

REFERENCES

1. UNAIDS/WHO. 2004. AIDS Epidemic Update: July. (<http://www.unaids.org>).
2. Phanuphak, P., C. Lochareernkul, W. Panmuong, and H. Wilde. 1985. A report of three cases of AIDS in Thailand. *Asian Pac J Allergy Immunol* 3:195-199.
3. Limsuwan, Y., S. Kanapa, and Y. Siristonapun. 1989. Acquired immune deficiency syndrome in Thailand, a reported of two cases. *Journal of the Medical Association of Thailand*. 69:164-169.
4. Uneklabh, C., T. Phutiprawan, and T. Uneklabh. 1988. Prevalence of HIV infection among Thai drug dependents. (abstract 5524) Paper presented at the *Fourth International Conference on AIDS, Stockholm, Sweden*.
5. Weniger, B. G., K. Limpakarnjanarat, K. Ungchusak, S. Thanprasertsuk, K. Choopanya, S. Vanichseni, T. Uneklabh, P. Thongcharoen, and C. Wasi. 1991. The epidemiology of HIV infection and AIDS in Thailand. *Aids* 5:S71-85.
6. Thai Working Group on HIV/AIDS Projection. 2001. Projections for HIV/AIDS in Thailand: 2000-2020. *Bangkok, Thailand :AIDS Division, Department of Communicable Disease Control, Ministry of Public Health, Thailand*.
7. Voyles, B. A. 2002. The Biology of viruses.154-155.
8. Mansky, L. M., and H. M. Temin. 1995. Lower in vivo mutation rate of human immunodeficiency virus type 1 than that predicted from the fidelity of purified reverse transcriptase. *J Virol* 69:5087-5094.

9. Hu, W. S., and H. M. Temin. 1990. Genetic consequences of packaging two RNA genomes in one retroviral particle: pseudodiploidy and high rate of genetic recombination. *Proc Natl Acad Sci U S A* 87:1556-1560.
10. McCutchan, F. E. 2000. Understanding the genetic diversity of HIV-1. *Aids* 14:S31-44.
11. Peeters, M., and P. M. Sharp. 2000. Genetic diversity of HIV-1: the moving target. *Aids* 14:S129-140.
12. Los Alamos National Laboratory. 2005. HIV and SIV Nomenclature.
13. Robertson, D. L., J. P. Anderson, J. A. Bradac, J. K. Carr, B. Foley, R. K. Funkhouser, F. Gao, B. H. Hahn, M. L. Kalish, C. Kuiken, G. H. Learn, T. Leitner, F. McCutchan, S. Osmanov, M. Peeters, D. Pieniazek, M. Salminen, P. M. Sharp, S. Wolinsky, and B. Korber. 2000. HIV-1 nomenclature proposal. *Science* 288:55-56.
14. Piyasirisilp, S., F. E. McCutchan, J. K. Carr, E. Sanders-Buell, W. Liu, J. Chen, R. Wagner, H. Wolf, Y. Shao, S. Lai, C. Beyrer, and X. F. Yu. 2000. A recent outbreak of human immunodeficiency virus type 1 infection in southern China was initiated by two highly homogeneous, geographically separated strains, circulating recombinant form AE and a novel BC recombinant. *J Virol* 74:11286-11295.
15. Yu, X. F., J. Chen, Y. Shao, C. Beyrer, B. Liu, Z. Wang, W. Liu, J. Yang, S. Liang, R. P. Viscidi, J. Gu, G. Gurri-Glass, and S. Lai. 1999. Emerging HIV infections with distinct subtypes of HIV-1 infection among injection drug users from geographically separate locations in Guangxi Province, China. *J Acquir Immune Defic Syndr* 22:180-188.

16. McCutchan, F., Carr JK, Tovanabutra S, Yu XF, Beyrer C, Birx DL. 2002. HIV-1 and drug trafficking: viral strains illuminate networks and provide focus for interventions. In: Effects of drug use and high-risk behavior on HIV transmission across national borders. . *In the XIV International AIDS Conference. NIDA Satellite sessions* Barcelona, Spain, 7-12 July 2002.
17. Delwart, E. L., B. Herring, A. G. Rodrigo, and J. I. Mullins. 1995. Genetic subtyping of human immunodeficiency virus using a heteroduplex mobility assay. *PCR Methods Appl* 4:S202-216.
18. Delwart, E. L., E. G. Shpaer, J. Louwagie, F. E. McCutchan, M. Grez, H. Rubsamen-Waigmann, J. I. Mullins, L. Heyndrickx, W. Janssens, L. Zekeng, R. Musonda, S. Anagonou, G. Van der Auwera, S. Coppens, K. Vereecken, K. De Witte, R. Van Rampelbergh, M. Kahindo, L. Morison, J. K. Carr, J. Albert, M. Essex, J. Goudsmit, B. Asjo, M. Salminen, A. Buve, and G. van Der Groen. 1993. Genetic relationships determined by a DNA heteroduplex mobility assay: analysis of HIV-1 env genes. Simplified strategy for detection of recombinant human immunodeficiency virus type 1 group M isolates by gag/env heteroduplex mobility assay. Study Group on Heterogeneity of HIV Epidemics in African Cities. *Science* 262:1257-1261.
19. Heyndrickx, L., W. Janssens, L. Zekeng, R. Musonda, S. Anagonou, G. Van der Auwera, S. Coppens, K. Vereecken, K. De Witte, R. Van Rampelbergh, M. Kahindo, L. Morison, F. E. McCutchan, J. K. Carr, J. Albert, M. Essex, J. Goudsmit, B. Asjo, M. Salminen, A. Buve, and G. van Der Groen. 2000. Simplified strategy for detection of recombinant human immunodeficiency virus type 1 group M isolates by gag/env heteroduplex mobility assay. Study

- Group on Heterogeneity of HIV Epidemics in African Cities. *J Virol* 74:363-370.
20. Bredell, H., G. Hunt, B. Morgan, C. T. Tiemessen, D. J. Martin, and L. Morris. 2000. Identification of HIV type 1 intersubtype recombinants in South Africa using env and gag heteroduplex mobility assays. *AIDS Res Hum Retroviruses* 16:493-497.
21. Tatt, I. D., K. L. Barlow, and J. P. Clewley. 2000. A gag gene heteroduplex mobility assay for subtyping HIV-1. *J Virol Methods* 87:41-51.
22. Hoelscher, M., S. Hanker, F. Barin, R. Cheingsong-Popov, U. Dietrich, B. Jordan-Harder, D. Olaleye, E. Nagele, A. Markuzzi, D. Mwakagile, F. Minja, J. Weber, L. Gurtler, and F. Von Sonnenburg. 1998. HIV type 1 V3 serotyping of Tanzanian samples: probable reasons for mismatching with genetic subtyping. *AIDS Res Hum Retroviruses* 14:139-149.
23. Gaywee, J., A. W. Artenstein, T. C. VanCott, R. Trichavaroj, A. Sukchamnong, P. Amlee, M. de Souza, F. E. McCutchan, J. K. Carr, L. E. Markowitz, R. Michael, and S. Nittayaphan. 1996. Correlation of genetic and serologic approaches to HIV-1 subtyping in Thailand. *J Acquir Immune Defic Syndr Hum Retrovirol* 13:392-396.
24. Watanaveeradej, V., de Souza, M., Nitayaphan, S., Benenson, M. W., Sirisopana, N., Renzullo, P. O., Brown, A. E., McNeil, J. G., Birx, D. L., McCutchan, F. E., and Carr, J. K. 2004. Molecular epidemiology of HIV-1 in a vaccine candidate cohort in Thailand.: In preparation.
25. Hoelscher, M., W. E. Dowling, E. Sanders-Buell, J. K. Carr, M. E. Harris, A. Thomschke, M. L. Robb, D. L. Birx, and F. E. McCutchan. 2002. Detection of

- HIV-1 subtypes, recombinants, and dual infections in east Africa by a multi-region hybridization assay. *Aids* 16:2055-2064.
26. Kijak G., T. S., Watanaveeradej V., Sanders-Buell E., Arroyo M., Moqueet N., De Souza M., Khamboonruang C., Amnajsirisuk S., Robb M., Bix D., McCutchan F. . 2005. High-throughput HIV-1 genotyping in the era of recombination: a second-generation multi-region hybridization assay for Southeast Asia. *The 3rd IAS Conference on HIV Pathogenesis and Treatment*.
 27. Salminen, M. O., C. Koch, E. Sanders-Buell, P. K. Ehrenberg, N. L. Michael, J. K. Carr, D. S. Burke, and F. E. McCutchan. 1995. Recovery of virtually full-length HIV-1 provirus of diverse subtypes from primary virus cultures using the polymerase chain reaction. *Virology* 213:80-86.
 28. Chan, D. C., Fass, D., Berger, J.M., and Kim, P.S. 1997. Core Structure of gp41 from the HIV envelop glycoprotein. *Cell* 89:263-273.
 29. Weissenhorn, W., Dessen, A., Harrison, S.C., Skehel, J.J., and Wiley, D.C. 1997. Atomic structure of the ectodomain from HIV-1 gp41. *Nature* 387:426-430.
 30. Hahn, B. H., G. M. Shaw, S. K. Arya, M. Popovic, R. C. Gallo, and F. Wong-Staal. 1984. Molecular cloning and characterization of the HTLV-III virus associated with AIDS. *Nature* 312:166-169.
 31. Ratner, L., W. Haseltine, R. Patarca, K. J. Livak, B. Starcich, S. F. Josephs, E. R. Doran, J. A. Rafalski, E. A. Whitehorn, K. Baumeister, et al., M. A. Muesing, D. H. Smith, C. D. Cabradilla, C. V. Benton, L. A. Lasky, and D. J. Capon. 1985. Complete nucleotide sequence of the AIDS virus, HTLV-III

Nucleic acid structure and expression of the human AIDS/lymphadenopathy retrovirus. *Nature* 313:277-284.

32. Muesing, M. A., D. H. Smith, C. D. Cabradilla, C. V. Benton, L. A. Lasky, and D. J. Capon. 1985. Nucleic acid structure and expression of the human AIDS/lymphadenopathy retrovirus. *Nature* 313:450-458.
33. Quinn, T. C. 1994. Population migration and the spread of types 1 and 2 human immunodeficiency viruses. *Proc Natl Acad Sci U S A* 91:2407-2414.
34. De Cock KM, A. G., Ekpini E, Sibailly T, Kouadio J, Maran M, Brattegaard K, Vetter KM, Doorly R, and Gayle HD. 1993. Epidemiology and transmission of HIV-2 : why there is no HIV-2 pandemic. *JAMA* 270:2083-2086.
35. DM., M. 1993. Infection with the human immunodeficiency virus type 2. *Ann Intern Med* 118:211-218.
36. McCutchan, F. 1999. Global diversity in HIV. *The evolution of HIV (Crandall KA, ed.):*41-101.
37. Jetzt, A. E., H. Yu, G. J. Klarmann, Y. Ron, B. D. Preston, and J. P. Dougherty. 2000. High rate of recombination throughout the human immunodeficiency virus type 1 genome. *J Virol* 74:1234-1240.
38. Saag, M. S., B. H. Hahn, J. Gibbons, Y. Li, E. S. Parks, W. P. Parks, G. M. Shaw, J. M. Coffin, A. Meyerhans, R. Cheynier, J. Albert, M. Seth, S. Kwok, J. Sninsky, L. Morfeldt-Manson, B. Asjo, S. Wain-Hobson, M. E. Taylor, R. R. Redfield, P. D. Markham, S. Z. Salahuddin, F. Wong-Staal, and R. C. Gallo. 1988. Extensive variation of human immunodeficiency virus type-1 in vivo Genetic variation in AIDS viruses. Temporal fluctuations in HIV quasispecies in vivo are not reflected by sequential HIV isolations. Genetic variation in

HTLV-III/LAV over time in patients with AIDS or at risk for AIDS. The fastest genome evolution ever described: HIV variation in situ. *Nature* 334:440-444.

39. Coffin, J. M., A. Meyerhans, R. Cheynier, J. Albert, M. Seth, S. Kwok, J. Sninsky, L. Morfeldt-Manson, B. Asjo, and S. Wain-Hobson. 1986. Genetic variation in AIDS viruses. Temporal fluctuations in HIV quasispecies in vivo are not reflected by sequential HIV isolations. *Cell* 46:1-4.
40. Meyerhans, A., R. Cheynier, J. Albert, M. Seth, S. Kwok, J. Sninsky, L. Morfeldt-Manson, B. Asjo, and S. Wain-Hobson. 1989. Temporal fluctuations in HIV quasispecies in vivo are not reflected by sequential HIV isolations. *Cell* 58:901-910.
41. Hahn, B. H., G. M. Shaw, M. E. Taylor, R. R. Redfield, P. D. Markham, S. Z. Salahuddin, F. Wong-Staal, R. C. Gallo, E. S. Parks, and W. P. Parks. 1986. Genetic variation in HTLV-III/LAV over time in patients with AIDS or at risk for AIDS. *Science* 232:1548-1553.
42. Wain-Hobson, S. 1993. The fastest genome evolution ever described: HIV variation in situ. *Curr Opin Genet Dev* 3:878-883.
43. Robertson D L, G. F. 1998. Recombination of HIV Genomes. *Human Immunodeficiency Viruses. Biology, Immunology, and Molecular Biology*:197-202.
44. Artenstein, A. W., T. C. VanCott, J. R. Mascola, J. K. Carr, P. A. Hegerich, J. Gaywee, E. Sanders-Buell, M. L. Robb, D. E. Dayhoff, S. Thitivichianlert, and et al. 1995. Dual infection with human immunodeficiency virus type 1 of distinct envelope subtypes in humans. *J Infect Dis* 171:805-810.

45. Diaz, R. S., E. C. Sabino, A. Mayer, J. W. Mosley, and M. P. Busch. 1995. Dual human immunodeficiency virus type 1 infection and recombination in a dually exposed transfusion recipient. The Transfusion Safety Study Group. *J Virol* 69:3273-3281.
46. Kampinga, G. A., A. Simonon, P. Van de Perre, E. Karita, P. Msellati, and J. Goudsmit. 1997. Primary infections with HIV-1 of women and their offspring in Rwanda: findings of heterogeneity at seroconversion, coinfection, and recombinants of HIV-1 subtypes A and C. *Virology* 227:63-76.
47. Zhu, T., N. Wang, A. Carr, S. Wolinsky, and D. D. Ho. 1995. Evidence for coinfection by multiple strains of human immunodeficiency virus type 1 subtype B in an acute seroconverter. *J Virol* 69:1324-1327.
48. Salminen, M. O., J. K. Carr, D. L. Robertson, P. Hegerich, D. Gotte, C. Koch, E. Sanders-Buell, F. Gao, P. M. Sharp, B. H. Hahn, D. S. Burke, and F. E. McCutchan. 1997. Evolution and probable transmission of intersubtype recombinant human immunodeficiency virus type 1 in a Zambian couple. *J Virol* 71:2647-2655.
49. Carr, J. K., M. O. Salminen, C. Koch, D. Gotte, A. W. Artenstein, P. A. Hegerich, D. St Louis, D. S. Burke, and F. E. McCutchan. 1996. Full-length sequence and mosaic structure of a human immunodeficiency virus type 1 isolate from Thailand. *J Virol* 70:5935-5943.
50. Gao, F., D. L. Robertson, S. G. Morrison, H. Hui, S. Craig, J. Decker, P. N. Fultz, M. Girard, G. M. Shaw, B. H. Hahn, and P. M. Sharp. 1996. The heterosexual human immunodeficiency virus type 1 epidemic in Thailand is

caused by an intersubtype (A/E) recombinant of African origin. *J Virol* 70:7013-7029.

51. Murphy, E., B. Korber, M. C. Georges-Courbot, B. You, A. Pinter, D. Cook, M. P. Kieny, A. Georges, C. Mathiot, F. Barre-Sinoussi, et al., I. N. Koulinska, T. Ndung'u, D. Mwakagile, G. Msamanga, C. Kagoma, W. Fawzi, M. Essex, and B. Renjifo. 1993. Diversity of V3 region sequences of human immunodeficiency viruses type 1 from the central African Republic. A new human immunodeficiency virus type 1 circulating recombinant form from Tanzania. *AIDS Res Hum Retroviruses* 9:997-1006.
52. Su, L., M. Graf, Y. Zhang, H. von Briesen, H. Xing, J. Kostler, H. Melzl, H. Wolf, Y. Shao, and R. Wagner. 2000. Characterization of a virtually full-length human immunodeficiency virus type 1 genome of a prevalent intersubtype (C/B') recombinant strain in China. *J Virol* 74:11367-11376.
53. Koulinska, I. N., T. Ndung'u, D. Mwakagile, G. Msamanga, C. Kagoma, W. Fawzi, M. Essex, and B. Renjifo. 2001. A new human immunodeficiency virus type 1 circulating recombinant form from Tanzania. *AIDS Res Hum Retroviruses* 17:423-431.
54. Tovanabutra, S., V. Watanaveeradej, K. Viputtikul, M. De Souza, M. H. Razak, V. Suriyanon, J. Jittiwutikarn, S. Sriplienchan, S. Nitayaphan, M. W. Benenson, N. Sirisopana, P. O. Renzullo, A. E. Brown, M. L. Robb, C. Beyrer, D. D. Celentano, J. G. McNeil, D. L. Birx, J. K. Carr, and F. E. McCutchan. 2003. A new circulating recombinant form, CRF15_01B, reinforces the linkage between IDU and heterosexual epidemics in Thailand. *AIDS Res Hum Retroviruses* 19:561-567.

55. UNAIDS/WHO. 2005. AIDS Epidemic Update. November 2005. (<http://www.unaids.org>).
56. Zekeng, L., L. Gurtler, E. Afane Ze, A. Sam-Abbenyi, G. Mbouni-Essomba, E. Mpoudi-Ngolle, M. Monny-Lobe, J. B. Tapka, and L. Kaptue. 1994. Prevalence of HIV-1 subtype O infection in Cameroon: preliminary results. *Aids* 8:1626-1628.
57. Mauciere, P., I. Loussert-Ajaka, F. Damond, P. Fagot, S. Souquieres, M. Monny Lobe, F. X. Mbopi Keou, F. Barre-Sinoussi, S. Saragosti, F. Brun-Vezinet, and F. Simon. 1997. Serological and virological characterization of HIV-1 group O infection in Cameroon. *Aids* 11:445-453.
58. Peeters, M., A. Gueye, S. Mboup, F. Bibollet-Ruche, E. Ekaza, C. Mulanga, R. Ouedrago, R. Gandji, P. Mpele, G. Dibanga, B. Koumare, M. Saidou, E. Esu-Williams, J. P. Lombart, W. Badombena, N. Luo, M. Vanden Haesevelde, and E. Delaporte. 1997. Geographical distribution of HIV-1 group O viruses in Africa. *Aids* 11:493-498.
59. Ayouba, A., S. Souquieres, B. Njinku, P. M. Martin, M. C. Muller-Trutwin, P. Roques, F. Barre-Sinoussi, P. Mauciere, F. Simon, and E. Nerrienet. 2000. HIV-1 group N among HIV-1-seropositive individuals in Cameroon. *Aids* 14:2623-2625.
60. Simon, F., P. Mauciere, P. Roques, I. Loussert-Ajaka, M. C. Muller-Trutwin, S. Saragosti, M. C. Georges-Courbot, F. Barre-Sinoussi, and F. Brun-Vezinet. 1998. Identification of a new human immunodeficiency virus type 1 distinct from group M and group O. *Nat Med* 4:1032-1037.

61. Bodelle, P., A. Vallari, R. Coffey, C. P. McArthur, M. Beyeme, S. G. Devare, G. Schochetman, and C. A. Brennan. 2004. Identification and genomic sequence of an HIV type 1 group N isolate from Cameroon. *AIDS Res Hum Retroviruses* 20:902-908.
62. Los Alamos National Laboratory. 2004. HIV and SIV Nomenclature.
63. Essex, M. 1999. Human immunodeficiency viruses in the developing world. *Adv Virus Res* 53:71-88.
64. Tovanabutra, S., C. Beyrer, S. Sakkhachornphop, M. H. Razak, G. L. Ramos, T. Vongchak, K. Rungruengthanakit, P. Saokhieo, K. Tejafong, B. Kim, M. De Souza, M. L. Robb, D. L. Bix, J. Jittiwutikarn, V. Suriyanon, D. D. Celentano, and F. E. McCutchan. 2004. The changing molecular epidemiology of HIV type 1 among northern Thai drug users, 1999 to 2002. *AIDS Res Hum Retroviruses* 20:465-475.
65. Mandal, D., S. Jana, S. K. Bhattacharya, and S. Chakrabarti. 2002. HIV type 1 subtypes circulating in eastern and northeastern regions of India. *AIDS Res Hum Retroviruses* 18:1219-1227.
66. Sahni, A. K., V. V. Prasad, and P. Seth. 2002. Genomic diversity of human immunodeficiency virus type-1 in India. *Int J STD AIDS* 13:115-118.
67. Chakrabarti, S., S. Panda, A. Chatterjee, S. Sarkar, B. Manna, N. B. Singh, T. N. Naik, R. Detels, and S. K. Bhattacharya. 2000. HIV-1 subtypes in injecting drug users & their non-injecting wives in Manipur, India. *Indian J Med Res* 111:189-194.
68. Tovanabutra, S., Razak, M. H., Rungruengthanakit, K., Chanbancherd, P., de Souza, M., Jittiwutikarn, J., Suriyanon, V., Celentano, D. D., and McCutchan,

- F. E. 2000. HIV-1 subtype E is predominant among drug users in northern Thailand. *In the XIII International AIDS Conference* Durban, South Africa, 9-14 July 2000.
69. Kalish, M. L., A. Baldwin, S. Raktham, C. Wasi, C. C. Luo, G. Schochetman, T. D. Mastro, N. Young, S. Vanichseni, H. Rubsamen-Waigmann, and et al. 1995. The evolving molecular epidemiology of HIV-1 envelope subtypes in injecting drug users in Bangkok, Thailand: implications for HIV vaccine trials. *Aids* 9:851-857.
70. Kasper, P., N. Chalwatzis, G. Duraisamy, B. Ofenloch-Hahnle, and E. Faatz. 1997. HIV type 1 gag subtype A is predominant in Malaysian intravenous drug users. *AIDS Res Hum Retroviruses* 13:1251-1253.
71. Lasky, M., J. L. Perret, M. Peeters, F. Bibollet-Ruche, F. Liegeois, D. Patrel, S. Molinier, C. Gras, and E. Delaporte. 1997. Presence of multiple non-B subtypes and divergent subtype B strains of HIV-1 in individuals infected after overseas deployment. *Aids* 11:43-51.
72. Artenstein, A. W., J. Coppola, A. E. Brown, J. K. Carr, E. Sanders-Buell, E. Galbarini, J. R. Mascola, T. C. VanCott, P. Schonbrood, F. E. McCutchan, and et al. 1995. Multiple introductions of HIV-1 subtype E into the western hemisphere. *Lancet* 346:1197-1198.
73. Loue, S., K. Bounlu, V. Pholsena, and T. D. Mastro. 1998. HIV seroprevalence and HIV-1 subtype E among pregnant women in Vientiane, Laos. *Aids* 12:1403.
74. Htoon, M. T., H. H. Lwin, K. O. San, E. Zan, M. Thwe, S. Kusagawa, H. Sato, S. Watanabe, K. Nohtomi, K. Kato, T. Shino, K. Y. Oo, S. Lwin, R. Mra, B.

- Kywe, S. Yamazaki, and Y. Takebe. 1994. HIV/AIDS in Myanmar. Genetic and serologic characterization of HIV type 1 prevailing in Myanmar (Burma). *Aids* 8 Suppl 2:S105-109.
75. Kusagawa, S., H. Sato, S. Watanabe, K. Nohtomi, K. Kato, T. Shino, M. Thwe, K. Y. Oo, S. Lwin, R. Mra, B. Kywe, S. Yamazaki, and Y. Takebe. 1998. Genetic and serologic characterization of HIV type 1 prevailing in Myanmar (Burma). *AIDS Res Hum Retroviruses* 14:1379-1385.
76. UNAIDS. 2001. United Nations response to HIV/AIDS in Myanmar: the United Nations joint plan of action 2001-2002. Geneva, Switzerland: UNAIDS.
77. UNAIDS/WHO. 2001. AIDS Epidemic Update December 2001. Geneva: UNAIDS/WHO.
78. Motomura, K., S. Kusagawa, K. Kato, K. Nohtomi, H. H. Lwin, K. M. Tun, M. Thwe, K. Y. Oo, S. Lwin, O. Kyaw, M. Zaw, Y. Nagai, and Y. Takebe. 2000. Emergence of new forms of human immunodeficiency virus type 1 intersubtype recombinants in central Myanmar. *AIDS Res Hum Retroviruses* 16:1831-1843.
79. Shao, Y., Su, L., Sun, X., Sun, H., Xing, H., Pan, P.L., Wolf, H., and Shen, J. 1998. Molecular Epidemiology of HIV infection in China. In the XII International AIDS Conference, Geneva, Switzerland, 28 June-3 July 1998.
80. Zheng, X., C. Tian, K. H. Choi, J. Zhang, H. Cheng, X. Yang, D. Li, J. Lin, S. Qu, X. Sun, and et al. 1994. Injecting drug use and HIV infection in southwest China. *Aids* 8:1141-1147.
81. Weniger, B. G., Y. Takebe, C. Y. Ou, and S. Yamazaki. 1994. The molecular epidemiology of HIV in Asia. *Aids* 8:S13-28.

82. Luo, C. C., C. Tian, D. J. Hu, M. Kai, T. Dondero, and X. Zheng. 1995. HIV-1 subtype C in China. *Lancet* 345:1051-1052.
83. Yang, R., X. Xia, S. Kusagawa, C. Zhang, K. Ben, and Y. Takebe. 2002. Ongoing generation of multiple forms of HIV-1 intersubtype recombinants in the Yunnan Province of China. *Aids* 16:1401-1407.
84. Li, X. J., S. Kusagawa, X. Xia, C. Yang, Q. Wang, Y. Yokota, Y. Hoshina, T. Onogi, K. Nohtomi, Y. Imamura, T. Shiino, R. Yang, N. Yamamoto, K. Ben, and Y. Takebe. 2005. Molecular epidemiology of the heterosexual HIV-1 transmission in Kunming, Yunnan Province of China suggests origin from the local IDU epidemic. *AIDS Res Hum Retroviruses* 21:977-980.
85. McCutchan, F. E., P. A. Hegerich, T. P. Brennan, P. Phanuphak, P. Singharaj, A. Jugsudee, P. W. Berman, A. M. Gray, A. K. Fowler, and D. S. Burke. 1992. Genetic variants of HIV-1 in Thailand. *AIDS Res Hum Retroviruses* 8:1887-1895.
86. Ou, C. Y., Y. Takebe, B. G. Weniger, C. C. Luo, M. L. Kalish, W. Auwanit, S. Yamazaki, H. D. Gayle, N. L. Young, and G. Schochetman. 1993. Independent introduction of two major HIV-1 genotypes into distinct high-risk populations in Thailand. *Lancet* 341:1171-1174.
87. Kuiken, C. L., Foley, B., Freed, E., Hahn, B., Marx, P.A., McCutchan, F., Mellors, J.W., Wolinsky, S., and Kober, B.,. 2002. HIV Sequence Compendium. *editors. Published by Theoretical Biology and Biophysics Group, Los Alamos National Laboratory, Los Alamos, NM, LA-UR 03-3564.*
88. Louwagie, J., F. E. McCutchan, M. Peeters, T. P. Brennan, E. Sanders-Buell, G. A. Eddy, G. van der Groen, K. Fransen, G. M. Gershy-Damet, R. Deleys,

and et al. 1993. Phylogenetic analysis of gag genes from 70 international HIV-1 isolates provides evidence for multiple genotypes. *Aids* 7:769-780.

89. Mason, C. J., S. Kitsiripornchai, L. E. Markowitz, P. Chanbancherd, T. Supamongse, A. Jugsudee, N. Sirisopana, C. Chuenchitra, K. Torugsa, T. C. VanCott, R. A. Michael, and S. Nitayaphan. 1998. Nationwide surveillance of HIV-1 prevalence and subtype in young Thai men. *J Acquir Immune Defic Syndr Hum Retrovirol* 19:165-173.
90. Entz, A. T., V. P. Ruffolo, V. Chinveschakitvanich, V. Soskolne, and G. J. van Griensven. 2000. HIV-1 prevalence, HIV-1 subtypes and risk factors among fishermen in the Gulf of Thailand and the Andaman Sea. *Aids* 14:1027-1034.
91. Limpakarnjanarat, K., T. D. Mastro, S. Saisorn, W. Uthaivoravit, J. Kaewkungwal, S. Korattana, N. L. Young, S. A. Morse, D. S. Schmid, B. G. Weniger, and P. Nieburg. 1999. HIV-1 and other sexually transmitted infections in a cohort of female sex workers in Chiang Rai, Thailand. *Sex Transm Infect* 75:30-35.
92. Beyrer, C., A. Artenstein, P. Kunawararak, T. VanCott, C. Mason, K. Rungreunthanakit, P. Hegerich, K. E. Nelson, C. Khamboonruang, and C. Natpratan. 1997. The molecular epidemiology of HIV-1 among male sex workers in northern Thailand. *J Acquir Immune Defic Syndr Hum Retrovirol* 15:304-307.
93. Subbarao, S., K. Limpakarnjanarat, T. D. Mastro, J. Bhumisawasdi, P. Warachit, C. Jayavas, N. L. Young, C. C. Luo, N. Shaffer, M. L. Kalish, and G. Schochetman. 1998. HIV type 1 in Thailand, 1994-1995: persistence of two subtypes with low genetic diversity. *AIDS Res Hum Retroviruses* 14:319-327.

94. Tovananubutra, S., V. Robison, J. Wongtrakul, S. Sennum, V. Suriyanon, D. Kingkeow, S. Kawichai, P. Tanan, A. Duerr, and K. E. Nelson. 2002. Male viral load and heterosexual transmission of HIV-1 subtype E in northern Thailand. *J Acquir Immune Defic Syndr* 29:275-283.
95. Kunanusont, C., H. M. Foy, J. K. Kreiss, S. Rerks-Ngarm, P. Phanuphak, S. Raktham, C. P. Pau, and N. L. Young. 1995. HIV-1 subtypes and male-to-female transmission in Thailand. *Lancet* 345:1078-1083.
96. Kitayaporn, D., S. Vanichseni, T. D. Mastro, S. Raktham, T. Vaniyapongs, D. C. Des Jarlais, C. Wasi, N. L. Young, S. Sujarita, W. L. Heyward, and J. Esparza. 1998. Infection with HIV-1 subtypes B and E in injecting drug users screened for enrollment into a prospective cohort in Bangkok, Thailand. *J Acquir Immune Defic Syndr Hum Retrovirol* 19:289-295.
97. Vongsheree, S., T. Phutiprawan, P. Sri-ngam, H. Thaisri, W. Puangtabtim, and P. Sawanpanyalert. 2002. Co-existence of HIV-1 subtypes B' and E infections among Thai injecting drug users. *Asian Pac J Allergy Immunol* 20:29-35.
98. Ou, C. Y., Y. Takebe, C. C. Luo, M. Kalish, W. Auwanit, C. Bandea, N. de la Torre, J. L. Moore, G. Schochetman, S. Yamazaki, and et al. 1992. Wide distribution of two subtypes of HIV-1 in Thailand. *AIDS Res Hum Retroviruses* 8:1471-1472.
99. Kalish, M. L., C. C. Luo, B. G. Weniger, K. Limpakarnjanarat, N. Young, C. Y. Ou, and G. Schochetman. 1994. Early HIV type 1 strains in Thailand were not responsible for the current epidemic. *AIDS Res Hum Retroviruses* 10:1573-1575.

100. Wasi, C., B. Herring, S. Raktham, S. Vanichseni, T. D. Mastro, N. L. Young, H. Rubsamen-Waigmann, H. von Briesen, M. L. Kalish, C. C. Luo, and et al. 1995. Determination of HIV-1 subtypes in injecting drug users in Bangkok, Thailand, using peptide-binding enzyme immunoassay and heteroduplex mobility assay: evidence of increasing infection with HIV-1 subtype E. *Aids* 9:843-849.
101. Tovanabutra, S., V. Polonis, M. De Souza, R. Trichavaroj, P. Chanbancherd, B. Kim, E. Sanders-Buell, S. Nitayaphan, A. Brown, M. R. Robb, D. L. Birx, F. E. McCutchan, and J. K. Carr. 2001. First CRF01_AE/B recombinant of HIV-1 is found in Thailand. *Aids* 15:1063-1065.
102. Viputtikul, K., M. de Souza, R. Trichavaroj, J. K. Carr, S. Tovanabutra, F. E. McCutchan, S. Sriplienchan, P. Buapunth, C. Chuenchitra, J. G. McNeil, D. L. Birx, A. E. Brown, and S. Nitayaphan. 2002. Heterosexually acquired CRF01_AE/B recombinant HIV type 1 found in Thailand. *AIDS Res Hum Retroviruses* 18:1235-1237.
103. Swanson, P., S. G. Devare, and J. Hackett, Jr. 2003. Full-length sequence analysis of HIV-1 isolate CM237: a CRF01_AE/B intersubtype recombinant from Thailand. *AIDS Res Hum Retroviruses* 19:707-712.
104. Watanaveeradej, V., M. S. DeSouza, M. W. Benenson, N. Sirisopana, S. Nitayaphan, P. Chanbancherd, A. E. Brown, E. Sanders-Buell, D. L. Birx, F. E. McCutchan, and J. K. Carr. 2003. Subtype C/CRF01_AE recombinant HIV-1 found in Thailand. *Aids* 17:2138-2140.

105. Chen, M. Y., W. K. Wang, M. C. Lee, S. J. Twu, S. I. Wu, and C. N. Lee. 2002. Rapid detection of human immunodeficiency virus type 1 subtype E infection by PCR. *J Clin Microbiol* 40:3805-3809.
106. Yagy, F., Y. Ikeda, K. Ariyoshi, W. Sugiura, S. A. Wongkhomthong, M. Masuda, and H. Ushijima. 2002. Differentiation of subtypes B and E of human immunodeficiency virus type 1 by polymerase chain reaction using novel env gene primers. *J Virol Methods* 101:11-20.
107. St Louis, D. C., D. Gotte, E. Sanders-Buell, D. W. Ritchey, M. O. Salminen, J. K. Carr, and F. E. McCutchan. 1998. Infectious molecular clones with the nonhomologous dimer initiation sequences found in different subtypes of human immunodeficiency virus type 1 can recombine and initiate a spreading infection in vitro. *J Virol* 72:3991-3998.
108. van Harmelen, J., E. van der Ryst, R. Wood, S. F. Lyons, and C. Williamson. 1999. Restriction fragment length polymorphism analysis for rapid gag subtype determination of human immunodeficiency virus type 1 in South Africa. *J Virol Methods* 78:51-59.
109. Hierholzer, J., S. Montano, M. Hoelscher, M. Negrete, M. Hierholzer, M. M. Avila, M. G. Carrillo, J. C. Russi, J. Vinales, A. Alava, M. E. Acosta, A. Gianella, R. Andrade, J. L. Sanchez, G. Carrion, K. Russell, M. Robb, D. Birx, F. McCutchan, and J. K. Carr. 2002. Molecular Epidemiology of HIV Type 1 in Ecuador, Peru, Bolivia, Uruguay, and Argentina. *AIDS Res Hum Retroviruses* 18:1339-1350.
110. Kijak, G. H., E. Sanders-Buell, N. D. Wolfe, E. Mpoudi-Ngole, B. Kim, B. Brown, M. L. Robb, D. L. Birx, D. S. Burke, J. K. Carr, and F. E. McCutchan.

2004. Development and application of a high-throughput HIV type 1 genotyping assay to identify CRF02_AG in West/West Central Africa. *AIDS Res Hum Retroviruses* 20:521-530.
111. Razak, M. H., J. Jittiwutikarn, V. Suriyanon, T. Vongchak, N. Srirak, C. Beyrer, S. Kawichai, S. Tovanabutra, K. Rungruengthanakit, P. Sawanpanyalert, and D. D. Celentano. 2003. HIV Prevalence and Risks Among Injection and Noninjection Drug Users in Northern Thailand: Need for Comprehensive HIV Prevention Programs. *J Acquir Immune Defic Syndr* 33:259-266.
112. Arroyo, M. A., M. Hoelscher, W. Sateren, E. Samky, L. Maboko, O. Hoffmann, G. Kijak, M. Robb, D. L. Birx, and F. E. McCutchan. 2005. HIV-1 diversity and prevalence differ between urban and rural areas in the Mbeya region of Tanzania. *Aids* 19:1517-1524.
113. Ramos, A., L. Nguyen, D. J. Hu, S. Vanichseni, K. Choopanya, N. L. Young, J. W. Tappero, T. D. Mastro, T. M. Folks, and S. Subbarao. 2003. New HIV type 1 CRF01_AE/B recombinants displaying unique distribution of breakpoints from incident infections among injecting drug users in Thailand. *AIDS Res Hum Retroviruses* 19:667-674.
114. Wei, M., Q. Guan, H. Liang, J. Chen, Z. Chen, F. Hei, Y. Feng, K. Hong, H. Huang, H. Xing, and Y. Shao. 2004. Simple subtyping assay for human immunodeficiency virus type 1 subtypes B, C, CRF01-AE, CRF07-BC, and CRF08-BC. *J Clin Microbiol* 42:4261-4267.