wisnewski, L. Cavacini, G. Kingsbury, D. Sadden, & M. Posner. Anti-HIV human monoclonal antibody variable region gene usage. *J Cell Biochem* **supple 21 B**:229, 1995.

[Wisnewski (1996)] A. Wisnewski, L. Cavacini, & M. Posner. Human antibody variable region gene usage in HIV-1 infection. *J Acquir Immune Defic Syndr Hum Retrovirol* **11**:31–38, 1996. (Medline: 96130044).

[Wolfe (1996)] E. J. Wolfe, L. A. Cavacini, M. H. Samore, M. R. Posner, C. Kozial, C. Spino, C. B. Trapnell, N. Ketter, S. Hammer, & J. G. Gambertoglio. Pharmacokinetics of F105, a human monoclonal antibody, in persons infected with human immunodeficiency virus type 1. *Clin Pharmacol Ther* **59**:662–667, 1996. (Medline: 96290506).

[Wu (1993)] J. Wu, E. Amandoron, X. Li, M. A. Wainberg, & M. A. Parniak. Monoclonal Antibody-mediated Inhibition of HIV-1 Reverse Transcriptase Polymerase Activity. *J Biol Chem* **268**:9980–9985, 1993. (Medline: 93252974).

[Wu (1996)] L. Wu, N. P. Gerard, R. Wyatt, H. Choe, C. Parolin, N. Ruffing, A. Borsetti, A. A. Cardoso, E. Desjardin, W. Newman, C. Gerard, & J. Sodroski. CD4-induced interaction of primary HIV-1 gp120 glycoproteins with the chemokine receptor CCR-5. *Nature* **384**:179–183, 1996. (Medline: 97064176) Notes: Results suggest that HIV-1 attachment to CD4 creates a high-affinity binding site for CCR-5, leading to membrane fusion and virus entry. CD4-induced or V3 neutralizing MAbs block the interaction of gp120-CD4 complexes with CCR-5.

[Wu (1995)] Z. Wu, S. C. Kayman, W. Honnen, K. Revesz, H. Chen, S. V. Warrier, S. A. Tilley, J. McKeating, C. Shotton, & A. Pinter. Characterization of neutralization epitopes in the V2 region of human immunodeficiency virus type 1 gp120: role of glycosylation in the correct folding of the V1/V2 domain. *J Virol* **69**:2271–2278, 1995. (Medline: 95191000) Notes: Most epitopes based only on numbering.

[Wyatt (1997)] R. Wyatt, E. Desjardin, U. Olshevsky, C. Nixon, J. Binley, V. Olshevsky, & J. Sodroski. Analysis of the interaction of the human immunodeficiency virus type 1 gp120 Envelope glycoprotein with the gp41 transmembrane glycoprotein. *J Virol* **71**:9722–31, 1997. (Medline: 98037689) Notes: This study characterized the binding of gp120 and gp41 by comparing Ab reactivity to soluble gp120 and to a soluble complex of gp120 and gp41 called sgp140. The occlusion of gp120 epitopes in the sgp140 complex provides a guide to the gp120 domains that interact with gp41, localizing them in C1 and C5 of gp120. Mutations that disrupt the binding of the occluded antibodies do not influence NAb binding or CD4 binding, thus if the gp41 binding domain is deleted, the immunologically desirable features of gp120 for vaccine design are still intact.

[Wyatt (1998)] R. Wyatt, P. D. Kwong, E. Desjardins, R. W. Sweet, J. Robinson, W. A. Hendrickson, & J. G. Sodroski. The antigenic structure of the HIV gp120 envelope glycoprotein. *Nature* **393**:705–711, 1998. (Medline: 98303386) Notes: Comment in: Nature 1998 Jun 18;393(6686):630-1. The spatial organization of the neutralizing epitopes of gp120 is described, based on epitope maps interpreted in the context of the X-ray crystal structure of a ternary complex that includes a gp120 core, CD4 and a neutralizing antibody.

[Wyatt (1995)] R. Wyatt, J. Moore, M. Accola, E. Desjardin, J. Robinson, & J. Sodroski. Involvement of the V1/V2 variable loop structure in the exposure of human immunodeficiency virus type 1 gp120 epitopes induced by receptor binding. *J Virol* **69**:5723–5733, 1995. (Medline: 95363986) Notes: Deletions in the V1/V2 loops of gp120 resulted in the loss of the ability of sCD4 to induce binding of the MAbs 17b, 48d, and A32. A32 can induce binding of 17b and 48d; this induction does not appear to involve the V1/V2 regions.

[Wyatt & Sodroski(1998)] R. Wyatt & J. Sodroski. The HIV-1 envelope glycoproteins: fusogens, antigens, and immunogens. *Science* **280**:1884–1888, 1998. (Medline: 98296351) Notes: Review discussing of the mechanisms used by the virus to evade a neutralizing antibody response while maintaining vital Env functions of binding to target cells, and then entering through membrane fusion.

[Wyatt (1993)] R. Wyatt, N. Sullivan, M. Thali, H. Repke, D. Ho, J. Robinson, M. Posner, & J. Sodroski. Functional and Immunologic Characterization

of Human Immunodeficiency virus type 1 envelope glycoproteins containing deletions of the major variable regions. *J Virol* **67**:4557–4565, 1993. (Medline: 93323196) Notes: Affinity of neutralizing MAbs directed against the CD4 binding site was increased dramatically by deletion mutants across the V1/V2 and V3 structures, suggesting that these domains mask these conserved discontinuous epitopes.

[Wyatt (1992)] R. Wyatt, M. Thali, S. Tilley, A. Pinter, M. Posner, D. Ho, J. Robinson, & J. Sodroski. Relationship of the human immunodeficiency virus type 1 gp120 third variable loop to elements of the CD4 binding site. *J Virol* **66**:6997–7004, 1992. (Medline: 93059644) Notes: This paper examines mutations which alter MAb binding and neutralization. Anti-V3 MAb 9284 has enhanced binding due to a mutation in the C4 region that is also important for CD4 binding, and anti-CD4 binding MAbs F105, 1.5e and 1125H show increased precipitation of a gp120 from which the V3 loop was deleted, relative to wild type, in RIPA buffer containing non-ionic detergents.

[Xiao (2000a)] Y. Xiao, M. Liao, Y. Lu, M. P. Dierich, & Y. H. Chen. Epitope-vaccines: a new strategy to induce high levels of neutralizing antibodies against HIV-1. *Immunobiology* **201**:323–31, 2000a. (Medline: 20236547).

[Xiao (2000b)] Y. Xiao, Y. Zhao, Y. Lu, & Y. H. Chen. Epitope-vaccine induces high levels of ELDKWA-epitope-specific neutralizing antibody. *Immunol Invest* **29**:41–50, 2000b. (Medline: 20173079).

[Xu (1991)] J.-Y. Xu, M. K. Gorny, T. Palker, S. Karwowska, & S. Zolla-Pazner. Epitope mapping of two immunodominant domains of gp41, the transmembrane protein of human immunodeficiency virus type 1, using ten human monoclonal antibodies. *J Virol* **65**:4832–4838, 1991. (Medline: 91333026) Notes: The immunodominance of linear epitope in the region 590-600 of gp41 (cluster I) was established, and a second conformational epitope was mapped that reacted with a region between amino acids 644 and 663 (cluster II). Titration experiments showed that there was 100-fold more antibody to cluster I than cluster II in patient sera.

[Yamada (1991)] M. Yamada, A. Zurbriggen, M. B. A. Oldstone, & R. S. Fujinami. Common immunologic determinant between human immunodeficiency virus type 1 gp41 and astrocytes. *J Virol* **65**:1370–1376, 1991. (Medline: 91140728).

[Yang (1998)] G. Yang, M. P. D'Souza, & G. N. Vyas. Neutralizing antibodies against HIV determined by amplification of viral long terminal repeat sequences from cells infected in vitro by nonneutralized virions. *J Acquir Immune Defic Syndr Hum Retrovirol* **17**:27–34, 1998. (Medline: 98097255) Notes: A neutralization assay was developed based on heminested PCR amplification of the LTR (HNPCR) – LTR-HNPCR consistently revealed HIV DNA and was shown to be a rapid, specific and reliable neutralization assay based on tests with 6 MAbs and 5 HIV isolates.

[Yang (1997)] W.-P. Yang, K. Green, S. Pinz-Sweeney, A. T. Briones, D. R. Burton, & C. F. Barbas III. CDR walking mutagenesis for the affinity maturation of a potent human anti-HIV-1 antibody into the picomolar range. *J Mol Biol* **254**:392–403, 1997. (Medline: 96095799).

[Yoshida (1997)] K. Yoshida, M. Nakamura, & T. Ohno. Mutations of the HIV type 1 V3 loop under selection pressure with neutralizing monoclonal antibody NM-01. *AIDS Res Hum Retroviruses* **13**:1283–1290, 1997. (Medline: 9339845).

[Yoshiyama (1994)] H. Yoshiyama, H.-M. Mo, J. P. Moore, & D. D. Ho. Characterization of mutants of human immunodeficiency virus type 1 that have escaped neutralization by monoclonal antibody G3-4 to the gp120 V2 loop. *J Virol* **68**:974–978, 1994. (Medline: 94118447) Notes: MAb G3-4 binds a conformationally sensitive epitope in the V2 loop of HIV-1 RF. RF was cultured in the presence of G3-4 to select for neutralization resistance. Three independent experiments yielded escape mutants, and sequencing revealed two V2 mutations to be responsible for the neutralization escape phenotype, 177 Y/H and 179 L/P. Experimental introduction of the 179 P substitution resulted in non-viable virus, and 177 H confirmed the resistance phenotype.

[Yu (2000)] T. Yu, Y. Bai, M. P. Dierich, & Y. H. Chen. Induction of high levels of epitope-specific antibodies by epitope/peptide candidate vaccines against human immunodeficiency virus type-1 (HIV-1) [In Process Citation]. *Microbiol Immunol* **44**:105–10, 2000. (Medline: 20260633).

[Zinckgraf (1999)] J. W. Zinckgraf, J. M. Winchell, & L. K. Silbart. Antibody responses to a mucosally delivered HIV-1 gp120-derived C4/V3 peptide. *J Reprod Immunol* **45**:99–112, 1999. (Medline: 20137444).

[Zolla-Pazner (1997)] S. Zolla-Pazner, C. Alving, R. Belshe, P. Berman, S. Burda, P. Chigurupati, M. L. Clements ML, A. M. Duliege, J. L. Excler, C. Hioe, J. Kahn, M. J. McElrath, S. Sharpe, F. Sinangil, K. Steimer, M. C. Walker, N. Wassef, & S. Xu. Neutralization of a clade B primary isolate by sera from human immunodeficiency virus-uninfected recipients

of candidate AIDS vaccines. *J Infect Dis* **175**:764–774, 1997. (Medline: 97240668) Notes: Comment in: J Infect Dis 1997 Nov;176(5):1410-2. Clade B primary isolate BZ167 was neutralized, using a new assay, by sera from HIV-uninfected volunteers in vaccine trials.

[Zolla-Pazner (1999a)] S. Zolla-Pazner, M. K. Gorny, & P. N. Nyambi. The implications of antigenic diversity for vaccine development. *Immunol Lett* **66**:159–64, 1999a. (Medline: 99217699).

[Zolla-Pazner (1999b)] S. Zolla-Pazner, M. K. Gorny, P. N. Nyambi, T. C. VanCott, & A. Nadas. Immunotyping of human immunodeficiency virus type 1 (HIV): an approach to immunologic classification of HIV. *J Virol* **73**:4042–51, 1999b. (Medline: 99214343) Notes: 21 human anti-V3 MAbs were studied with respect to cross-clade reactivity and immunological relationship to other human anti-V3 MAbs. Broad cross-reactivities were observed, and V3 peptides were grouped into immunotypes that contained peptides from several clades.

[Zolla-Pazner (1995)] S. Zolla-Pazner, J. O'Leary, S. Burda, M. K. Gorny, M. Kim, J. Mascola, & F. McCutchan. Serotyping of primary human immunodeficiency virus type 1 isolates from diverse geographic locations by flow cytometry. *J Virol* **69**:3807–3815, 1995. (Medline: 95264474) Notes: A set of 13 human MAbs to a variety of epitopes were tested against a panel of primary isolates of HIV-1, representing different genetic clades. The V3 loop tended to be B clade restricted, and a single gp120 C-terminus binding antibody was clade specific. Two other gp120 C-terminus binding antibodies were group specific.

[Zolla-Pazner & Sharpe(1995)] S. Zolla-Pazner & S. Sharpe. A resting cell assay for improved detection of antibody-mediated neutralization of HIV type 1 primary isolates. *AIDS Res Hum Retroviruses* **11**:1449–1458, 1995. (Medline: 96288443).

[Zvi (1997)] A. Zvi, D. J. Feigelson, Y. Hayek, & J. Anglister. Conformation of the principal neutralizing determinant of human immunodeficiency virus type 1 in complex with an anti-gp120 virus neutralizing antibody studied by two-dimensional nuclear magnetic resonance difference spectroscopy. *Biochemistry* **36**:8619–27, 1997. (Medline: 97361973).

[Zvi (1995a)] A. Zvi, I. Kustanovich, D. Feigelson, R. Levy, M. Eisenstein, S. Matsushita, P. Richalet-Secordel, M. H. Regenmortel, & J. Anglister. NMR mapping of the antigenic determinant recognized by an anti-gp120, human immunodeficiency virus neutralizing antibody. *Eur J Biochem* **229**:178–187, 1995a. (Medline: 95262664).

[Zvi (1995b)] A. Zvi, I. Kustanovich, Y. Hayek, S. Matsushita, & J. Anglister. The principal neutralizing determinant of HIV-1 located in V3 of gp120 forms a 12-residue loop by internal hydrophobic interactions. *FEBS Lett* **368**:267–270, 1995b. (Medline: 95354850).

[Zvi (2000)] A. Zvi, V. Tugarinov, G. A. Faiman, A. Horovitz, & J. Anglister. A model of a gp120 V3 peptide in complex with an HIV-neutralizing antibody based on NMR and mutant cycle-derived constraints. *Eur J Biochem* **267**:767–79, 2000. (Medline: 20117685).